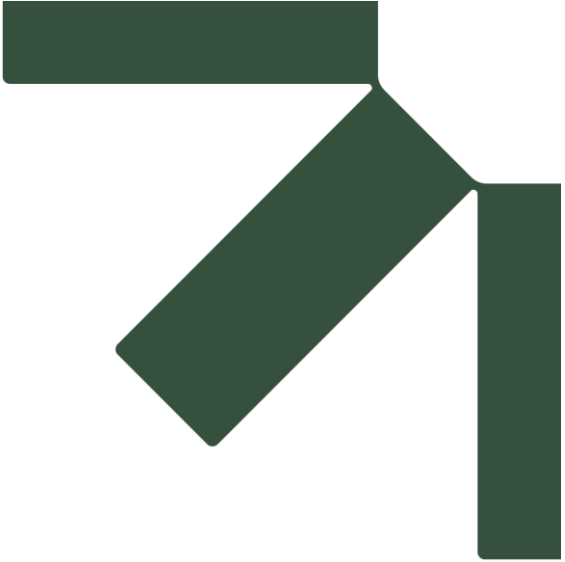




Appendix F Geotechnical Assessment

Fast-Track Approvals Act 2024 Substantive Application

Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

19 August 2026

13 January 2026

Hinuera Solar Farm

4775 State Highway 29, Matamata

GEOTECHNICAL INVESTIGATION REPORT

Harmony Energy NZ Limited #06

Job No. HAM2025-0095AB | Version 2



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EXECUTIVE SUMMARY

This report presents the results of geotechnical investigations and a geohazards assessment to support a fast track substantive/Resource Consent application.

The subject site is located on the corner of Ste Highways 27 and 29, Matamata, where it is proposed to develop an 80MW_{ac} solar farm, with associated roading infrastructure. The site is predominantly underlain by Late Pleistocene aged Alluvial deposits comprised of silt and sand.

The topography is nearly level with some low rolling hills along the eastern boundary ranging in height between RL73m and RL101m. The regional groundwater table is shallow, usually within 1 metre of the surface. A drain runs through the centre of the site to the north.

We consider that the site is suitable for the proposed level of development subject to our geohazard assessment and geotechnical recommendations summarised as follows:

- In terms of Pile driveability, we expect overall “good driving” conditions within the Silt/Sand. Test piles will be needed to assess drivability with the proposed installation plant is recommended, along with load testing of the test piles to assess the load capacity of the piles.
- The GNS Active Fault Database identifies the Kerepehi Fault running a few hundred metres east of the site in a north-west to south-east alignment. The fault is one of the most active in the region, with minor quakes occurring as recently as 2023. However previous academic studies of the Kerepehi fault predict major seismic events (>M5.0) that have the potential to cause significant damage as having a recurrence interval of >10,000 years, which is outside the building code design life that needs to be considered for a greenfield site. Therefore, the proximity of this active fault is not an impediment to the overall development.
- Due to the flat to gently sloping nature of the site, the risk of deep-seated land instability occurring is assessed to be low. Quantitative site-specific stability analysis is therefore not considered necessary for the site.
- Preliminary estimates of static settlements for typical floor loads between 10 to 150kPa are calculated to range from 25mm to 40mm (primary, over 6 months) and an additional <5mm to 35mm (secondary, over design life of 50 years). These settlements exceed building code limits and therefore, further analysis will be required once IL3 building designs (such as the switch room) have been finalised to determine appropriate foundations.
- The ULS liquefaction risk for this site is high based on the liquefaction analysis results. The panels are likely at very minor risk as the piles could simple be straightened following a major seismic event, however stiffened TC3 style foundation types will be required to support the TC3 buildings, subject to further assessment of liquefaction susceptibility at design stage once building designs are finalised.

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1.0 INTRODUCTION

CMW Geosciences (CMW) was engaged by Harmony Energy NZ Limited #06 to carry out a geotechnical investigation of a site located at 4775 State Highway 29, Matamata, where it is proposed to develop an 80MW_{AC} solar farm.

The scope of work and associated terms and conditions of our engagement were detailed in the Short Form Agreement for Consultant Engagement, dated 3 October, 2025.

2.0 SITE DESCRIPTION

2.1 Site Location

The site comprises an area of approximately 153Ha and is located along State Highways 27 and 29 south of Matamata township as shown on **Figure 1** below.

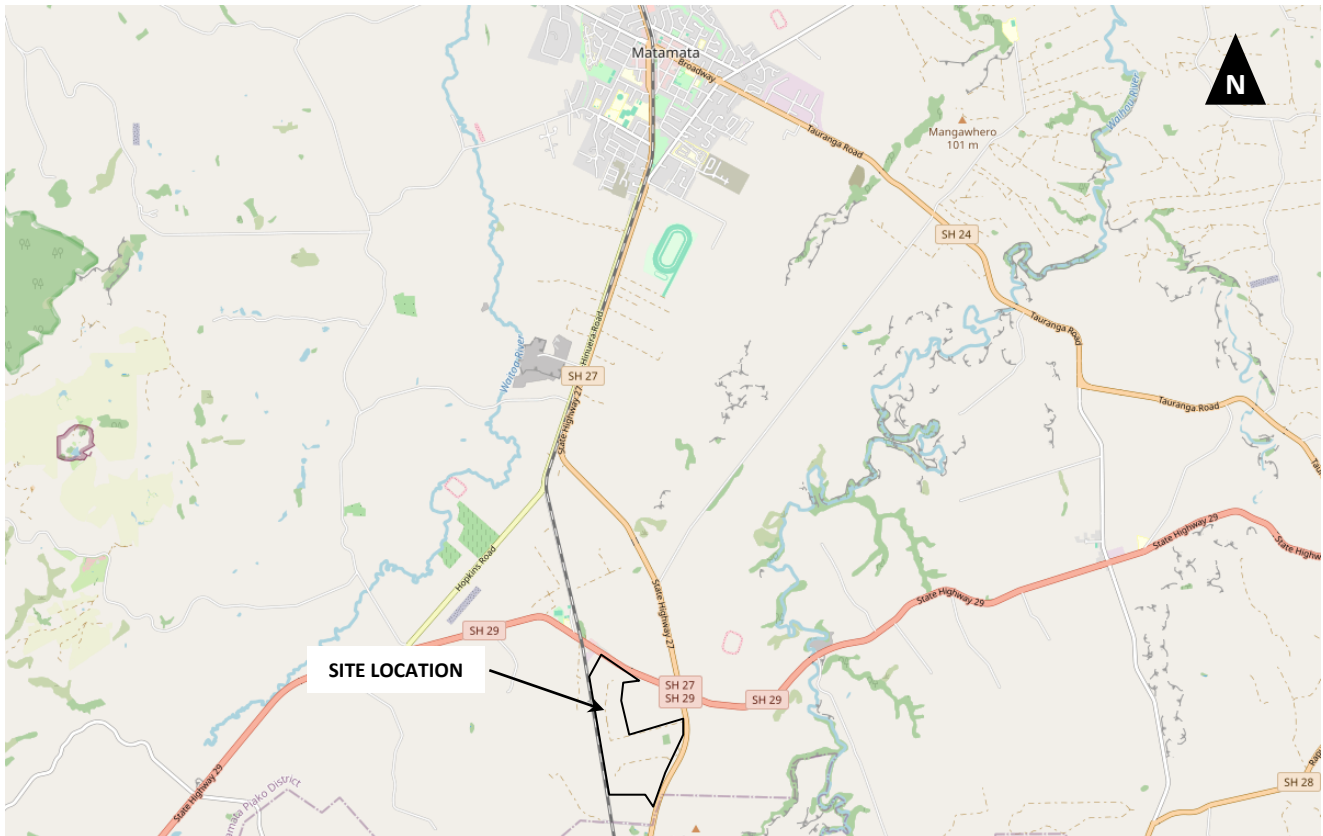


Figure 1: Site Location Plan. Reference: OpenStreetMaps

2.2 Landform

The current general landform, together with associated features located within and adjacent to the site is presented on the attached Site Plan as **Drawing 01** in **Appendix A**.

The site is situated within a near level alluvial plain which grades gently (<5 degrees) to the north, ranging between RL73m and RL101m.

The Mangawhara Stream runs through the centre of the site, flowing northward. A series of low rolling hills run inside the eastern boundary. Beyond the western boundary are a series of larger rolling hills, incised by several tributaries of the Mangawhara stream. A drain runs through the centre of the site to the north.

2.3 Land Use

The site is currently pastoral farmland split over two farms which are bound to the north by State Highway 27, to the east by State Highway 29, to the west by the Kinleith Branch Railway line, to the south by farmland. Three existing residential lots are located within site and several farm buildings are spread across the site.

3.0 PROPOSED DEVELOPMENT

The current development proposal is to construct an 80MW_{ac} solar farm, as shown on the draft scheme plan provided by Harmony Energy (**Appendix B**). The development plans show that most of the site is to be covered by solar panels connected to an existing sub-station located to the south. The proposed solar panels will be supported on pile foundations, and the panels are understood to be Importance Level 1 (IL1) structures with a 25-year design life as defined by NZS1170:2004. The inverters will be installed regularly along the arrays and a switchroom will be constructed in the southern corner of the site. The switchroom is understood to be Importance Level 3 (IL3) with 50-year design life.

The proposed panels are to be mounted on single axis tracker systems supported by steel piles with a maximum length of 4m, subject to ground conditions.

Most of the development is located across near level topography and it is therefore anticipated that only minor earthworks will be required to form access roads.

4.0 INVESTIGATION SCOPE

4.1 Field Investigation

Following a dial before you dig search, and onsite service location, the field investigation was carried out over several days in October 2025. All fieldwork was carried out under the direction of CMW Geosciences in general accordance with the NZGS specifications¹ and logged in accordance with NZGS guidance². The scope of fieldwork completed was as follows:

- Undertook a walkover survey of the site to assess the general landform and site conditions;
- Five Cone Penetrometer Tests, denoted CPT01 to CPT05, were pushed to depths of between 12.3 and 20m. Results of the CPT's, presented as traces of tip resistance (qc), friction resistance (fs) and friction ratio are presented in **Appendix C**;
- Five Test Pits, denoted TP01 to TP05, were excavated using a 12-tonne excavator to depths of between 2.5 and 3.4m below existing ground levels (target depth was 5m though they all collapsed early due to shallow groundwater). In situ shear vane tests were carried within the test pits walls where fine grained soils were encountered and Dynamic Cone (Scala) Penetrometer Probe tests (DCP) were carried out adjacent to the test pits where granular soils were encountered. Engineering logs and photographs of the test pits are also presented in **Appendix D**;

¹ NZ Geotechnical Society (2017) NZ Ground Investigation Specification, Volume 1 – Master Specification

² NZ Geotechnical Society (2005), Field Description of Soil and Rock, Guideline for the field classification and description of soil and rock for engineering purposes.

- Two Electrical Resistivity transects, denoted ERT01 and 02 were carried out in the vicinity of TP03 and TP05 respectively. Each transect comprised two 20m test runs centred on the test pit location, one oriented north/south, and one east west. Results are presented in **Appendix E**;
- Three piezometer standpipes were installed within CPT test holes, denoted P01, P02 and P03 installed in CPT01, 03 and 04 respectively. Level loggers have been installed within the piezometers and initial groundwater results are presented in Section 5.4;
- The approximate locations of the respective investigation sites referred to above are shown on the Site Investigation Plan **Drawing 01**. Test locations were measured using hand-held GPS to an accuracy of +/- 4m.

4.2 Laboratory Testing

Laboratory testing was carried out in accordance with the requirements of NZS4402³ (where applicable). Where a test was not covered by a New Zealand standard, a local or International standard was adopted and noted on the laboratory test certificate.

All testing was scheduled by CMW and carried out by WSP New Zealand and Hill Laboratories, both of which are IANZ Registered Testing Authorities. Results discussed in Section 5.3.

Table 1: Laboratory Testing Schedule

Type of Test	Test Method	Quantity
Moisture content	NZS4402 – 1986 2.1	2
California Bearing Ration (CBR) (soaked)	NZS4402 – 1986 6.1.1	2
Compaction Curve MDD	NZS4402 – 1986 2.7.1 / 2.7.2	2
Particle Size Distribution	NZS4402 – 1986 2.8.1 / 2.8.3	1 Wet sieve 1 hydrometer
Shrink Swell Index	AS1289 7.1.1 - 2003	1
Atterberg limits	NZS4402 – 1986 2.3 / 2.4 / 2.5	1
Electrical Resistivity	AS1289 4.4.1 - 1997	1
Corrosivity Suite (pH, sulphate, chloride, magnesium)	DIN 4030 Part 2 Section 5.3.5, BS1377:Part 3:1990 Sections 5.3.3, 5.5 and 9.5	(1 Soil) and (1 Water)
Solid density test (Pycnometer)	NZS4402 – 1986 2.7.1 / 2.7.2	1
Organic matter soil content	NZS4402 – 1986 3.1.2	1
Thermal Resistivity	ASTM D5334-14	2

5.0 GROUND MODEL

5.1 Published Geology

The published geological map⁴ for the area presented in Figure 2 depicts the geology as late Pleistocene aged River Deposits of the Hinuera Formation comprising interbedded layers of Silt and Sand with minor gravels and

³ New Zealand Standard NZS4402 (1986), Methods of testing soils for civil engineering purposes.

⁴ Leonard, G.S., Briggs, J.G., 2002. Institute of Geological and Nuclear Sciences, Geological Map 11: Geology of the Wairarapa Area, 1:250,000

organic peat. Underlying the low hills to the east are middle Pleistocene aged river deposits comprised of moderately to poorly sorted gravel with minor sand and silt.

The Okoroire branch of the Kerepehi Fault runs approximately 200m beyond the eastern boundary, and an inactive fault runs along the western edge of the site.

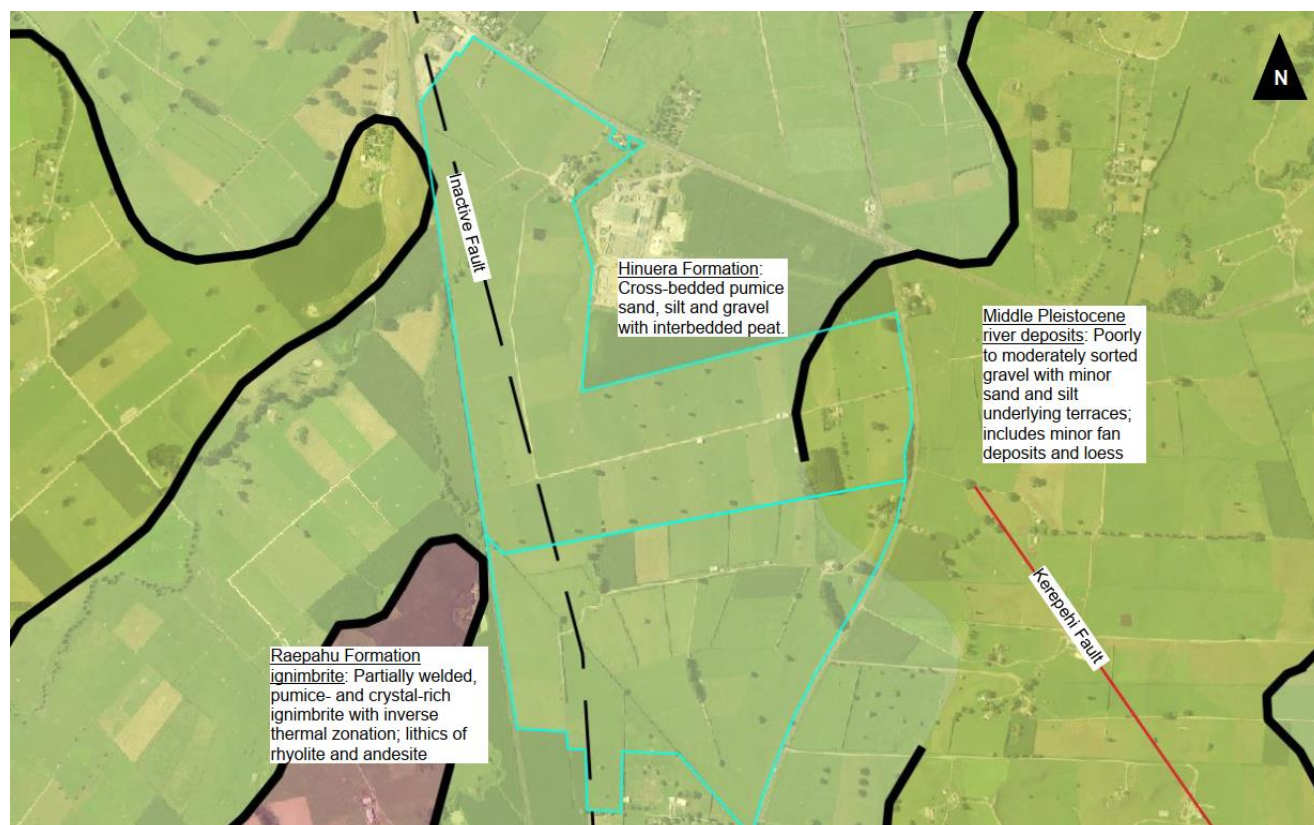


Figure 2: Regional Geology (QMAP)

Based on the known history of the site, some superficial depths of fill are anticipated as a result of farming activities.

5.2 Stratigraphic Units

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area.

Table 2: Summary of Strata Encountered

Unit	Depth to Top of Unit (m)		Thickness (m)	
	Min	Max	Min	Max
Topsoil	0		0.2	0.3
Sandy SILT (Hinuera Formation), stiff to very stiff	0.2	0.3	0.5	1.0
Sandy SILT interbedded with medium dense to dense SAND (Hinuera Formation), stiff to very stiff	0.9	2.8	5.5	9.0
SAND (Hinuera Formation), dense	6.5	10.2	3.0	>13.0
Sandy SILT and SAND (Walton Subgroup)* very stiff and very dense	3.0	15.0	5.0	>9.0

*Encountered in TP25-03 and CPT25-03 to 05 only

5.3 Laboratory Test Results

Results of the civil engineering laboratory tests provided in **Appendix F** and summarised below. Note all tests were taken from approximately 1.0 metre below existing ground level.

Table 3: Laboratory Test Results - Soil

Test Location	Natural Water Content (%)	4-day soaked California Bearing Ratio	Maximum Dry Density (t/m ³)	Particle Size Distribution (PSD)	Plasticity index	Liquid Limit (%)	Linear Shrinkage (%)	Electrical Resistivity (Ohm.cm)	Solid Density (t/m ³)	Organic Matter content (%)	Thermal Resistivity (NMC) (°C.m/W)*
TP25-01	58.1	0.5	-	-	32	84	12	-	-	-	-
TP25-02	-	-	-	Silt/Clay	-	-	-	-	-	-	-
TP25-03	52.8	-	1.08	-	-	-	-	-	2.40	-	2.5
TP25-04	58.5	1.0	-	Silt/Clay	-	-	-	-	-	-	-
TP25-05	34.3	-	1.44	-	-	-	-	25,200	2.57	0	2.1

*Note thermal resistivity is highly dependent on water content. The value presented corresponds to the natural water content measured

Table 4: Laboratory Test Results - Chemical

Test Location	Matrix	Depth (mbgl)	pH	Magnesium mg/kg (dry wt)	Chloride mg/kg (dry wt)	Water Soluble Sulphate as SO ₃ g/100g (dry wt)
TP25-05	Soil	1.0	6.7	310	<50	<0.01
Drain (near TP25-02)	Water	1.0	7.0	7.5	32	35

5.4 Groundwater

During the investigation, which was completed in mid-spring conditions (October 2025), groundwater was encountered within the Test Pits and CPTs between 0.4 and 2.0 metres below existing ground level with depths presented below.

Table 5: Groundwater Levels

Test Location	Groundwater Level below existing ground level (mbgl)	Test Location	Groundwater Level below existing ground level (mbgl)
TP25-01	1.5	CPT25-01	1.2
TP25-02	0.4	CPT25-02	1.0
TP25-03	1.5	CPT25-03	2.0
TP25-04	1.4	CPT25-04	0.6
TP25-05	1.5	CPT25-05	1.4

5.5 Electrical Resistivity Tests

Electrical Resistivity Testing (ERT) was carried out in general accordance with ASTM G57-06 (2012) Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method.

A digital resistivity meter manufactured by Sonel S.A. was used for the testing with metal stake electrodes. A maximum 'a' spacing of 20m was used and orthogonal resistivity soundings were performed at each test location. The results of the ERT tests are presented in **Appendix E**.

6.0 GEOHAZARDS ASSESSMENT

6.1 Context

Section 106 of the Resource Management Act⁵ (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land or structures (consequence).

The following sections of this report provide an assessment of the geohazards relevant to this site and provide the basis for the Natural Hazards Risk Assessment presented in **Appendix G**.

6.2 Seismicity

A seismic assessment has been carried out in general accordance with NZGS guidance⁶ to determine the peak horizontal ground acceleration or PGA (a_{max}) in accordance with the NZ Building Code⁷ and based on a 25-year design life Importance Level (IL) 1 structures such as the proposed solar panel arrays, and a 50 year design life and IL3 Importance Level switchroom structure.

PGA values for the Serviceability Limit State (SLS), and Ultimate Limit State (ULS) are presented in Table 5 below.

⁵ Resource Management Act (1991), as at 29 October 2019

⁶ NZ Geotechnical Society publication "Earthquake geotechnical engineering practice, Module 1: Overview of the standards", (March 2016)

⁷ Ministry of Business, Innovation and Employment (1992) NZ Building Code Handbook, Third Edition, Amendment 13 (effective from 14 February 2014)

Table 6: Design Peak Ground Acceleration (PGA) for Various Limit States

IL1 Structures (Solar Panels)			
Limit State	AEP	PGA (g)	Magnitude _{eff}
SLS	1/25	0.07	5.9
ULS	1/50	0.10	5.9
IL3 Structures (Switch room)			
Limit State	AEP	PGA (g)	Magnitude _{eff}
SLS	1/25	0.07	5.9
ULS	1/1000	0.36	5.9
Note: SLS = serviceability limit state; ULS = ultimate limit state; AEP = annual exceedance probability			

6.3 Faulting

The Institute of Geological and Nuclear Sciences (GNS) active faults database⁸ identifies the Okoroire segment of the Kerepehi Fault running just outside the eastern boundary of the site as shown on **Drawing 01**.

The Kerepehi Fault is the one of the most active faults in the region with the last major seismic event occurring in 2023 with a Magnitude 4.8 and a vertical displacement of approximately 0.6m.



Figure 3: Surface displacement along the Kerepehi Fault following the 2023 earthquake (near Te Aroha township)

Previous studies of the Kerepehi Fault⁹ referenced by the database, indicate the Okoroire segment of the Kerepehi Fault as having a recurrence interval of >10,000 years for characteristic seismic ruptures ranging from Mw 5.5 to 7.0. Paleoseismic data for the last 25,000 ($\pm 2,500$) years indicates an average slip rate of 0.08-0.4mm per year, that is to say, low risk.

⁸ New Zealand Active Faults Database <https://data.gns.cri.nz/af/>

⁹ M Persaud et al, (2015) The Kerepehi Fault, NEW ZEALAND JOURNAL OF GEOLOGY AND GEOPHYSICS, 2016VOL. 59, NO. 1, 117–135

6.4 Liquefaction

Liquefaction occurs in loose saturated cohesionless soils that are subject to cyclic shear loading during an earthquake. This process leads to pore pressure build-up, soil grains moving into suspension and temporary loss of strength causing vertical and lateral ground deformation.

6.4.1 Methodology

In accordance with MBIE/NZGS guidance the liquefaction susceptibility of the soils at this site was assessed with respect to geological age and compositional (soil fabric and density) criteria, based on the following assumptions:

- Only saturated soils below measured groundwater levels of 0.6 to 2.0m depth at CPT locations were modelled as being susceptible to liquefaction.
- In accordance with MBIE/NZGS guidance⁴ and in the absence of site-specific shear wave velocity measurements, no aging / strength gain factor has been applied to the Pleistocene aged soils.
- Soils are also classified with respect to their grain size and plasticity to assess liquefaction susceptibility. For this project, a cut-off threshold soil behaviour type index value (I_c) of 2.6 was used to distinguish between liquefiable ($I_c < 2.6$) and non-liquefiable ($I_c > 2.6$) soils.
- Specific liquefaction analyses were undertaken for IL1 and IL3 structures, using the software package CLiq and the Boulanger and Idriss (2014) method. The cyclic stress ratio (CSR), being a function of the PGA corrected for the relevant magnitude for the design return period event, was compared to the cyclic resistance ratio (CRR), being a function of the CPT data.
- Free-field liquefaction induced settlements were determined in accordance with Zhang et al. (2002). With respect to liquefaction response, consideration was given to a 10m cut-off depth to estimate index settlements as per MBIE¹⁰ guidance (foundation technical categories). These were compared to liquefaction settlement estimates over the full depth range of the CPT's with a depth weighting factor applied to the volumetric reconsolidation strains ranging from 1 at the ground surface to 0 at 20m depth.

6.4.2 Results

Results are presented in **Appendix H** and are summarised in Table 7 below.

Table 7: Liquefaction Analyses Results

CPT No.	SLS Settlement (mm)	Total ULS (IL1) Settlement (mm)	Total ULS (IL3) Settlement (mm)	Index ULS (IL1) Settlement (mm)	Index ULS (IL3) Settlement (mm)	Depth to Liquefied Layer (m)
CPT25-01	<5	<5	160	<5	190	1.2
CPT25-02	<5	10	165	5	200	1.0
CPT25-03	<5	<5	105	<5	160	2.1
CPT25-04	<5	20	190	15	210	0.7
CPT25-05	<5	<5	170	<5	190	1.4

Note: All settlements and depths based on existing ground profile.
Index settlements are calculated based on the upper 10m of the soil profile using no depth weighting factor.

¹⁰Repairing and Rebuilding House affected by the Canterbury Earthquakes", (December 2012)

CPT No.	SLS Settlement (mm)	Total ULS (IL1) Settlement (mm)	Total ULS (IL3) Settlement (mm)	Index ULS (IL1) Settlement (mm)	Index ULS (IL3) Settlement (mm)	Depth to Liquefied Layer (m)
Total ULS settlements are based on the full depth of the CPT trace with a depth weighting factor applied. Index settlements are for assessment of the site against the MBIE site Technical Category guidelines and are not comparable to the total ULS settlements.						

The calculations indicate that liquefaction may occur in some soil layers during a ULS earthquake event. Affected layers are shown within the liquefaction report attached within **Appendix H**.

While liquefaction induced settlement is not a significant risk for the solar panels (as they can be straightened post-earthquake), settlement could be damaging to the foundation of IL3 structures such as the switch room. In the ULS scenario for both IL1 and IL3 cases, liquefaction analyses results using the full depth of the CPT testing indicate a high risk of liquefaction occurring at the site. Recommendations follow in Section 7.2.

6.5 Slope Stability and Lateral Spread

Due to the flat to gently sloping nature of the site, the risk of deep-seated land instability occurring is assessed to be low. Site-specific slope stability analysis is therefore not considered necessary for the site.

lateral spread within the drains was considered during a ULS seismic event. The drains are generally 1m deep and the development plans show no structures within 5m. Analysis results using the CLiq software package indicated >25mm spread at 5m from the drain, which is within building code limits and need not be considered further.

6.6 Erosion

The predominantly cohesive (clayey) nature of the natural soils, which could be used as engineered fill, presents a low risk of erosion if appropriate controls are not in place. Recommendations follow in Section 7.5.

6.7 Load Induced Settlement

Settlements due to building loads and possible fill have been estimated using the CPeT-IT software, which calculates the change in vertical stress based on a Boussinesq distribution, with the 1-D constrained modulus estimated from the CPT tip resistance (q_c). Although no detailed plans were available at the time of writing, we understand that the switch room is likely to be constructed in the northern corner of the site (near CPT01 and 02) at or near existing ground level and have assessed likely scenarios for shallow foundations in that area.

Preliminary results of the assessment for a typical 10-30kPa building load are summarised in Table 6 below.

Table 8: Load Induced Settlement Summary – Shallow Foundations

Foundation Type	Footing Width (m)	Applied Working Pressure (kPa)	Primary Settlement (mm)	Overall settlement (mm)
Slab on Grade	Widespread	10	0 to 20	10 to 50
Slab on Grade	Widespread	20	15 to 35	15 to 70
Slab on Grade	Widespread	30	20 to 50	25 to 85
Strip / Pad Footing	0.5	150	5 to 10	10 to 40
	1.0		15 to 20	15 to 45
	1.5		20 to 25	20 to 55

2.0

25 to 30

25 to 60

Results show that predicted settlements exceed building code limits. Recommendations are provided in Section 7 and further settlement analysis by a geotechnical engineer will be required once the building design has been finalised.

6.8 Expansive Soils

Based on the Atterberg Limit tests (Liquid Limit and Linear Shrinkage) and Shrink/Swell test results presented in Section 5.3 along with a visual tactile assessment of the site soils, the upper silt unit could be expansive.

Recommendations discussed in Section 7.4.

7.0 RECOMMENDATIONS

7.1 Fault Rupture

In accordance with NZS1170.5:2004, the Kerepehi Fault does not have a return period of less than 1/250 years, therefore no near fault factor needs to be applied (i.e. $N(T,D) = 1.0$).

7.2 Liquefaction / Lateral Spread Mitigation

7.2.1 Substation Liquefaction Mitigation

As outlined in Section 6.4.2 under a ULS event for an IL3 structure liquefaction induced settlements of between 105 to 190mm are predicted to occur. Due to liquefaction occurring at shallow depths punching failure is a risk under a ULS seismic event. Therefore, ground improvement is likely required, with the following options recommended:

- Shallow ground improvement comprising a geogrid reinforced gravel raft below shallow foundations. Raft thickness and geogrid grade and spacing to be determined once building design has been finalised.
- Deep foundations extending into non-liquefiable material encountered below 11.0mbgl.
- Rammed Aggregate Piers (or similar ground improvement technique) installed beneath the foundations to depths of up to about 15m, to densify the soil to reduce the risk of liquefaction triggering occurring.

7.2.2 Solar Panel Liquefaction Mitigation

As outlined in Section 6.4.2 under a ULS event for an IL1 structure, liquefaction induced settlements of between 95mm to 190mm is predicted to occur. It is recommended the arrays are designed to tolerate the anticipated liquefaction induced settlement.

7.2.3 PCU Inverters

Assuming the inverters are IL3 structures, ULS liquefaction settlements are anticipated to be in the order of 85mm to 170mm. Due to liquefaction occurring at shallow depths, punching failure is also a risk under a ULS seismic event. Therefore, we recommend that the foundation slab for the inverters is designed in accordance with the TC2/3 hybrid specification, allowing for loss of support over 2m around the perimeter and internally over 4m span.

7.3 Pile Foundations

7.3.1 Pile Driveability

The test pits encountered interbedded stiff to very stiff silt and medium dense to dense sand, typically within 0.9 to 2.8mBGL.

We anticipate “good driving” conditions within the Silt/Sand. However, it is critical that test piles are carried out to assess driveability during the design stage.

If driven piles were to refuse early, then potential alternatives could include:

- Drilling of bored piles. However, drilling below the groundwater table may be problematic due to the potential for hole collapse.
- Resting the piles where they meet refusal if testing indicates they can provide adequate load capacity.
- Switching to a shallow pad foundation design.

Trial piles are highly recommended at various locations across the site to verify if piles can reach design founding levels.

7.3.2 Axial Pile Design Parameters

For preliminary sizing of driven steel pile foundations, we provide the following preliminary geotechnical design parameters in Table 7. It is recommended that these parameters are reviewed once test piles have been installed and load tested, and the foundation installation methodology, site civil works and design loadings are known.

Table 9: Preliminary Design Parameters for driven steel piles

Soil Unit	ϕ' (deg)	c' (kPa)	S_u (kPa)	E_v' (MPa)	γ (kN/m ³)	f_s (kPa)	f_b (kPa)
Stiff to very stiff Sandy SILT (Hinuera Formation)	30	1	80	28	17	20	800
Stiff to very stiff Sandy SILT interbedded with medium dense to dense Sand (Hinuera Formation)	30	1	70	33	17	15	1000
Dense to dense Sand (Hinuera Formation)	37	5	-	64	18	70	3000
Very Stiff Sandy SILT and very dense SAND (Walton Subgroup)	35	1	75	35	17	19	900

Where: ϕ' = angle of internal friction, c' = drained cohesion, S_u = Undrained Shear Strength, E_v' = drained elastic modulus (vertical), γ = bulk unit weight, f_s = unfactored skin friction, f_b = unfactored end bearing

Note: A nominal 0.8 strength reduction factor should be applied to skin friction (f_s) when the pile is loaded in tension

Pile design should ignore any topsoil and the upper 1.5 pile diameters

7.3.3 Lateral Pile Design Parameters

Horizontal spring stiffnesses have been calculated for the upper 5m of natural ground using the Elasto-Plastic model for cohesive soils and Sand API model for granular soils, assuming a 150mm x 70mm pile section, with values presented below.

It is recommended that a sensitivity analysis be conducted on these values when used in design, by adopting both half and double these values.

Table 10: Horizontal Spring Stiffness and Limiting Spring Force – Upper Soils (Hinuera Formation)

Spring Depth (m)	Long Axis (150mm)			Short Axis (70mm)		
	Horizontal Spring Stiffness K_h (MN/m)	Limiting Spring Force F (MN)	Horizontal Deflection at Limiting Spring Force (mm)	Horizontal Spring Stiffness K_h (MN/m)	Limiting Spring Force F (MN)	Horizontal Deflection at Limiting Spring Force (mm)
1.0	10	0.01	0.8	10	0.00	0.4
2.0	10	0.03	3.4	10	0.02	1.6
3.0	47	0.17	3.6	47	0.09	2.0
4.0	70	0.30	4.3	70	0.14	2.0
5.0	94	0.40	4.3	94	0.19	2.0
6.0	117	0.50	4.3	117	0.23	2.0

Table 11: Horizontal Spring Stiffness and Limiting Spring Force – Lower Soils (Walton Subgroup)

Spring Depth (m)	Long Axis (150mm)			Short Axis (70mm)		
	Horizontal Spring Stiffness K_h (MN/m)	Limiting Spring Force F (MN)	Horizontal Deflection at Limiting Spring Force (mm)	Horizontal Spring Stiffness K_h (MN/m)	Limiting Spring Force F (MN)	Horizontal Deflection at Limiting Spring Force (mm)
3.0	20	0.07	3.4	20	0.03	1.6
4.0	20	0.07	3.4	20	0.03	1.6
5.0	20	0.07	3.4	20	0.03	1.6
6.0	20	0.07	3.4	20	0.03	1.6

7.3.4 Strength Reduction Factor

Based on available geotechnical investigation data, moderately conservative design, and the proposed construction methods, we have adopted a very low to low risk basic strength reduction factor, as per AS2159:2009.

A geotechnical strength reduction factor of 0.72 has been adopted for pile capacity, which is based on static load testing of 1% of all piles installed. Static load testing should include axial, tension and lateral loads.

The strength reduction factor should be confirmed following pile testing by the pile designer.

7.3.5 Preliminary Pile Lengths

Preliminary uplift loads versus pile length calculations for some typical pile types have been provided below.

Table 12: Preliminary Design length for driven steel piles

Pile Type	Pile Tension Load	Pile Length (m)
-----------	-------------------	-----------------

	7.5kN	10kN	15kN	20kN
150UB14	1.5	2	2.9	4
150UC23	1.1	1.5	2.3	3
HB – HP 200x43	1.1	1.1	1.7	2.2
Hat type (Omega) steel sheet pile 81x144x100	1.4	1.9	2.8	3.7
C-Section steel pile 140x70x28x2	1.6	2.1	3.2	4.3

7.3.6 Durability

We have assessed the exposure classification for steel and concrete piles based on Tables 6.4.2(c) and 6.5.2(c) of AS2159:2009, “Piling – design and Installation”. The standard provides guidance on aggressivity of soils and groundwater to buried steel and concrete and should be referred to for the durability design of piles.

The table below presents the exposure classification in accordance with AS2159, based on the laboratory test results presented in Section 5.3.

Table 13: Exposure Classification for Piles

Sample ID	pH	Chlorides (soil) ppm	Water Soluble Sulphate as SO ₃ g/100g (dry wt)	Electrical Resistivity (ohm.cm)	Stratum	Soil Condition for Steel as per AS2159	Exposure Classification for Steel Piles AS2159 Table 6.5.2 C
TP25-05	6.7	<50	<0.01	25,200	Silt/Sand	A/B	Non-aggressive
Note: Table 6.5.2c ‘Non-aggressive’ classification requires pH >5, Chlorides <1000ppm, Water Soluble sulfates <100ppm, and Resistivity >5000 ohm.cm Soil conditions consider piles above and below the groundwater level							

As exposure classification for steel piles in soil is classified as ‘non-aggressive’ therefore, the existing soil chemistry is unlikely to cause significant corrosion to steel piles. It is important to note that this assessment is based on limited sampling of locations and depths.

7.3.7 Pile Testing

Axial and lateral pile design capacities provided in this report are based on normal methods of geotechnical investigation and assessment although it must be acknowledged that the scope of investigation completed represents a small proportion of the site.

It is therefore important that an appropriate scope of pile verification testing, including axial, tension and lateral, is carried out prior to the bulk order of foundation piles, to verify design capacities.

Testing should be carried out adjacent to geotechnical investigation sites to calibrate in situ soil strength with pile capacities achieved and distant from those sites to assess consistency.

7.4 Shallow Foundations

Shallow foundations are expected to be acceptable for light weight buildings such as switch rooms or sheds, provided they are 'specifically designed' to account for the expansive nature of the near surface soils indicated by laboratory test results.

On the basis of our visual–tactile assessment, the available laboratory test results, and reference to BRANZ Report SR120A, the superficial soils are considered potentially expansive. However, at this stage, we are unable to conclusively rule out the presence of expansive soils and/or assign a definitive AS 2870 expansive site class. Confirmation of the expansive classification will require a targeted programme of laboratory testing, including shrink–swell and linear shrinkage tests, to be completed prior to detailed design.

Additionally, for footings >300mm (ie less than 3B to liquefied soil at ~1mbgl) bearing capacity will be reduced due to liquefaction, to be assessed in coordination with structural design.

7.5 Erosion controls

Slopes or batters shall be designed to reduce the effects of erosion of susceptible materials, either by construction via appropriate gradients or forming of slopes with materials less susceptible to erosion.

7.6 Roding

The subsurface soils within the site are variable stiff to very stiff sandy silts and and medium dense to dense silty sands.

Subgrade improvement and/or specific pavement design may be required where firm silts/sands are present to form roads suitable for heavy construction traffic and future maintenance vehicle access. Typical CBR values¹¹ of between 2% and 4% should be available in areas of cut natural ground following removal of topsoil.

A preliminary access road design has been completed using Austroads design guidance¹² and the following assumptions:

- One heavy vehicle per day for the five month construction period.
- One light vehicle per week and one heavy truck per month over the following 20 years.
- Three heavy vehicle axle groups per truck.

A minimum pavement thickness of 250mm is recommended subject to further testing during construction and confirmation of traffic loading.

During winter conditions topsoil saturation is typical due to poorly drained subgrade soils. Designers should consider the installation of pavement subsoil drains to mitigate the risk of pavement saturation and poor performance.

8.0 FURTHER WORK

Additional geotechnical inputs to support the design and construction of the proposed development at this site may include, but not be limited to:

- Test Piles in various locations to ascertain pile drivability and load capacity;

¹¹ CBR Correlation Sourced From Austroad 2017 Guide to Pavement Technology Part 2: Table 5.4

¹² Austroads Guide to Pavement Technology Part 6: Unsealed Pavements 2009 – Figure 4.3: Design for granular pavements

- Preparation of a detailed foundation design report to support the building consent application, including additional liquefaction assessment;
- Construction observations and testing to verify design assumptions.

9.0 CLOSURE

This report has been prepared for use by Harmony Energy NZ Limited #06 in relation to the 4775 State Highway 29, Matamata project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Harmony Energy NZ Limited #06 seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site. A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental matters are not covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

APPENDIX A

Drawings

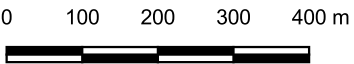


LEGEND:

- Boundary
- CMW
- OpenGround
- HAM2025-0095 - OpenGround Locations
- CPT
- TP
- Contours
- GNS 250K Geology
- New Zealand mainland
- Faults
- Inactive Faults

NOTES:

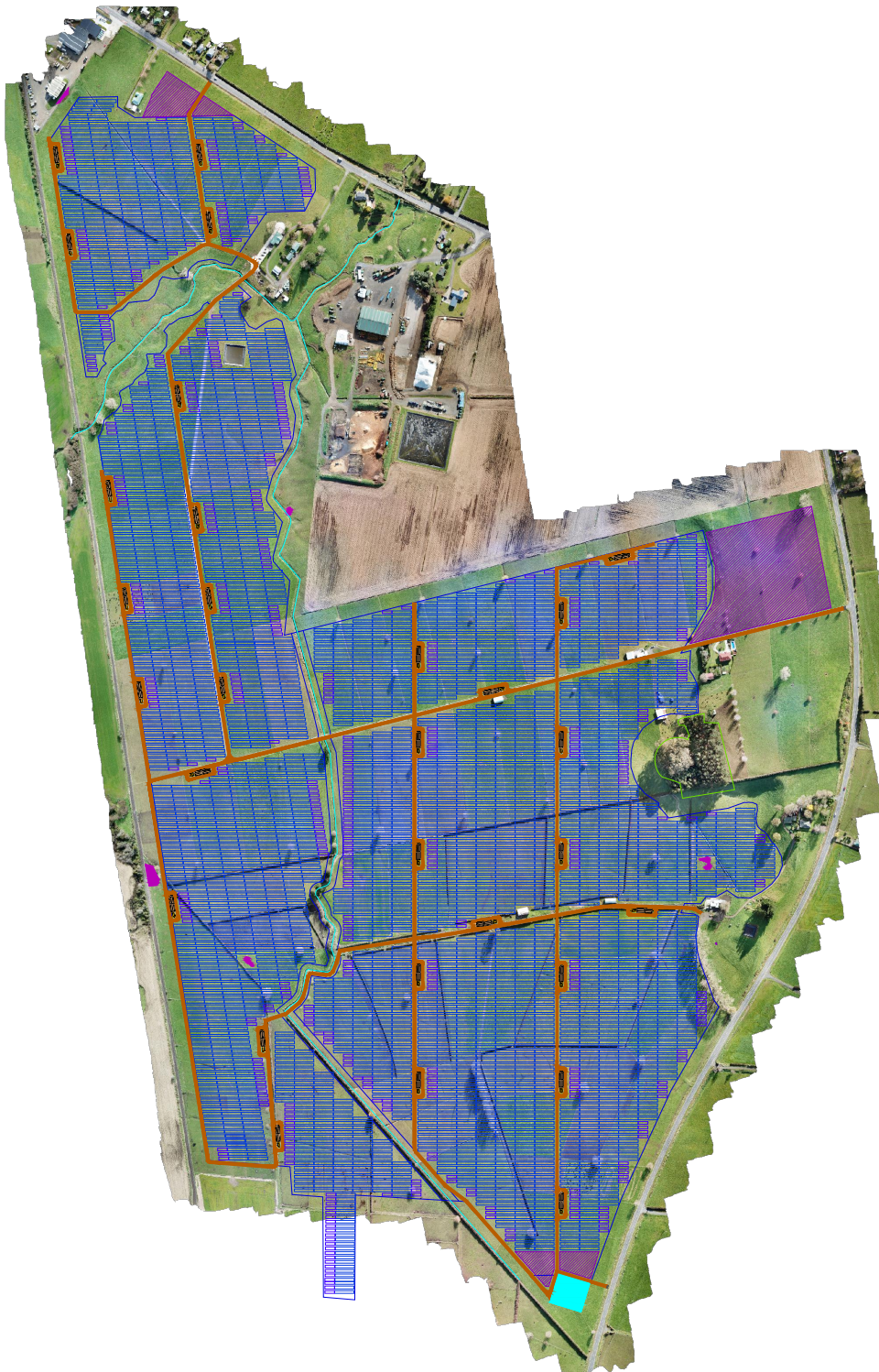
1. BASE MAP ADAPTED FROM LINZ NZ BASE AERIAL IMAGERY
2. CONTOURS IN 1M INTERVALS, ADAPTED FROM NZ 1M DEM LIDAR SURVEY FROM LINZ DATA SOURCE
3. TEST LOCATIONS WERE RECORDED BY HANDHELD GPS AND ARE INDICATIVE ONLY



 Great People Practical Solutions	CLIENT: Harmony Energy NZ Limited #06	DRAWN: MM	PROJECT: HAM2025-0095
	PROJECT: HINUERA SOLAR FARM	CHECKED: HNB	DRAWING: 01
	TITLE: SITE INVESTIGATION PLAN	REVISION: 0	SCALE: 1:10,000
		DATE: 24/10/2025	SHEET: A3 P

APPENDIX B

Proposed Development Plans



LEGEND		
SYMBOL	DESCRIPTION	QTY
	PV MODULE	207,592
	PV MODULE	14,932
	INVERTER STATION	30
	BATTERY STATION	30
	ENTRY/EXIT GATE (6m)	
	TOP OF COUNCIL DRAIN	
	EASEMENT EXCLUSION AREA	
	AVAILABLE PV AREA	
	VEGETATION TO REMAIN	
	WATERWAY	
	DEDICATED SUBSTATION YARD	
	INTERNAL ROADS	
	CONTRACTOR LAYDOWN AREA	

SYSTEM SPECIFICATIONS	
P _{ac} Rated	100.00 MW _{ac}
P _{dc} Rated	135.41 MW _{dc}
HV TRANSFORMER	100 MVA 132/33 kV
MV TRANSFORMER	3400 kVA 33/0.60
MODULE SPECIFICATIONS	
MODULE TYPE	ASTRONERGY MODULE SUPPLIER
MODULE SIZE	610 #
MODULE QTY	221,984
MODULES/STRING	28
BATTERY SPECIFICATIONS	
BATTERY TYPE	TBC
BATTERY SIZE	TBC
BATTERY QTY	30
BATTERY CAPACITY	TBC
INVERTER SPECIFICATIONS	
INVERTER TYPE	SUNGROW
INVERTER CONFIGURATION	SINGLE or DUAL SKID
INVERTER SIZE	3400kW
INVERTER QTY	30
COMBINERS/INVERTER	TBC
MOUNTING GEAR SPECIFICATIONS	
MOUNTING GEAR TYPE	TBC
MOUNTING GEAR PITCH	6.0 m
MOUNTING GEAR ANGLE	+/- 20°
MOUNTING GEAR AXIMUTH	0°

- NOTES:
1. DESIGN INTENDED FOR PLANNING PURPOSES ONLY. NOT FOR CONSTRUCTION.
 2. ANY DIMENSIONS SHOWN IN MILLIMETERS UNLESS NOTED OTHERWISE.



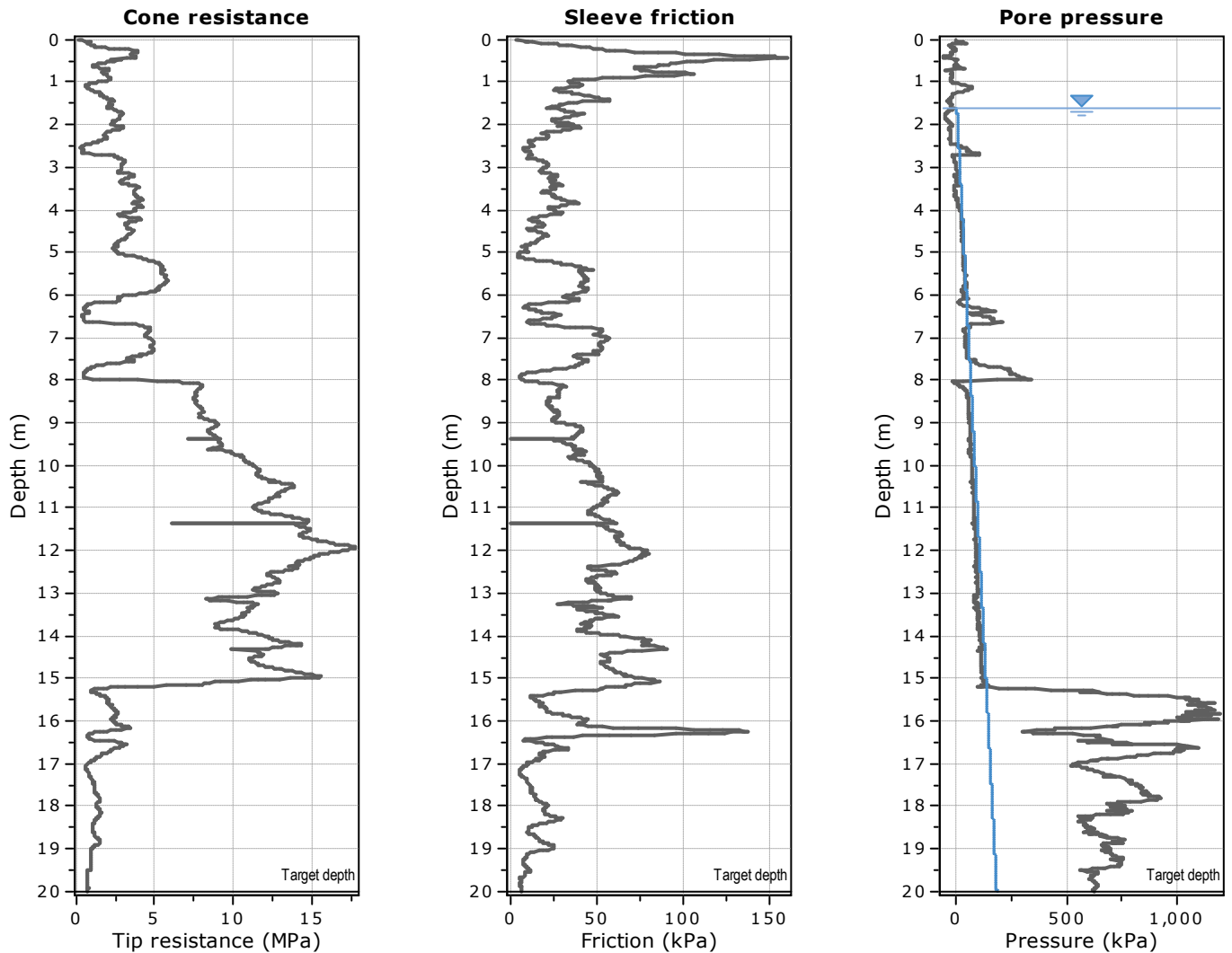
PROJECT:			
HINUERA SOLAR FARM			
TITLE:			
GENERAL LAYOUT			
SCALE:	DATE:	DRAWN:	CHECKED:
A4 @ 1:----	08/08/2024	RDP	--
DRAWING NO:	HIN_01_01		REVISION: 01

APPENDIX C

Cone Penetrometer Test Results

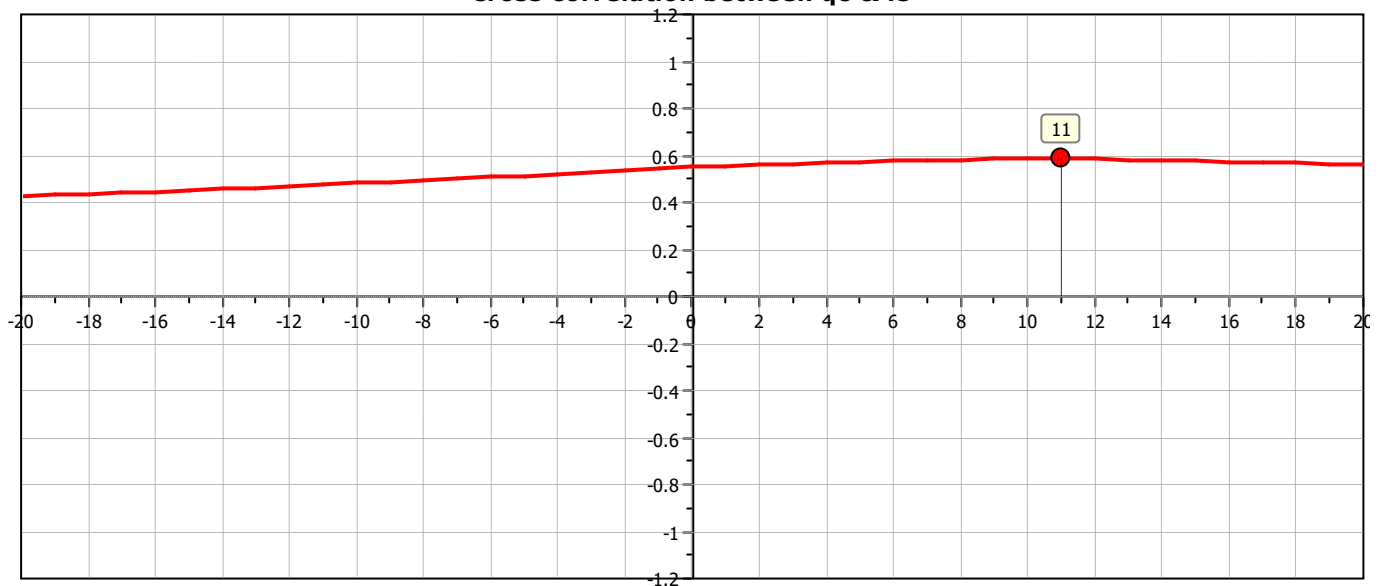
Project: CMW Geosciences | HAM2025-0095 | GDS NZ Ltd
Location: 4775 SH29, Matamata | Holes dipped onsite using Dipmeter

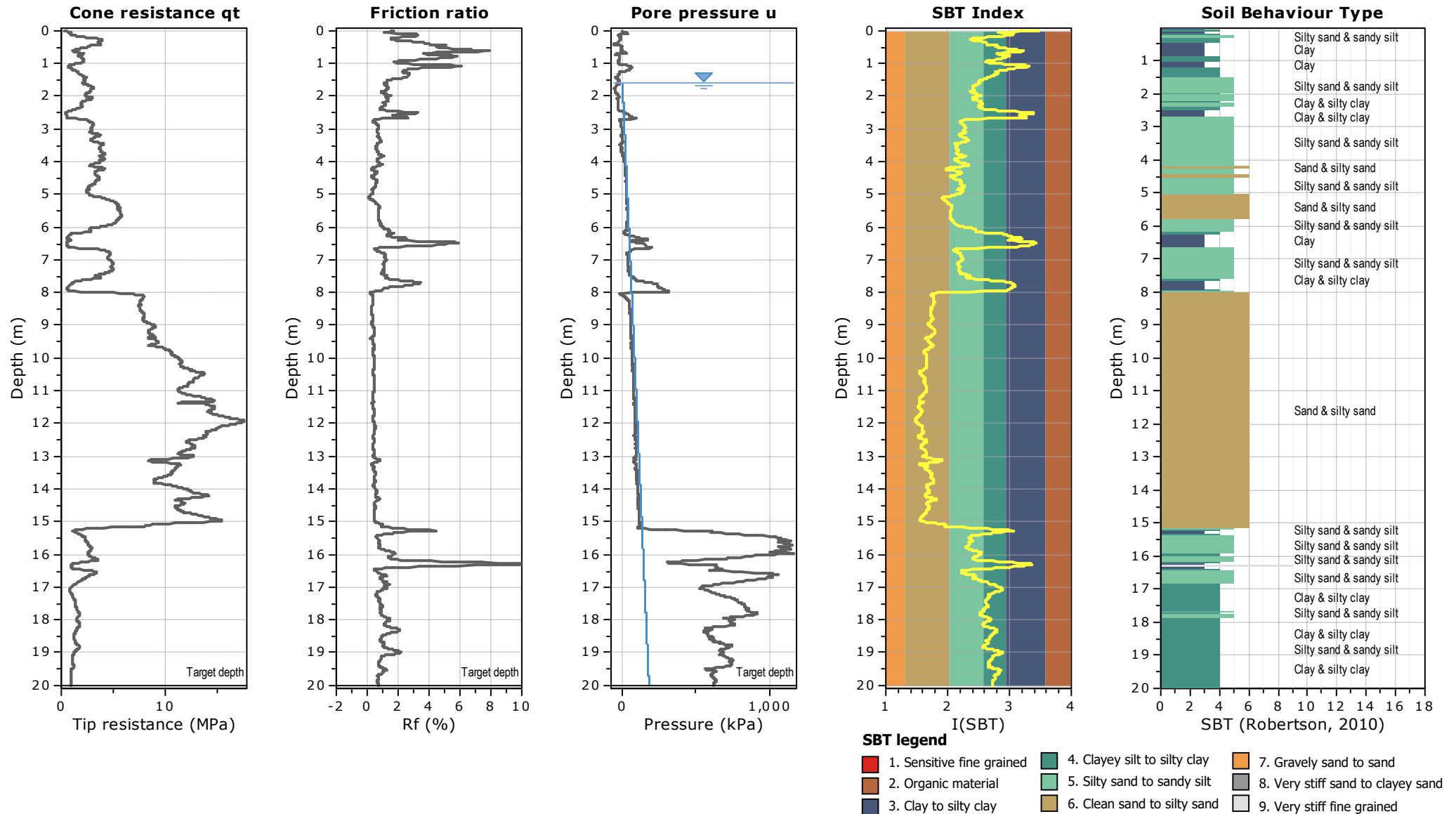
Total depth: 20.01 m, Date: 12/10/2025
Coords: lat -37.889727° lon 175.763954°
Cone Type: DC10



The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

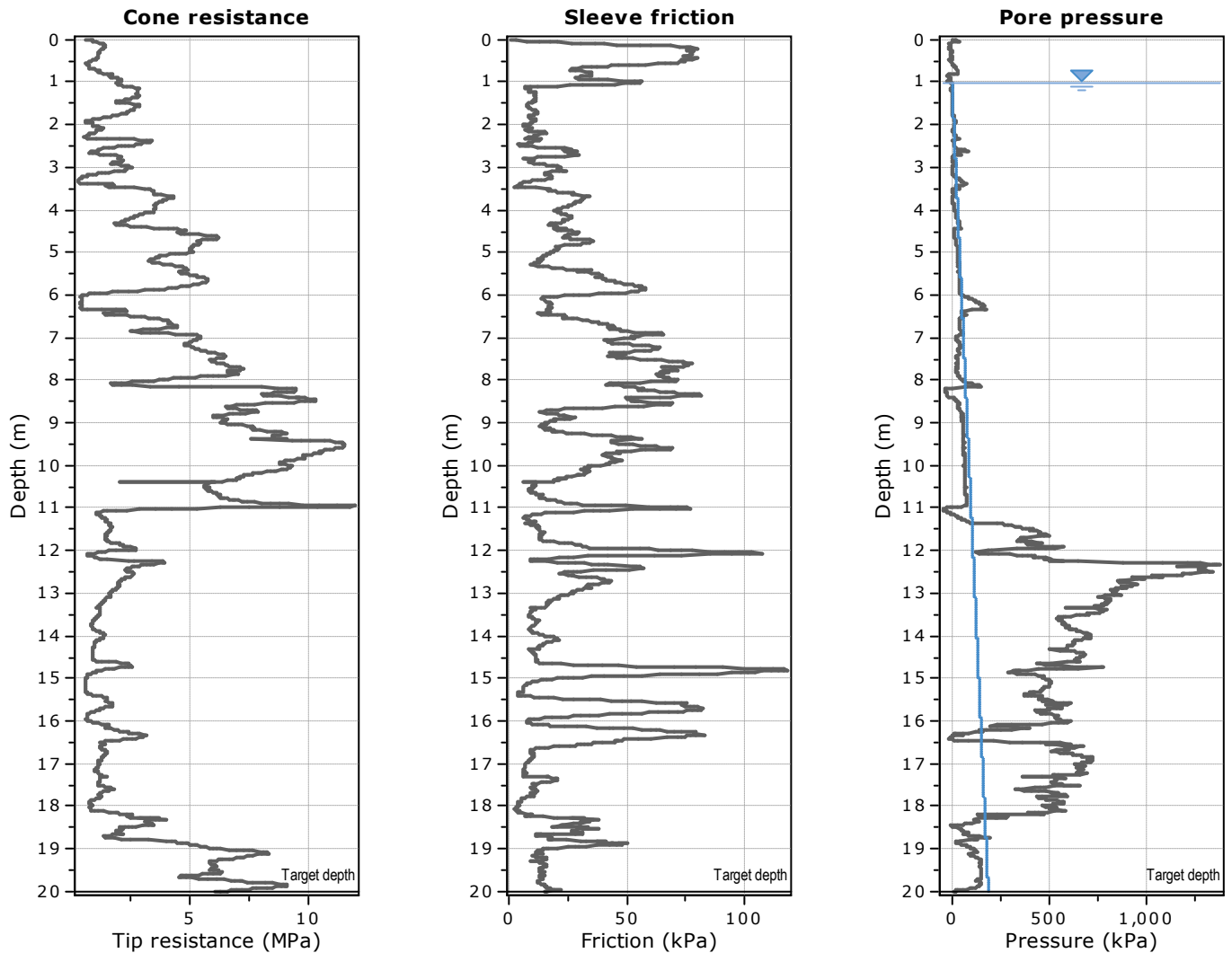
Cross correlation between qc & fs





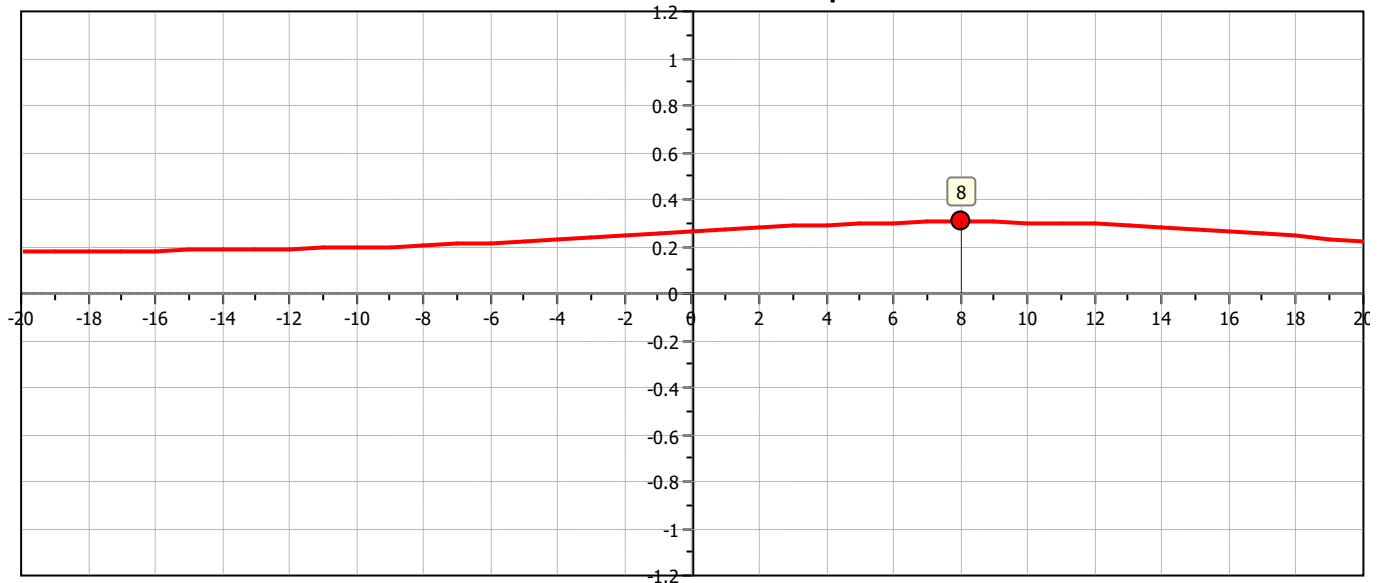
Project: CMW Geosciences | HAM2025-0095 | GDS NZ Ltd
Location: 4775 SH29, Matamata | Holes dipped onsite using Dipmeter

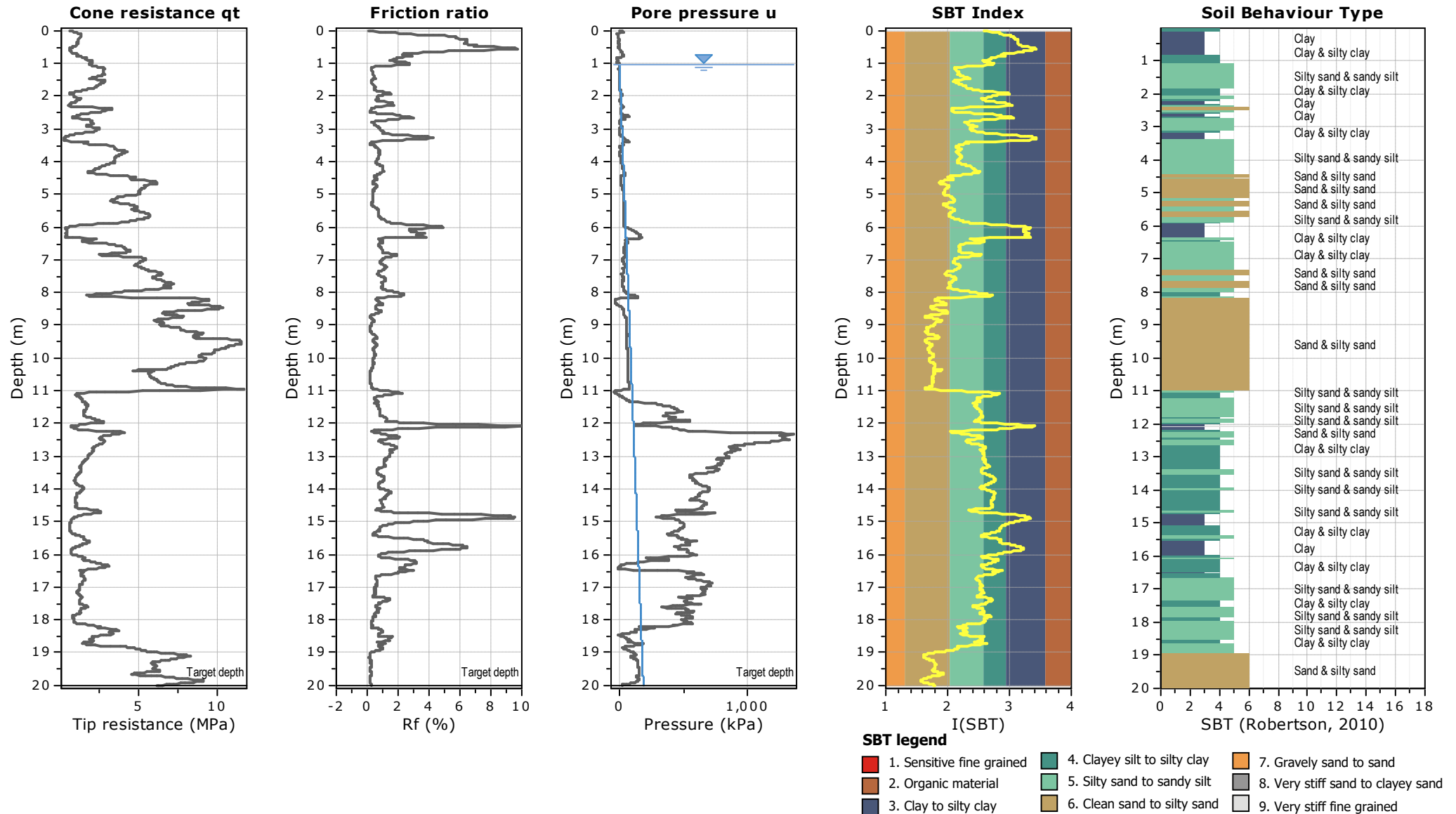
Total depth: 20.01 m, Date: 12/10/2025
Coords: lat -37.893778° lon 175.764495°
Cone Type: DC10

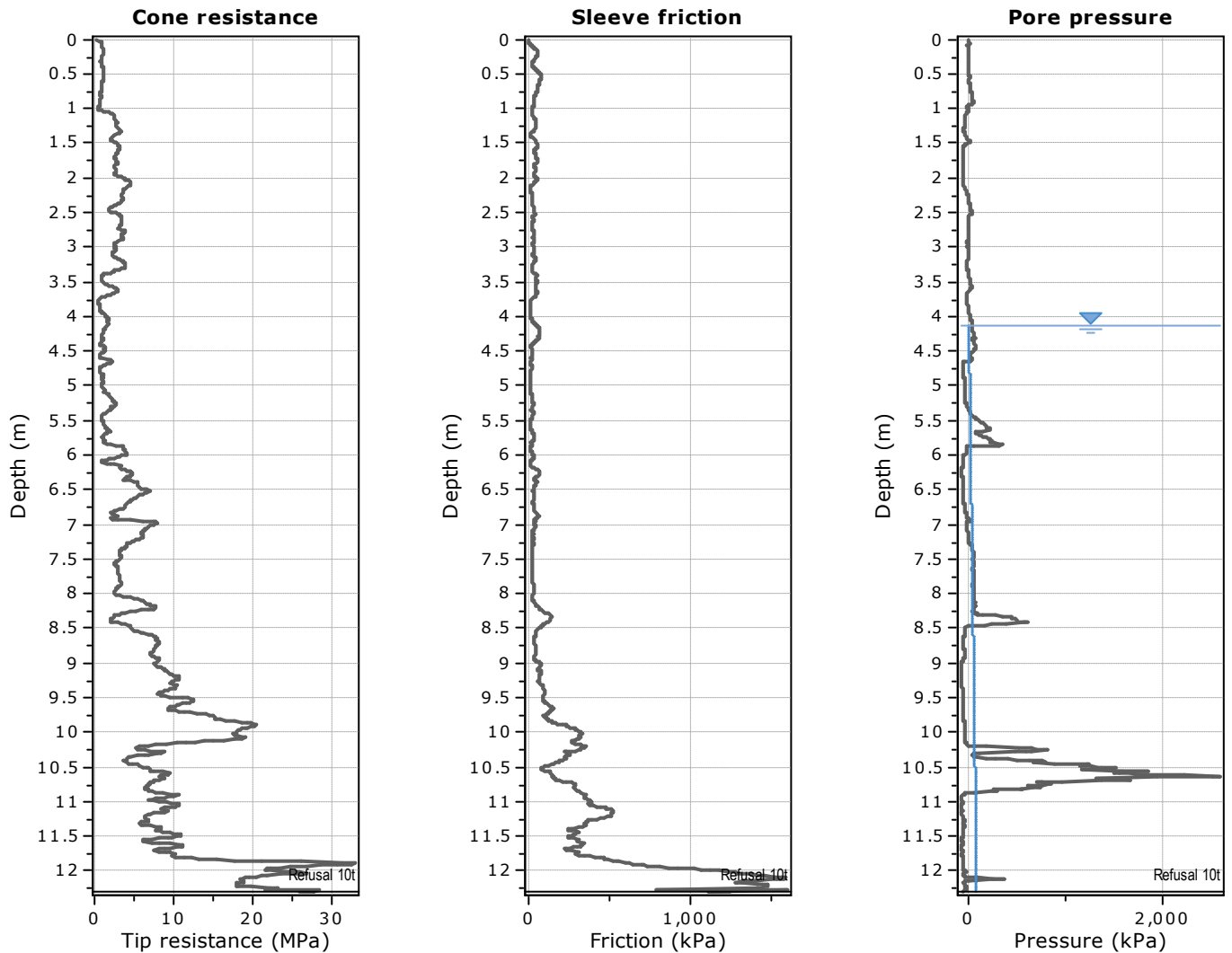


The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs

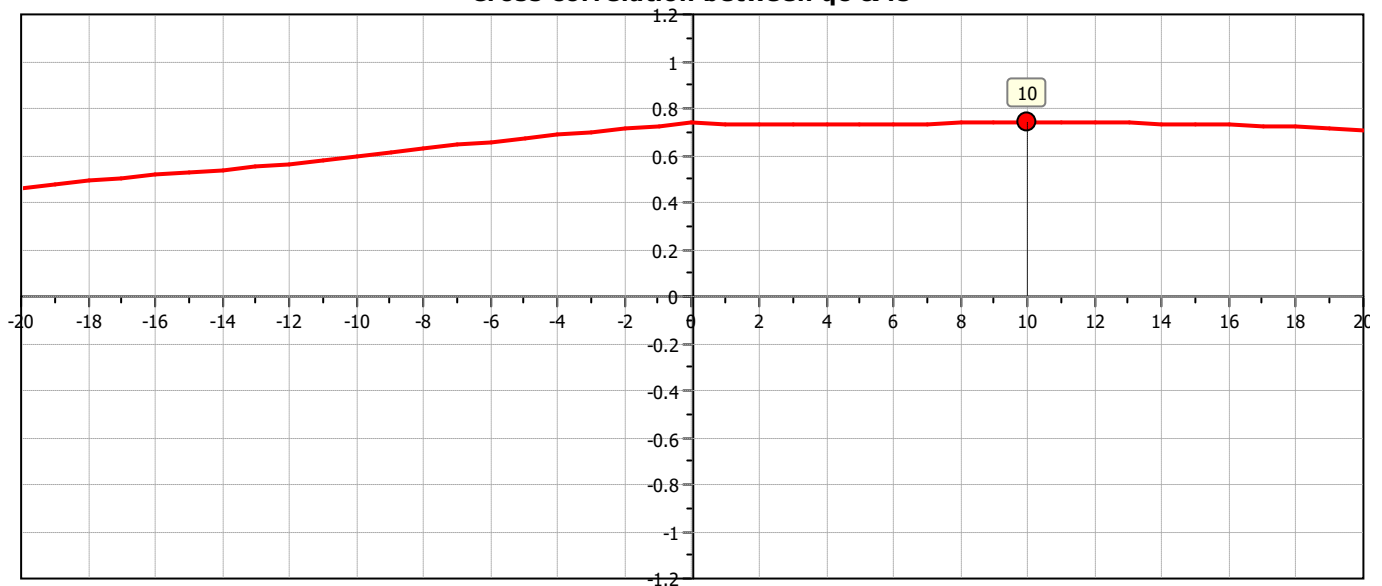


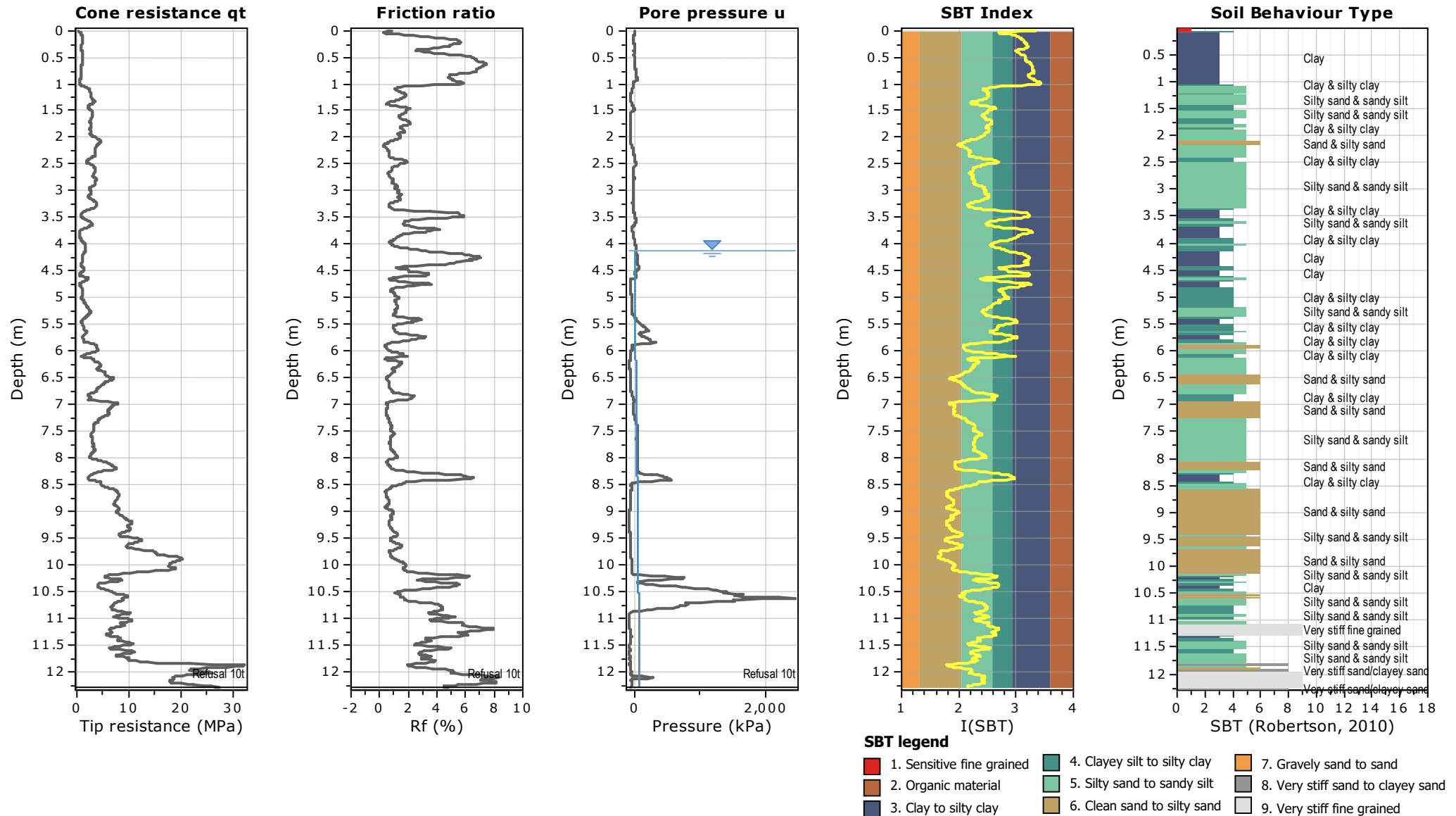


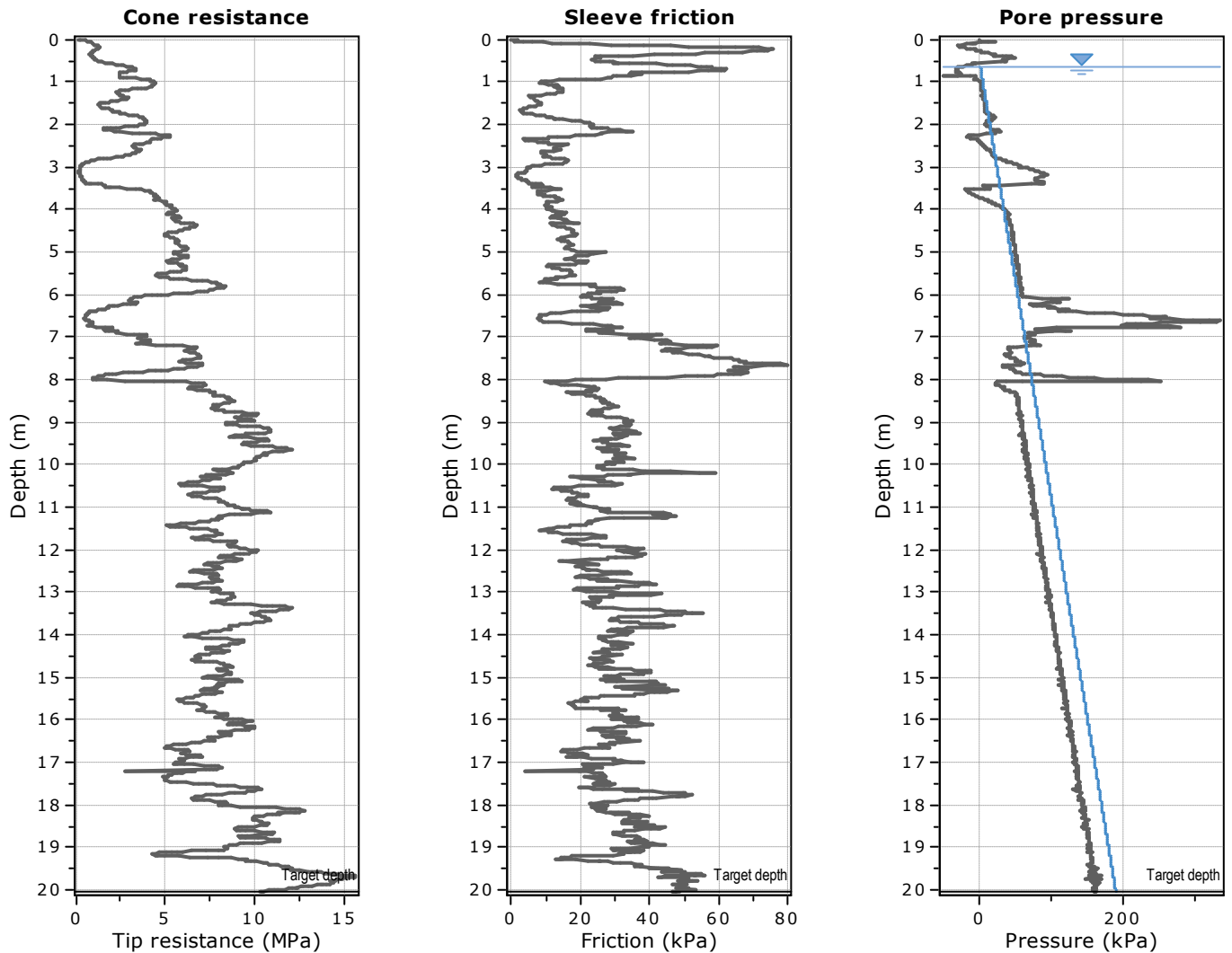


The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs

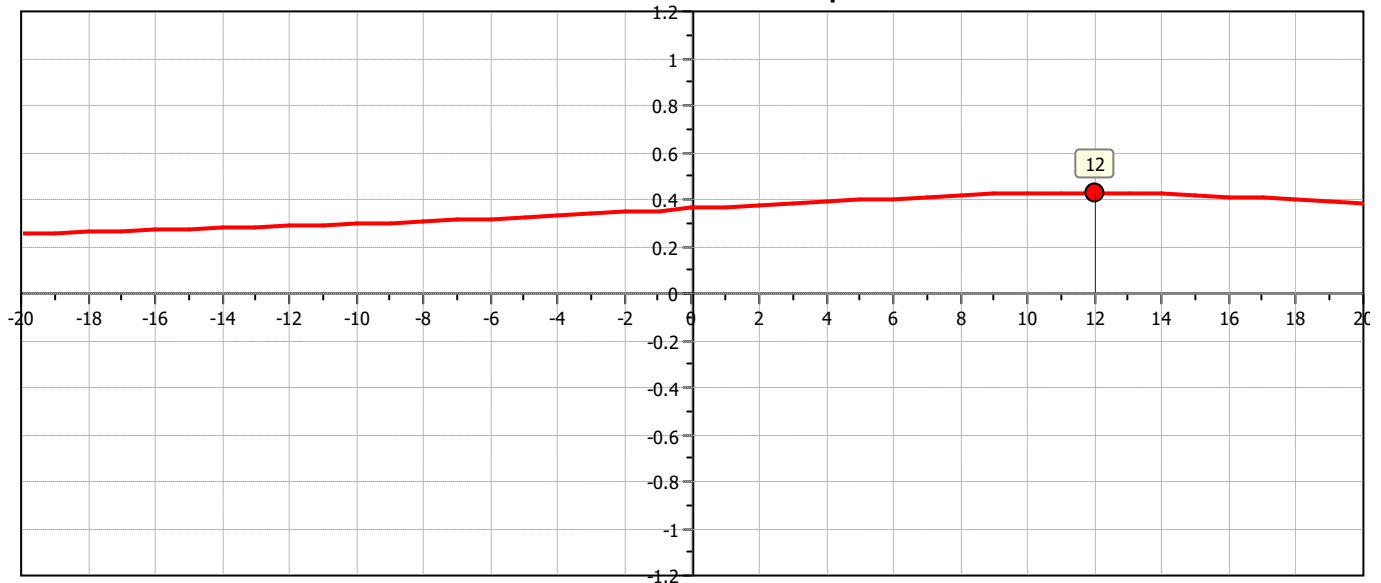


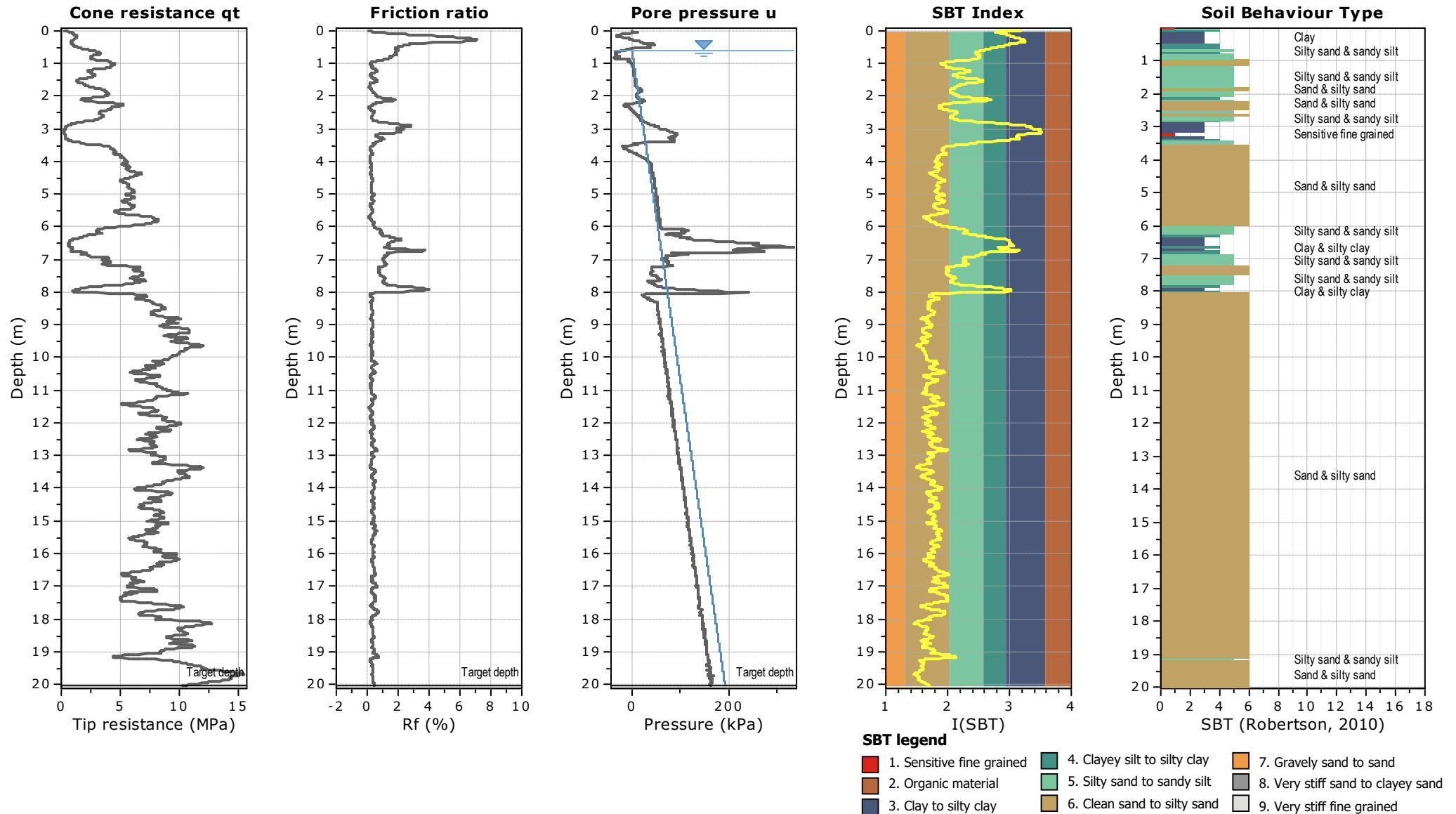


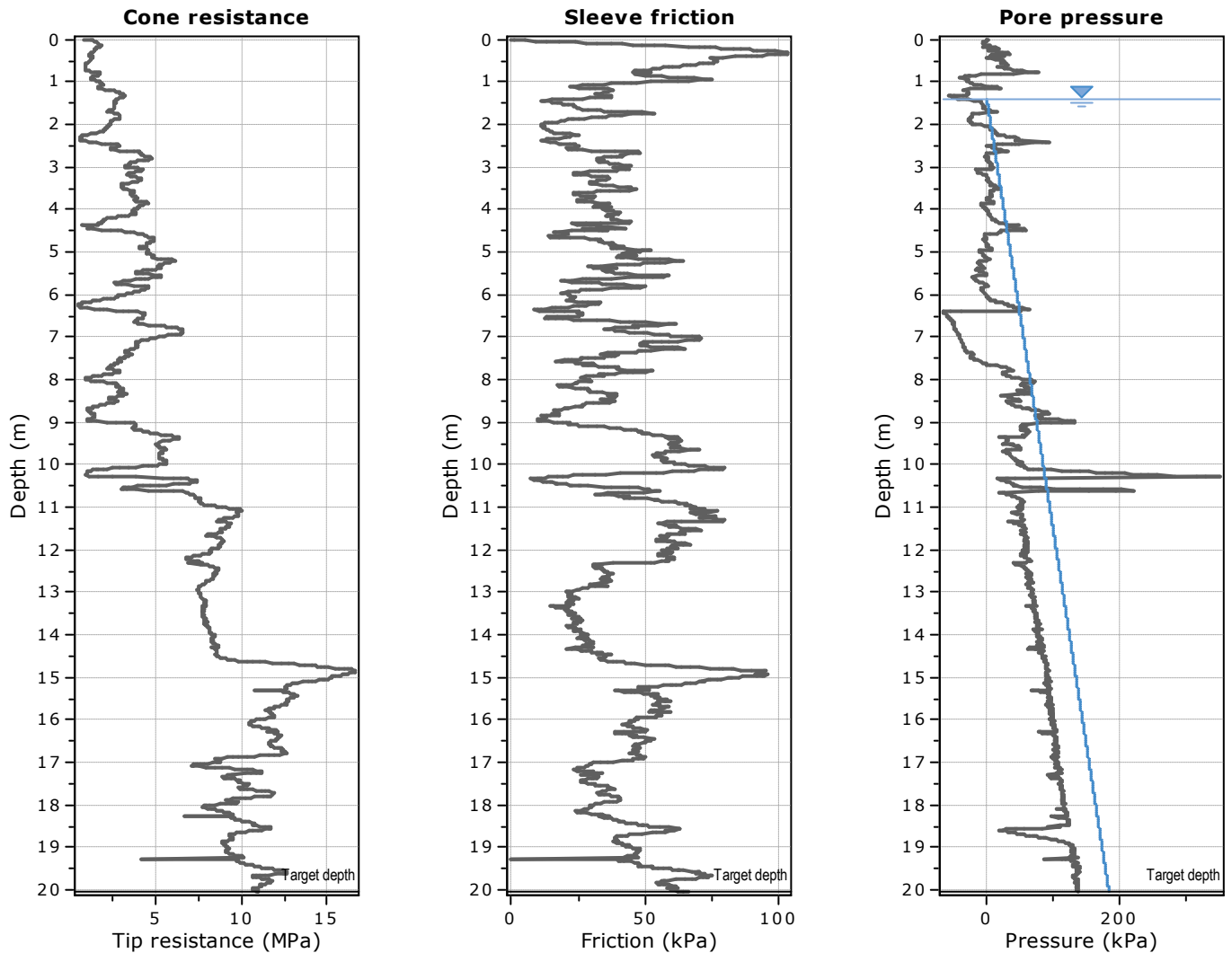


The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs

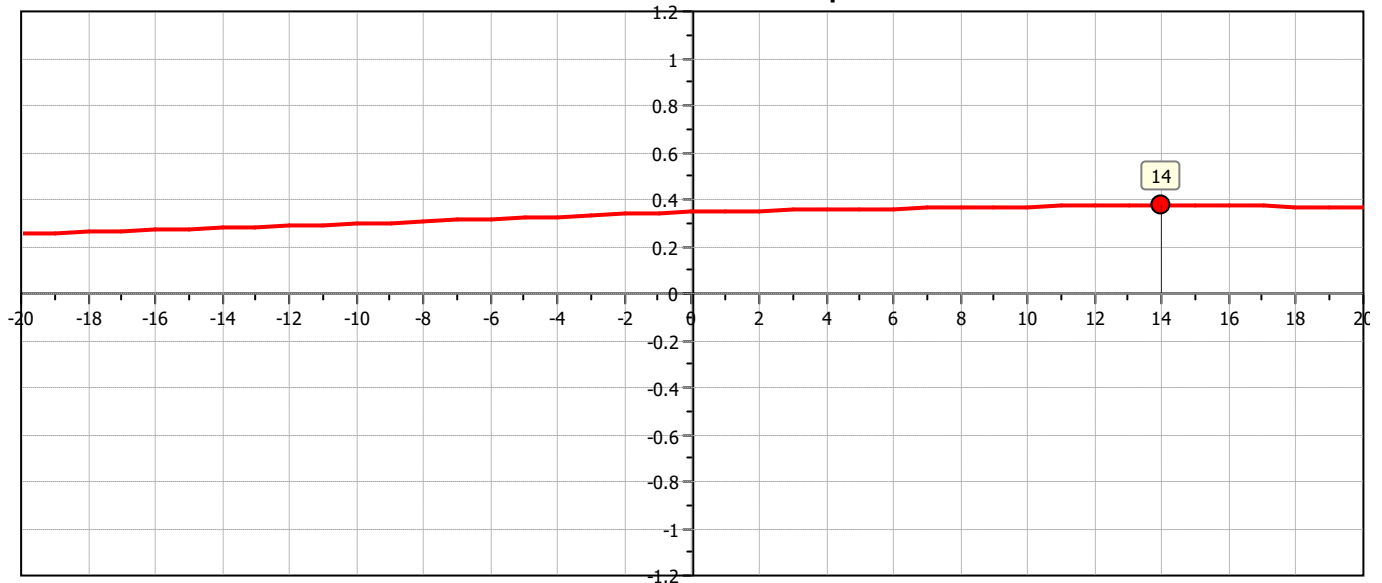


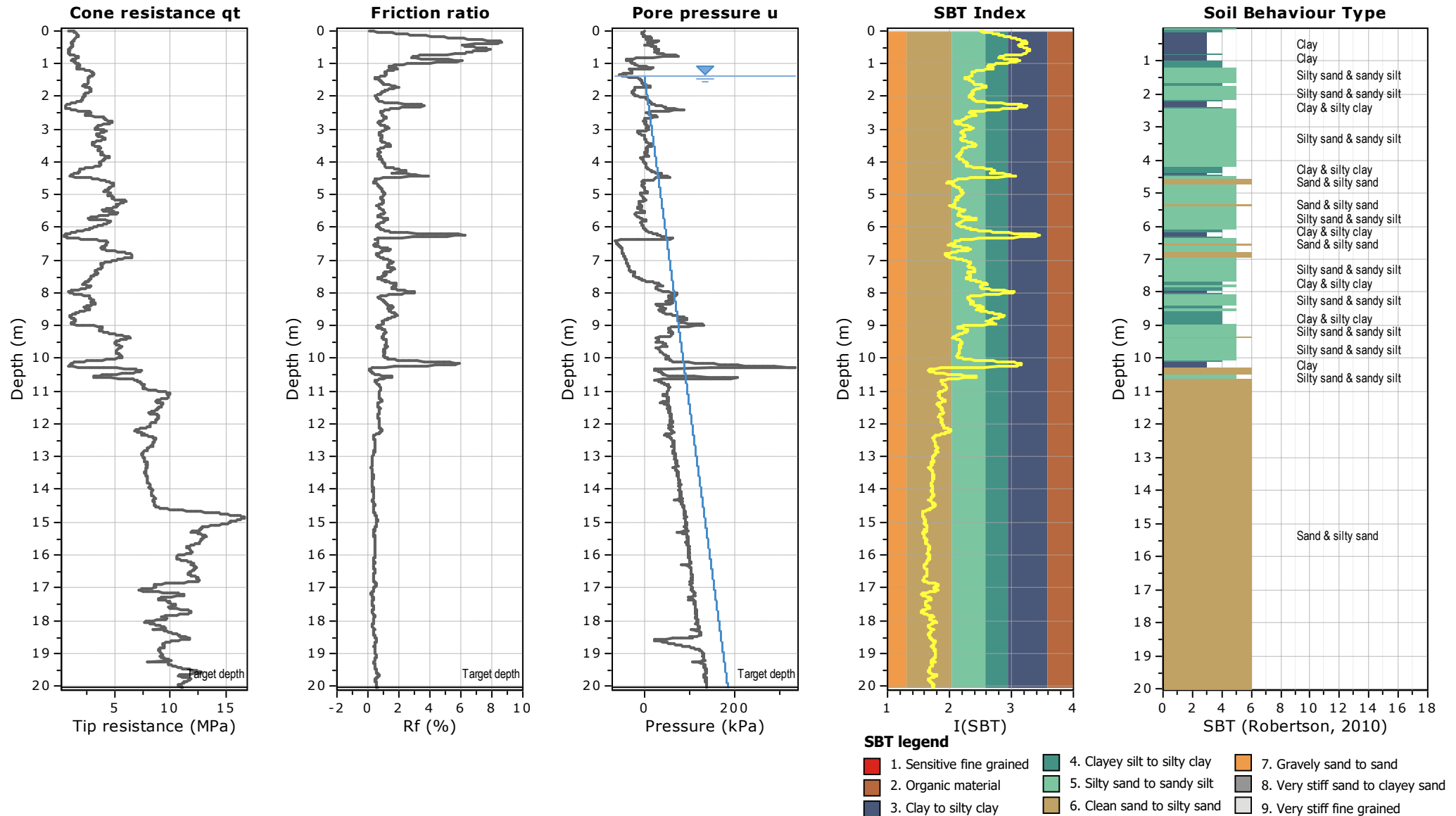




The plot below presents the cross correlation coefficient between the raw qc and fs values (as measured on the field). X axes presents the lag distance (one lag is the distance between two successive CPT measurements).

Cross correlation between qc & fs





APPENDIX D

Test Pit Logs

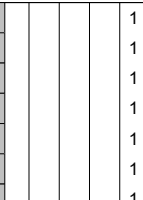
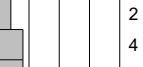
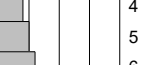
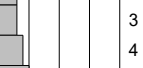
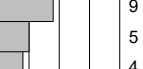
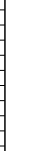
TEST PIT LOG - TP25-01

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Site Location: Matamata
Project No.: HAM2025-0095
Date: 15/10/2025



Test Pit Location: Refer to site plan Logged by: AN Checked by: MM Scale: 1:25 Sheet 1 of 1

Position: 487912.9mE; 687873.9mN Projection: Mount Eden 2000 Pit Dimensions: m by m
Elevation: m Datum: NZVD2016 Survey Source: Hand held GPS

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)				Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks								
	Depth	Type & Results							5	10	15	20									
	0.3	Peak = 133kPa Residual = 24kPa		0.5		OL: Organic SILT: dark brown. No plasticity. (Topsoil)	M			1											
						ML: SILT: with some fine sand. Light orange brown mottled light brownish grey. Low plasticity, sensitive. (Hinuera Formation)															
												SW: Silty Fine to coarse SAND: light orange brown mottled light brownish grey. Well graded, subrounded. (Hinuera Formation)			2						
												SW: Fine to coarse SAND: with minor coarse pumiceous sand. Light grey. Well graded. (Hinuera Formation)									
																	SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)			4	
	2.3	Peak = 56kPa Residual = 21kPa			ML: Clayey SILT: with some organic silt. Light grey mottled dark brown. Low plasticity, moderately sensitive. (Hinuera Formation)	S			3												
					SW: Silty fine SAND: with some medium to coarse sand. Light grey. Well graded. (Hinuera Formation)																
					... at 2.70m, becoming interbedded with silt.																
											GW: Silty fine to coarse pumiceous GRAVEL.: light grey. Well graded, subrounded. (Hinuera Formation)			5							
											SW: Fine to coarse SAND: with minor fine to coarse pumiceous gravel and pumiceous sand. Light grey. Well graded. (Hinuera Formation)										
											Test pit terminated at 3.70 m										
	4																				
	5																				

Termination Reason: Pit collapse due to groundwater.

Shear Vane No: 2995 DCP No: 18

Remarks: Groundwater encountered at 1.5m depth.

PHOTOGRAPH SHEET - TP25-01

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Location: Matamata
Project ID: HAM2025-0095
Date: 15/10/2025



TP25-01: 0.00m - 1.00m



TP25-01: 1.00m - 2.00m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-02

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Site Location: Matamata
Project No.: HAM2025-0095
Date: 15/10/2025



Test Pit Location: Refer to site plan Logged by: AN Checked by: MM Scale: 1:25 Sheet 1 of 1

Position: 488004.1mE; 686903.9mN Projection: Mount Eden 2000 Pit Dimensions: m by m
Elevation: m Datum: NZVD2016 Survey Source: Hand held GPS

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)				Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks		
	Depth	Type & Results							5	10	15	20			
	0.3	Peak = 77kPa Residual = 18kPa		0		OL: Organic SILT: dark brown. No plasticity (Topsoil)	M	St						2	
						ML: SILT: light greyish brown. Low plasticity, sensitive. (Hinuera Formation)							1		
						ML: SILT: light greyish brown. Low plasticity, sensitive. (Hinuera Formation)	S	L to MD					1		
						ML: SILT: light greyish brown. Low plasticity, sensitive. (Hinuera Formation)							1		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							2		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							1		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							3		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							3		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							3		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							2		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)							2		
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					4				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					4				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					4				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					3				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					2				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					5				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					4				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					5				
						SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					2				
		SW: Silty fine to coarse SAND: light grey. Well graded, subrounded. (Hinuera Formation)					4								
		ML: Fine sandy SILT : with trace coarse pumiceous sand and fine pumiceous gravel. Light grey. Low plasticity. (Hinuera Formation)	St					4							
		ML: Fine sandy SILT : with trace coarse pumiceous sand and fine pumiceous gravel. Light grey. Low plasticity. (Hinuera Formation)						4							
								3							
								5							
								4							
								5							
								5							
								5							
								2							
								1							
									1						
									2						
									3						
									5						
									3						
									6						
									8						
									10						
									12						
									17						
									20						
									0						

PHOTOGRAPH SHEET - TP25-02

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Location: Matamata
Project ID: HAM2025-0095
Date: 15/10/2025



TP25-02: 0.00m - 1.00m



TP25-02: 1.00m - 2.00m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-03

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Site Location: Matamata
Project No.: HAM2025-0095
Date: 15/10/2025
Test Pit Location: Refer to site plan



Logged by: AN Checked by: MM Scale: 1:25 Sheet 1 of 1

Position: 488438.6mE; 686993.3mN Projection: Mount Eden 2000 Pit Dimensions: m by m
Elevation: m Datum: NZVD2016 Survey Source: Hand held GPS

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)				Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
	Depth	Type & Results							5	10	15	20	
	0.3	Peak = 133kPa Residual = 21kPa				OL: Organic SILT: dark brown. No plasticity. (Topsoil)							
						ML: SILT: light orange brown. Low plasticity, sensitive. (Hinuera Formation)							
	0.8	Peak = 133kPa Residual = 27kPa				... at 0.60m, becoming light greyish brown.	M	VSt					
	1.0	TR01 C		1									Push tube
						SW: Silty Fine to coarse SAND: orange brown mottled grey. Well graded, subrounded. (Hinuera Formation)		MD					
				2		CH: Silty CLAY: light grey. high plasticity. (Hinuera Formation)							
						ML: Fine sandy SILT: light grey. Low plasticity. (Walton Subgroup)	S	St					
				3									
						Test pit terminated at 3.40 m							
				4									
				5									

Termination Reason: Pit collapse due to groundwater.
Shear Vane No: 2995 DCP No: 18
Remarks: Groundwater encountered at 1.5m depth.

PHOTOGRAPH SHEET - TP25-03

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Location: Matamata
Project ID: HAM2025-0095
Date: 15/10/2025



TP25-03: 0.00m - 1.00m



TP25-03: 1.00m - 2.00m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-04

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Site Location: Matamata
Project No.: HAM2025-0095
Date: 15/10/2025
Test Pit Location: Refer to site plan



Logged by: AN Checked by: MM Scale: 1:25 Sheet 1 of 2

Position: 488435.6mE; 686547.2mN Projection: Mount Eden 2000 Pit Dimensions: m by m
Elevation: m Datum: NZVD2016 Survey Source: Hand held GPS

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)				Structure & Other Observations Discontinuities: Depth; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
	Depth	Type & Results							5	10	15	20	
	0.3	Peak = 62kPa Residual = 18kPa			OL: Organic SILT: dark brown. No plasticity. (Topsoil)								
					ML: SILT: light grey. Low plasticity, moderately sensitive. (Hinuera Formation)								
	0.6	Peak = 88kPa Residual = 18kPa			SW: Silty fine to coarse SAND: orange brown. Well graded, subrounded (Hinuera Formation)							ML: Fine sandy SILT: light grey. Low plasticity. (Hinuera Formation)	
												... at 1.80m, becoming light grey streaked orange brown.	
	1	ML: Fine sandy SILT: light grey. Low plasticity. (Hinuera Formation)			... at 2.00m, becoming fine to coarse sandy silt								
					2							Test pit terminated at 3.00 m	
	3	Test pit terminated at 3.00 m											
					4							Test pit terminated at 3.00 m	
	5	Test pit terminated at 3.00 m											
					6							Test pit terminated at 3.00 m	
	7	Test pit terminated at 3.00 m											
					8							Test pit terminated at 3.00 m	
	9	Test pit terminated at 3.00 m											
					10							Test pit terminated at 3.00 m	
	11	Test pit terminated at 3.00 m											
					12							Test pit terminated at 3.00 m	
	13	Test pit terminated at 3.00 m											
					14							Test pit terminated at 3.00 m	
	15	Test pit terminated at 3.00 m											
					16							Test pit terminated at 3.00 m	
	17	Test pit terminated at 3.00 m											
					18							Test pit terminated at 3.00 m	
	19	Test pit terminated at 3.00 m											
					20							Test pit terminated at 3.00 m	
	21	Test pit terminated at 3.00 m											
					22							Test pit terminated at 3.00 m	
	23	Test pit terminated at 3.00 m											
					24							Test pit terminated at 3.00 m	
25	Test pit terminated at 3.00 m												
		26	Test pit terminated at 3.00 m										
27	Test pit terminated at 3.00 m												
		28	Test pit terminated at 3.00 m										

PHOTOGRAPH SHEET - TP25-04

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Location: Matamata
Project ID: HAM2025-0095
Date: 15/10/2025



TP25-04: 0.00m - 1.00m



TP25-04: 1.00m - 2.00m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

TEST PIT LOG - TP25-05

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Site Location: Matamata
Project No.: HAM2025-0095
Date: 15/10/2025
Test Pit Location: Refer to site plan



CMW Geosciences
Great People | Practical Solutions

Logged by: AN Checked by: MM Scale: 1:25 Sheet 1 of 1

Position: 488565.7mE; 686074.8mN Projection: Mount Eden 2000 Pit Dimensions: m by m
Elevation: m Datum: NZVD2016 Survey Source: Hand held GPS

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil: Soil symbol; soil type; colour; structure; bedding; plasticity; sensitivity; additional comments. (origin/geological unit) Rock: Colour; fabric; rock name; additional comments. (origin/geological unit)	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)				Structure & Other Observations Discontinuities: Depth; Defect Number; Defect Type; Dip; Defect Shape; Roughness; Aperture; Infill; Seepage; Spacing; Block Size; Block Shape; Remarks
	Depth	Type & Results							5	10	15	20	
	0.3	Peak = 77kPa Residual = 24kPa				OL: Organic SILT: dark brown. No plasticity. (Topsoil)							
	0.8	Peak = 91kPa Residual = 18kPa				ML: SILT: with some fine sand. Light orange brown. Low plasticity, sensitive. (Hinuera Formation)	M	St					
	1.0	TR2 C		1									
						SW: Fine to coarse SAND: with some silt and trace medium pumiceous gravel. Light grey mottled orange brown. Well graded. (Hinuera Formation)		MD					
				2			S						
				3									
				4									
				5									
						Test pit terminated at 2.50 m							

Termination Reason: Pit collapse due to groundwater.
Shear Vane No: 2995 DCP No: 18
Remarks: Groundwater encountered at 1.5m depth.

PHOTOGRAPH SHEET - TP25-05

Client: Harmony Energy New Zealand
Project: Hinuera Solar Farm
Location: Matamata
Project ID: HAM2025-0095
Date: 15/10/2025



TP25-05: 0.00m - 1.00m



TP25-05: 1.00m - 2.00m

This borehole report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination.

APPENDIX E

Electrical Resistivity Test Results

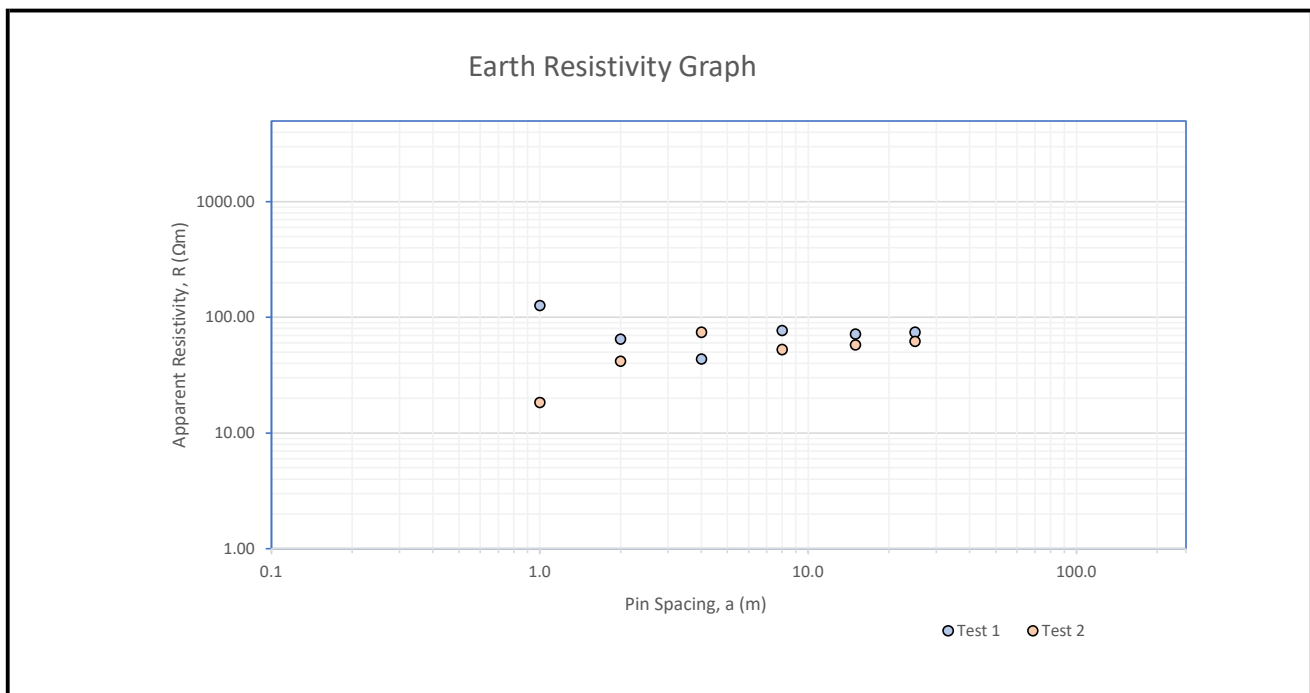
Earth Resistivity Test Results		
Client:	Harmony Energy New Zealand	
Project Name:	Hinuera Solar Farm	
Project Number:	HAM2025-0095	
Logged By:	AN	
Checked By:	MM	
Date:	16/10/2025	Sheet: 1 of 1

Test Number:	ERT01	Locality Reference:	TP25-03	SILT overlying sand
Bearing:	N-S	Equipment:	Sonel MRU200	
Location:	Refer to plan	Array Type:	Wenner Four Pin Method - ASTM G57-06 (2012)	
Ground Conditions:	Dry to moist		Weather Conditions:	Sunny
Pin Spacing, a (m)	Probe Embedment (m)	Wenner Resistance (Ω)	Apparent Resistivity (Ω m)	Standard Deviation (%)
1.0	0.1	20.12	126.40	1.0%
2.0	0.1	5.15	64.70	3.0%
4.0	0.1	1.73	43.60	7.0%
8.0	0.1	1.53	77.00	8.0%
15.0	0.1	0.76	71.70	17.0%
25.0	0.1	0.47	74.50	22.0%

Remark: 25V output

Test Number:	ERT01	Locality Reference:	TP25-03	SILT overlying sand
Bearing:	E-W	Equipment:	Sonel MRU200	
Location:	Refer to plan	Array Type:	Wenner Four Pin Method - ASTM G57-06 (2012)	
Ground Conditions:	Dry to moist		Weather Conditions:	Sunny
Pin Spacing, a (m)	Probe Embedment (m)	Wenner Resistance (Ω)	Apparent Resistivity (Ω m)	Standard Deviation (%)
1.0	0.1	2.93	18.40	4.0%
2.0	0.1	3.33	41.80	4.0%
4.0	0.1	2.96	74.30	4.0%
8.0	0.1	1.05	52.60	14.0%
15.0	0.1	0.61	57.80	16.0%
25.0	0.1	0.40	62.10	24.0%

Remark: 25V output



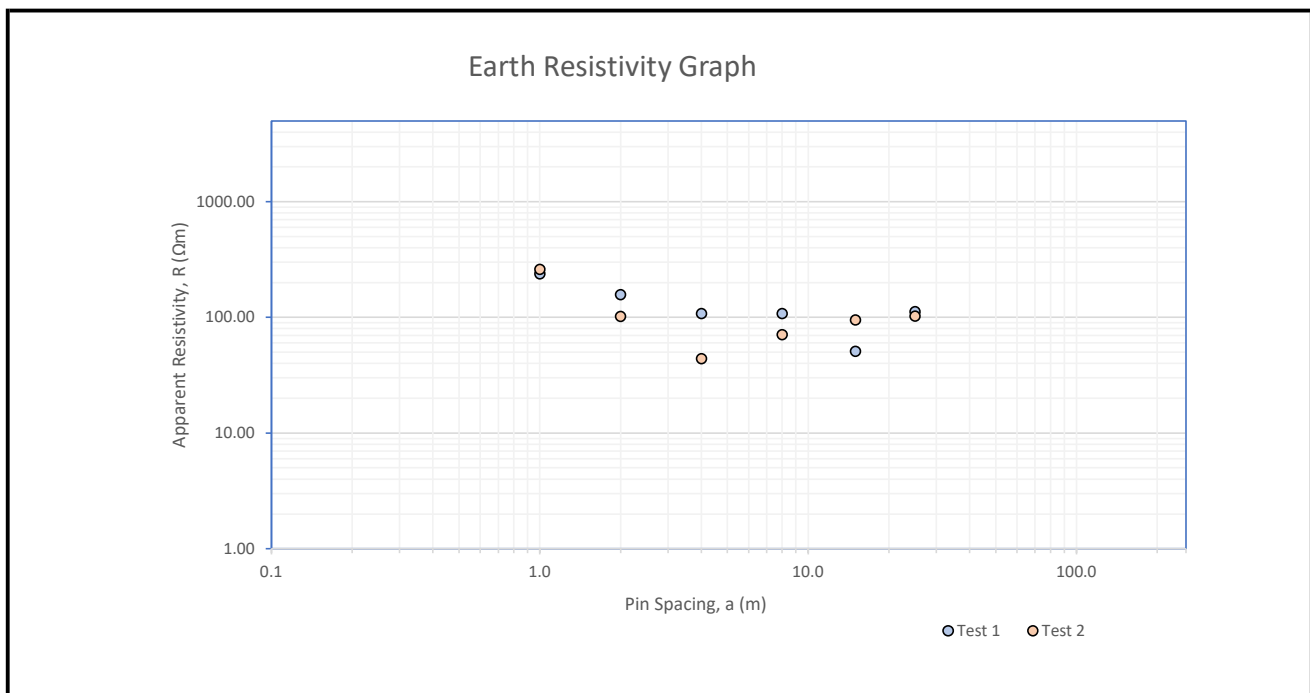
Earth Resistivity Test Results		
Client:	Harmony Energy New Zealand	
Project Name:	Hinuera Solar Farm	
Project Number:	HAM2025-0095	
Logged By:	AN	
Checked By:	MM	
Date:	16/10/2025	Sheet: 1 of 1

Test Number:	ERT02	Locality Reference:	TP25-05	SILT overlying sand
Bearing:	E-W	Equipment:	Sonel MRU200	
Location:	Refer to plan	Array Type:	Wenner Four Pin Method - ASTM G57-06 (2012)	
Ground Conditions:	Dry to moist		Weather Conditions:	Sunny
Pin Spacing, a (m)	Probe Embedment (m)	Wenner Resistance (Ω)	Apparent Resistivity (Ωm)	Standard Deviation (%)
1.0	0.1	37.88	238.00	1.0%
2.0	0.1	12.52	157.30	3.0%
4.0	0.1	4.30	108.00	8.0%
8.0	0.1	2.14	107.80	12.0%
15.0	0.1	0.54	51.00	45.0%
25.0	0.1	0.71	112.10	27.0%

Remark: 25V output

Test Number:	ERT02	Locality Reference:	TP25-05	SILT overlying sand
Bearing:	N-S	Equipment:	Sonel MRU200	
Location:	Refer to plan	Array Type:	Wenner Four Pin Method - ASTM G57-06 (2012)	
Ground Conditions:	Dry to moist		Weather Conditions:	Sunny
Pin Spacing, a (m)	Probe Embedment (m)	Wenner Resistance (Ω)	Apparent Resistivity (Ωm)	Standard Deviation (%)
1.0	0.1	41.54	261.00	2.0%
2.0	0.1	8.10	101.80	4.0%
4.0	0.1	1.75	44.00	15.0%
8.0	0.1	1.41	70.90	17.0%
15.0	0.1	1.01	95.00	32.0%
25.0	0.1	0.65	102.40	31.0%

Remark: 50V output



APPENDIX F

Laboratory Results

CALIFORNIA BEARING RATIO (REMOULDED)
TEST REPORT



Project : 4775 State Highway 27, Matamata
Location : Matamata
Client : CMW Geotechnical NZ Ltd
Contractor : -
Sampled by : Client
Date sampled : 17/10/25
Sampling method : Bulk Sample
Sample description : Sandy SILT/CLAY with trace gravel
Sample source : Insitu Test Pit

Project No : 2-68014.00
Lab Ref No : HA15797_TP02_CBR
Client Ref No : HAM2025-0095

Test Results			
Lab Ref No. :		HA15797_TP02	
Client Ref No. :		HAM2025-0095	
Sample source :		Insitu Test Pit	
Sample location :		TP25-02	
Sample description :		Insitu Material	
Sample condition at compaction :		As received	
Sample condition as tested :		Soaked	
Curing time :	days	-	
Soaking time ;	days	4	
Passing 19mm :	%	100	
Surcharge mass :	kg	4	
Lime additive :	%	-	
Cement additive :	%	-	
Swell :	%	-1.4	
Water content as received :	%	38.3	
Water content as compacted :	%	38.3	
Water content after testing :	%	38.9	
Dry Density :	t/m ³	1.26	
Penetration of CBR :	mm	2.5	
CBR value :	%	0.5	

Test Methods	Notes
CBR NZS : 4402 : 1986 : 6.1.1	Material Used Passing 19mm sieve
Water Content NZS : 4402 : 1986 : 2.1	Rate of penetration 1mm/min
Compaction NZS : 4402 : 1986 : 4.1.1 (Standard)	

Date tested : 03/11/25
Date reported : 12/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
This report may only be reproduced in full
All information supplied by Client

Approved Signatory

Designation : Senior Civil Engineering Technician
Date : 12/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

**CALIFORNIA BEARING RATIO (REMOULDED)
TEST REPORT**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Ltd
 Contractor : -
 Sampled by : Client
 Date sampled : 17/10/25
 Sampling method : Bulk Sample
 Sample description : Silty SAND with minor CLAY
 Sample source : Insitu Test Pit

Project No : 2-68014.00
 Lab Ref No : HA15797_TP04_CBR
 Client Ref No : HAM2025-0095

Test Results		
Lab Ref No. :		HA15797_TP04
Client Ref No. :		HAM2025-0095
Sample source :		Insitu Test Pit
Sample location :		TP25-04
Sample description :		Insitu Material
Sample condition at compaction :		As received
Sample condition as tested :		Soaked
Curing time :	days	-
Soaking time ;	days	4
Passing 19mm :	%	100
Surcharge mass :	kg	4
Lime additive :	%	-
Cement additive :	%	-
Swell :	%	-1.8
Water content as received :	%	58.5
Water content as compacted	%	58.5
Water content after testing :	%	54.0
Dry Density :	t/m ³	0.98
Penetration of CBR :	mm	5
CBR value :	%	1

Test Methods	Notes
CBR NZS : 4402 : 1986 : 6.1.1	Material Used Passing 19mm sieve
Water Content NZS : 4402 : 1986 : 2.1	Rate of penetration 1mm/min
Compaction NZS : 4402 : 1986 : 4.1.1 (Standard)	

Date tested : 03/11/25
 Date reported : 12/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full
 All information supplied by Client

Approved Signatory

Designation : Senior Civil Engineering Technician
 Date : 12/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

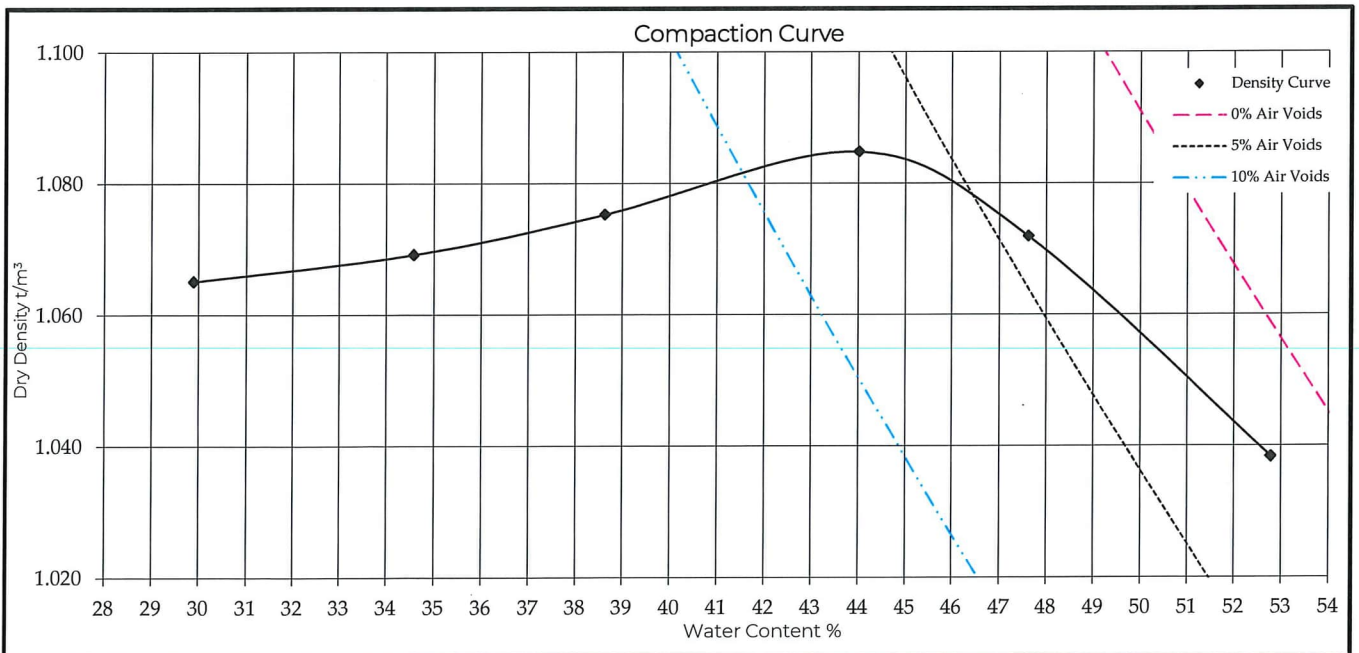
**DRY DENSITY / WATER CONTENT RELATIONSHIP
STANDARD COMPACTION**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Ltd
 Contractor : -
 Sampled by : Client
 Date sampled : 17/10/25
 Sampling method : Bulk Sample
 Sample description : Silty SAND with minor fine gravel
 Sample condition : As Received
 Solid density : 2.40 t/m³ (Assumed)
 Source : TP25-03

Project No : 2-68014.00
 Lab Ref No : HA15797_TP03_MDD
 Client Ref No : HAM2025-0095

Test Results							
Maximum dry density	1.08	t/m ³	Natural water content		52.8	%	
Optimum water content	44	%	Fraction tested		100%	Passing 19mm	
Sample ID	-350	-300	-225	-150	-75	Nat	
Bulk density t/m ³	1.384	1.439	1.491	1.562	1.582	1.586	
Water content %	29.9	34.6	38.6	44.0	47.6	52.8	
Dry density t/m ³	1.065	1.069	1.075	1.085	1.072	1.038	
Sample condition	Med Dense Dry	Med Dense Moist	Med Dense Moist	Dense Moist	Med Dense Wet	Loose Wet	



Test Methods	Notes
Compaction NZS 4402:1986 Test 4.1.1 (Standard)	All information supplied by Client

Date tested : 31/10/25
 Date reported : 12/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full

Approved Signatory

Designation : Senior Civil Engineering Technician
 Date : 12/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

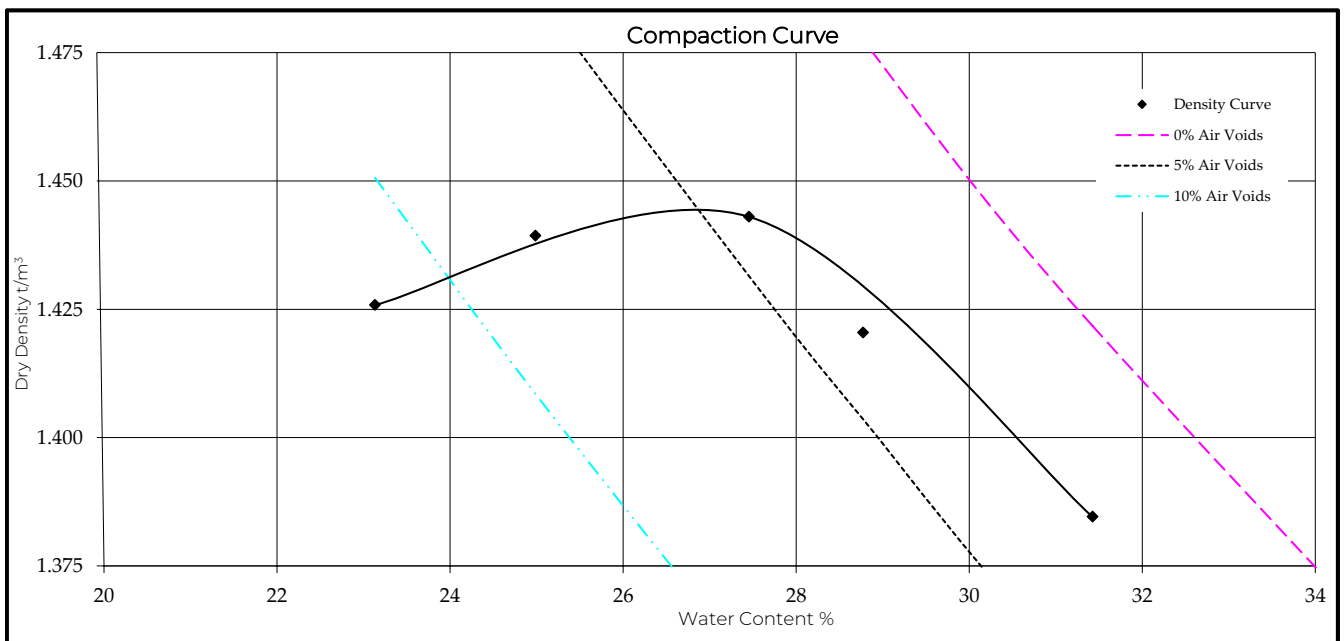
**DRY DENSITY / WATER CONTENT RELATIONSHIP
STANDARD COMPACTION**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Limited
 Contractor : Not stated
 Sampled by : Client
 Date sampled : 17/10/2025
 Sampling method : Bulk sample
 Sample description : Orange/brown SILT/SAND (pumaceous sands/ trace gravel)
 Sample condition : As received
 Solid density : 2.57 t/m³ (Tested)
 Source : TP25_05

Project No : 2-68014.00
 Lab Ref No : HA15797_TP05_MDD
 Client No : HAM2025-0095
 Report No : 5-22900/1597

Test Results							
Maximum dry density	1.44	t/m ³		Natural water content	34.3	%	
Optimum water content	27	%		Fraction tested	Whole		
Sample ID							
Bulk density	t/m ³	1.756	1.799	1.839	1.829	1.820	
Water content	%	23.1	25.0	27.5	28.8	31.4	
Dry density	t/m ³	1.426	1.439	1.443	1.420	1.385	
Sample condition							



Test Methods	Notes
Compaction : NZS 4402 : 1986 Test 4.1.1 (Standard)	All information supplied by Client
Solid Density : NZS 4407 : 2015 Test 2.7.1	History: As rec'd, air dried

Date tested : 10-11/11/2025
 Date reported : 13/11/2025

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.
 This report may only be reproduced in full

Approved Signatory

Designation : Team Leader - Testing Services (Z. Francis)
 Date : 13/11/2025



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

**SOLID DENSITY
TEST REPORT**

Project : 4775 State Highway 27, Matamata
Location : Matamata
Client : CMW Geotechnical NZ Limited
Contractor : Not stated
Sampled by : Client
Date sampled: 17/10/2025
Sampling method: Bulk sample
Sample history: As rec'd - Sealed in bags
Sample source: TP25_05

Project No: 2-68014.00
Sample No: HA15797_TP05_SD
Client Ref: HAM2025-0095

Test Results						
WSP Sample No:		HA15797_TP05_SD	-	-	-	-
Sample Description:		Orange/brown SILT/SAND (pumaceous sands/ trace gravel)	-	-	-	-
Solid density	t/m ³	2.57	-	-	-	-

Test Methods		Notes
Solid density	NZS 4407:2015 3.7.1	History: As rec'd, air dried Fraction tested: -19mm

Date tested : 11-13/11/2025
Date reported : 13/11/2025

Approved Signatory

Designation : Geomechanical Technician (DW Pollard)
Date : 13/11/2025

Testing is covered by IANZ accreditation
Results apply only to sample tested.
This report may only be reproduced in full



All tests reported herein
have been performed in
accordance with the
laboratory's scope of
accreditation

PF-LAB-004 (23/02/2010)

Page 1 of 1

PARTICLE SIZE ANALYSIS (WET SIEVE METHOD)

TEST REPORT

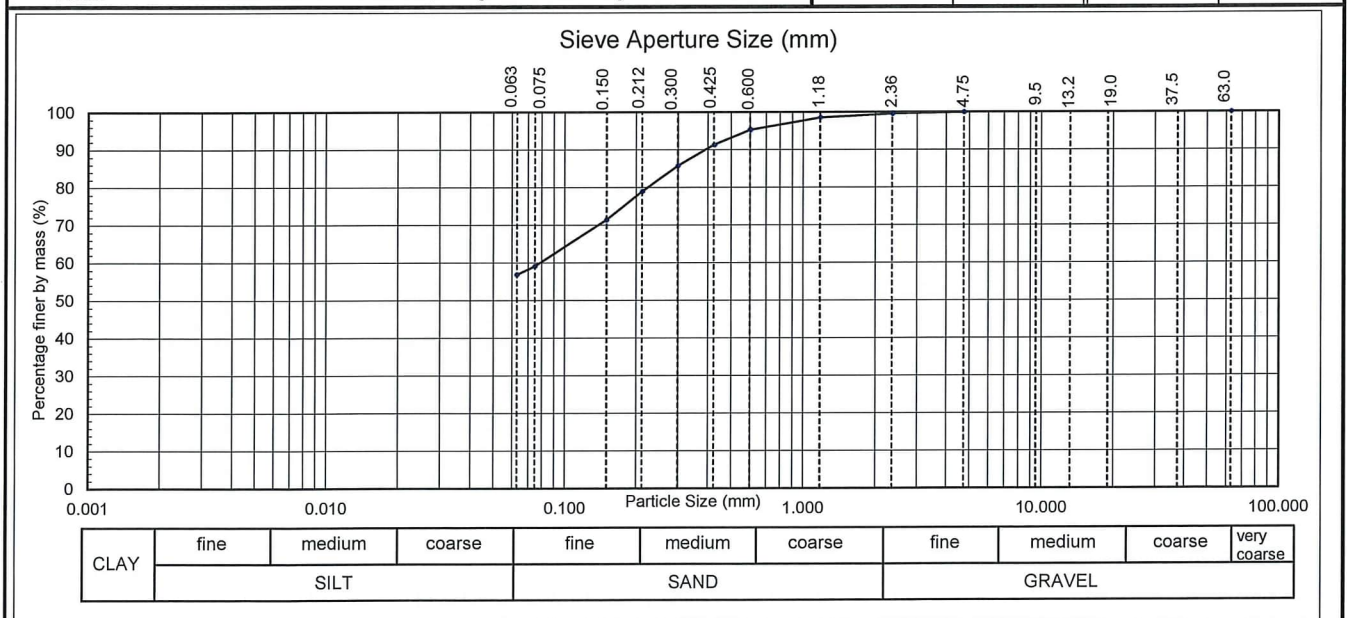


Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Ltd
 Consultant : -
 Test Pit No: 2
 Sample Ref No. : TP25-02
 Sampled by : Client
 Date sampled : 17/10/25
 Sampling method : Bulk Sample
 Sample condition : As Received
 Sample description : Sandy SILT/CLAY with trace gravel

Project No: 2-68014.00
 Lab Ref No: HA15797_TP02_PSD
 Client Ref: HAM2025-0095

Water Content (as received): 38.3 %

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	100	0.300	86	--	--	--	--
37.5	--	2.36	100	0.212	79	--	--	--	--
19.0	--	1.18	99	0.150	71	--	--	--	--
13.2	--	0.600	95	0.075	59	--	--	--	--
9.5	--	0.425	91	0.063	57	--	--	--	--
Note: "--" denotes sieve not used and/or hydrometer analysis not tested						--	--	--	--



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986: Test 2.8.1 (Wet Sieve Method)	All information supplied by Client

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

Date Tested: 06/11/25 This report may only be reproduced in full
 Date Reported: 12/11/25
 Approved Signatory: 
 Designation: Senior Civil Engineering Technician
 Date: 12/11/25



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PARTICLE SIZE ANALYSIS (HYDROMETER METHOD)

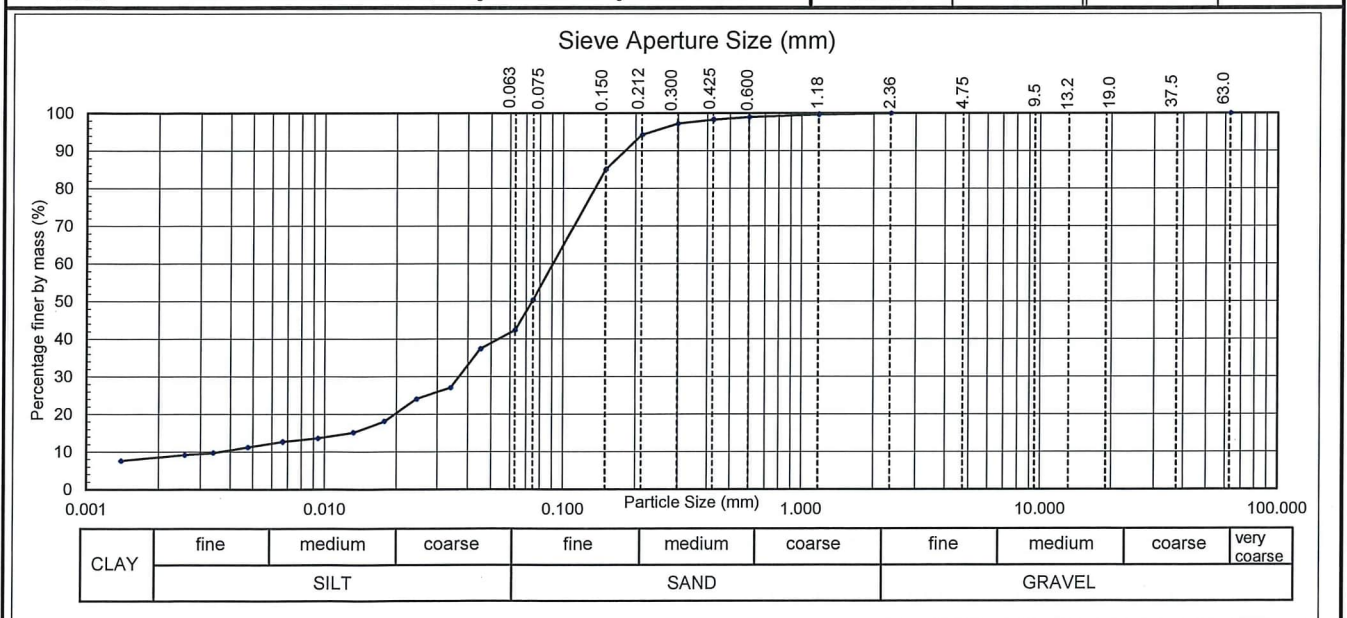
TEST REPORT



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Ltd
 Consultant : -
 Test Pit No: 4
 Sample Ref No. : TP25-04
 Sampled by : Client
 Date sampled : 17/10/25
 Sampling method : Bulk Sample
 Sample condition : As Received
 Sample description : Silty SAND with minor clay
 Solid Particle Density (t/m³): 2.60 Assumed
 Water Content (as received): 57.9 %

Project No: 2-68014.00
 Lab Ref No: HA15797_TP04_HYD
 Client Ref: HAM2025-0095

Sieve Analysis						Hydrometer Analysis			
Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Sieve Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)	Particle Size (mm)	Passing (%)
63.0	--	4.75	--	0.300	97	0.0452	37	0.0067	13
37.5	--	2.36	100	0.212	94	0.0340	27	0.0048	11
19.0	--	1.18	100	0.150	85	0.0244	24	0.0034	10
13.2	--	0.600	99	0.075	50	0.0178	18	0.0026	9
9.5	--	0.425	98	0.063	42	0.0132	15	0.0014	8
Note: "--" denotes sieve not used and/or hydrometer analysis not tested						0.0094	14		



Test Methods	Notes
Particle Size Analysis: NZS 4402:1986; Test 2.8.4 (Washed Grading & Hydrometer Method)	pH of suspension : 9.5 (ORION STAR A211 pH Meter) All information supplied by Client

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Date Tested: 11/11/25 This report may only be reproduced in full
 Date Reported: 12/11/25
 Approved Signatory:
 Designation : Senior Civil Engineering Technician
 Date : 12/11/25



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PLASTICITY INDEX FOR SOILS
TEST REPORT



Project : 4775 State Highway 27, Matamata
Location : Matamata
Client : CMW Geotechnical NZ Ltd
Contractor : -
Sampled by : Client
Date sampled : 17/10/25
Date received : 21/10/25
Sampling method : Bulk Sample
Sample condition : As Received

Project No : 2-68014.00
Lab Ref No : HA15797_TP01_PI
Client Ref No : HAM2025-0095

Test Results		
Sample Lab Ref No :	HA15797_TP01_PI	
Test Pit No. :	TP25-01	
Sample Depth (m) :	-	
Soil Fraction Tested :	-425µm	
Natural Water Content (%) :	58.1	
Liquid Limit :	84	
Plastic Limit :	52	
Plasticity Index :	32	
Sample Description :	HA15797_TP01_PI Sandy SILT/CLAY with minor gravel	
Test Methods		Notes
Water Content	NZS 4402 : 1986, Test 2.1	Soil fraction tested as shown.
Liquid Limit	NZS 4402 : 1986, Test 2.2	
Plastic Limit	NZS 4402 : 1986, Test 2.3	
Plasticity Index	NZS 4402 : 1986, Test 2.4	

Date tested : 07/11/25
Date reported : 12/11/25

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Approved Signatory

Designation : Senior Civil Engineering Technician
Date : 12/11/25



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LINEAR SHRINKAGE FOR SOILS
TEST REPORT



Project : 4775 State Highway 27, Matamata
Location : Matamata
Client : CMW Geotechnical NZ Ltd
Contractor : -
Sampled by : Client
Date sampled : 17/10/25
Date received : 21/10/25
Sampling method : Bulk Sample
Sample condition : As Received

Project No : 2-68014.00
Lab Ref No : HA15797_TP01_LS
Client Ref No : HAM2025-0095

Test Results	
Sample Lab Ref No :	HA15797_TP01
Location ID :	TP25-01
Sample Depth (m) :	-
Soil Fraction Tested :	-425µm
Sample History :	Natural
Water Content as Rec'd (%) :	59.4
Water Content at LS test (%) :	85.3
Linear Shrinkage (%) :	12
Sample Description : HA15797_TP01 Sandy SILT/CLAY with minor gravel	

Test Methods	Notes
Water Content NZS 4402 : 1986, Test 2.1 Linear Shrinkage NZS 4402 : 1986, Test 2.6	Sample description is not IANZ endorsed.

Date tested : 10/11/25

Date reported : 12/11/25

Sampling is not covered by IANZ Accreditation. Results apply only to sample tested.

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All information supplied by Client

Approved Signatory

Designation : Senior Civil Engineering Technician

Date : 12/11/25



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accredited are outside the
scope of the laboratory's
accreditation

**ELECTRICAL RESISTIVITY
TEST REPORT**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Ltd
 Contractor : Not stated
 Sampled by : Client
 Sampling date : 17/10/2025
 Sampling method : Bulk sample
 Sample history : As received

Project No: 2-68014.00
 Sample No: HA15797_TP05_ER
 Client No: HAM2025-0095
 Report No: 5-22900/1597

Test Results					
Client Ref:	HAM2025-0095		-	-	
WSP Sample No:	HA15797_TP05_ER		-	-	
Sample Source:	TP25_05		-	-	
Sample description:	Orange/brown SILT/SAND (pumaceous sands/ trace gravel)		-	-	
Electrical Resistivity @ saturated water content	Ohm.cm @ 20 °C	25,200	-	-	
As received water content (whole)	w	%	34.3	-	-
As compacted water content (whole)	w	%	28.0	-	-
Bulk density	ρ	t/m ³	1.74	-	-
Dry density	ρ_d	t/m ³	1.36	-	-
Percent compaction*		%	94	-	-
Saturated water content	w	%	28.4	-	-

Test Methods	Notes:
Works CD 512: 1988 Appendix B. "Laboratory determination of the resistivity of backfill material".	*Target density is 95% NZ Std compaction MDD using lab data = 1.44 t/m ³ @ 27% water content Soaked with distilled water. All information supplied by client.

Date tested : 14-18/11/2025
 Date reported : 18/11/2025
 Reported by: R. Steele (Senior Laboratory Technician)

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 Results apply only to sample tested.

CSF 2004 (22/08/03)

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ORGANIC MATTER CONTENT BY IGNITION
TEST REPORT



Project : 4775 State Highway 27, Matamata
Location : Matamata
Client : CMW Geotechnical NZ Ltd
Contractor : -
Sampled by : Client
Date sampled : 17/10/25
Date received : 21/10/25
Sampling method : Bulk sample
Sample condition : As received

Project No : 2-68014.00
Lab Ref No : HA15797_TP05_OC
Client Ref No : HAM2025-0095

Test Results

Sample Lab Ref No : HA15797_TP05_OC
Location ID : TP25-05
Sample Depth (m) : -
Water Content (%) : 23.0
Organic Matter (%) : 0
Sample Description : HA15797_TP05_OC SILT

Test Methods	Notes
Organic Matter Content : NZS 4402 : 1986, Test 3.1.2 Water Content : NZS 4402 : 1986, Test 2.1	For highly organic soils this method is sufficient for day to day engineering purposes, but should not be relied on for organic contents less than 15%

Date tested : 13-17/11/25
Date reported : 18/11/25

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All information supplied by Client

Approved Signatory

Designation : Senior Civil Engineering Technician
Date : 18/11/25



Test results indicated as not accredited are outside the scope of the laboratory's accreditation

**THERMAL RESISTIVITY
TEST REPORT**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Limited
 Contractor : n/a
 Sampled by : Client
 Date sampled: 17/10/2025
 Sampling method: Push tube + Bulk sample
 Sample history: As received

Project No: 2-68014.00
 Sample No: HA15797_TP03_TR
 Client Ref: HAM2025-0095

Test Results								
WSP Sample No:		HA15797/3A	HA15797/3B	HA15797/3C	HA15797/3D	-	-	
Sample source:		TP25-03 TP03				-	-	
Sample description:		Silty SAND				-	-	
Water content	%	57.9	24.2	6.5	0.98	-	-	
Thermal Resistivity	°C.m/W	1.77	3.46	6.40	6.57	-	-	
Water content (as rec'd)	w	%	57.8	←	←	←	-	-
Bulk density	ρ	t/m ³	1.38	←	←	←	-	-
Dry density	ρ _d	t/m ³	0.87	←	←	←	-	-
Compacted water content		%	n/a	←	←	←	-	-
Compacted bulk density	ρ	t/m ³	n/a	←	←	←	-	-
Compacted dry density	ρ _d	t/m ³	n/a	←	←	←	-	-
Compaction percent (NZ Std)		%	n/a	←	←	←	-	-

Thermal dry out curve				Thermal dry out curve - Log scale			

Test Methods	Notes
Water content Thermal resistivity	NZS 4402:1986 test 2.1 Thermal resistivity testing is carried out in accordance with ASTM D5334-14. The detailed methodology includes in-house technical developments and improvements. Intermediate water contents calculated by mass loss. Thermal dry out curve line is MS-Excel calculated logarithmic scale of best fit and valid for the stated range tested Specimen size(mm) 98.4Ø x 378 100% passing 4.75 mm. All information supplied by client.

Date tested: 30/10 - 08/12/2025

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Reported by: ZJF
 Date reported: 08/12/2025

PF-LAB-004 (27/07/2020)

Page 1 of 1

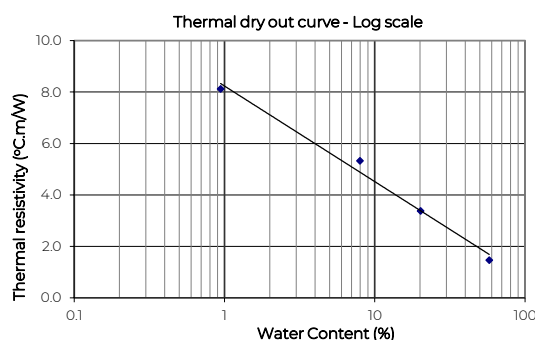
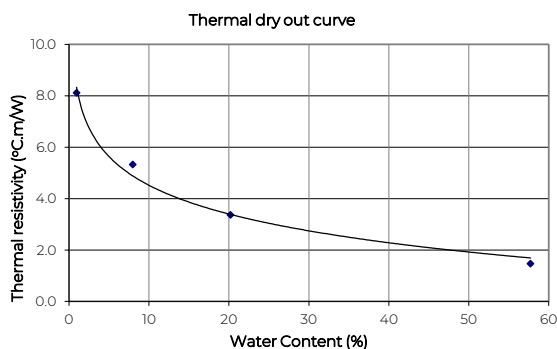
**THERMAL RESISTIVITY
TEST REPORT**



Project : 4775 State Highway 27, Matamata
 Location : Matamata
 Client : CMW Geotechnical NZ Limited
 Contractor : n/a
 Sampled by : Client
 Date sampled: 17/10/2025
 Sampling method: Push tube + Bulk sample
 Sample history: As received

Project No: 2-68014.00
 Sample No: HA15797_TP05_TR
 Client Ref: HAM2025-0095

Test Results								
WSP Sample No:		HA15797/5A	HA15797/5B	HA15797/5C	HA15797/5D	-	-	
Sample source:		TP25-05 TP05 1.0m				-	-	
Sample description:		Silty SAND				-	-	
Water content	%	57.7	20.2	8.0	0.94	-	-	
Thermal Resistivity	°C.m/W	1.47	3.37	5.33	8.12	-	-	
Water content (as rec'd)	w	%	57.7	←	←	←	-	-
Bulk density	ρ	t/m ³	1.22	←	←	←	-	-
Dry density	ρ_d	t/m ³	0.77	←	←	←	-	-
Compacted water content		%	n/a	←	←	←	-	-
Compacted bulk density	ρ	t/m ³	n/a	←	←	←	-	-
Compacted dry density	ρ_d	t/m ³	n/a	←	←	←	-	-
Compaction percent (NZ Std)		%	n/a	←	←	←	-	-



Test Methods	Notes
Water content	NZS 4402:1986 test 2.1
Thermal resistivity	Thermal resistivity testing is carried out in accordance with ASTM D5334-14. The detailed methodology includes in-house technical developments and improvements.
	Intermediate water contents calculated by mass loss.
	Thermal dry out curve line is MS-Excel calculated logarithmic scale of best fit and valid for the stated range tested
	Specimen size(mm) 98.7Ø x 411
	100% passing 4.75 mm.
	All information supplied by client.

Date tested: 30/10 - 04/12/2025

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Reported by: ZJF
 Date reported: 08/12/2025

Certificate of Analysis

Page 1 of 2

Client:	CMW Geotechnical NZ Limited	Lab No:	4012136	SPv1
Contact:	Mark McVinnie	Date Received:	20-Oct-2025	
	C/- CMW Geotechnical NZ Limited	Date Reported:	30-Oct-2025	
	PO Box 995	Quote No:	141110	
	Waikato Mail Centre	Order No:	HAM141736	
	Hamilton 3240	Client Reference:		
		Submitted By:	Mark McVinnie	

Sample Type: Soil

Sample Name:		TP05 07-Oct-2025 1:00 pm	
Lab Number:		4012136.1	
Individual Tests			
Total Recoverable Magnesium	mg/kg dry wt	310	
Chloride*	mg/kg dry wt	< 50	
pH*	pH Units	6.7	
Water Soluble Sulphate as SO4 and SO3*			
Water Soluble Sulphate*	g/100g dry wt	< 0.010	
Water Soluble Sulphate as SO3*	g/100g dry wt	< 0.010	
Water Soluble Sulphate as SO4*	g/L in extract	< 0.10	
Water Soluble Sulphate as SO3*	g/L in extract	< 0.10	

Sample Type: Aqueous

Sample Name:		Drain 1 17-Oct-2025 3:30 pm
Lab Number:		
		4012136.2
Individual Tests		
pH	pH Units	7.0
Dissolved Magnesium	g/m³	7.5
Chloride	g/m³	32
Sulphate	g/m³	35

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%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1
Non-Routine Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1
Non-Routine sample preparation. Air drying and 425 um sieving.*	Air dried and sieved, <425 um fraction. Used for sample preparation.	-	1
Non-Routine sample preparation. Air drying and 90 um sieving.*	Air dried and sieved, <90 um fraction. Used for sample preparation.	-	1



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Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Water Soluble Sulphate as SO ₄ and SO ₃ *		-	1
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	-	1
Total Recoverable Magnesium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	40 mg/kg dry wt	1
Water Soluble Chloride*	Extraction into boiling water, potentiometric titration with silver nitrate. DIN 4030 Part 2 section 5.3.5.	50 mg/kg dry wt	1
pH*	2.5:1 water:air dried, sub-2mm sieved soil, vol:wt, stand 8 hrs, electrometric with a pH meter. BS 1377: Part 3: 1990 section 9.5.	0.1 pH Units	1
Water Soluble Sulphate as SO ₄ *	Gravimetric after 2:1 water extn of sub-425um sample, dried at 80°C, and pptn as BaSO ₄ . BS 1377:Part 3:1990 sections 5.3.3, 5.5.	0.010 g/100g dry wt	1
Water Soluble Sulphate as SO ₃ *	Gravimetric after 2:1 water extn of sub-425um sample, dried at 80°C, and pptn as BaSO ₄ . BS 1377:Part 3:1990 sections 5.3.3, 5.5.	0.010 g/100g dry wt	1
Water Soluble Sulphate as SO ₄ *	BS 1377:Part 3:1990 sections 5.3.3, 5.5 (reported as g/L in 2:1 water soil extract).	0.10 g/L in extract	1
Water Soluble Sulphate as SO ₃ *	BS 1377:Part 3:1990 sections 5.3.3, 5.5 (reported as g/L in 2:1 water soil extract).	0.10 g/L in extract	1

Sample Type: Aqueous			
Test	Method Description	Default Detection Limit	Sample No
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	2
pH	pH meter. APHA 4500-H ⁺ B (modified) : Online Edition. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	2
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	2
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.02 g/m ³	2
Chloride	Filtered sample. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m ³	2
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m ³	2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 20-Oct-2025 and 30-Oct-2025. 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.

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Ara Heron BSc (Tech)
Client Services Manager - Environmental

APPENDIX G

Natural Hazards Risk Assessment

NATURAL HAZARDS RISK ASSESSMENT

HINUERA SOLAR FARM, 4775 STATE HIGHWAY 29, MATAMATA

1 CONTEXT

Section 106 of the Resource Management Act (RMA) requires an assessment of the risk from natural hazards to be carried out when considering the granting of a subdivision consent. S106 RMA specifically states that the assessment must consider the combined effect of the natural hazard likelihood and material damage to land, other land or structures (consequence).

Section 2 of the RMA defines natural hazards as any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.

This appendix to CMW report reference HAM2025-0095AB Rev0 sets out the criteria for and presents the results of an assessment of the geotechnical-related natural hazards associated with this proposed development. The remaining hazards, i.e. tsunami, wind, drought, fire and flooding hazards are not covered by this assessment.

2 BASIS OF ASSESSMENT

2.1 Risk Classification

The occurrence of natural hazards and their potential impacts on the proposed development is assessed in terms of risk significance, which is based on likelihood and consequence factors. A risk table is used to help assess the likelihood and consequence factors, the form of which used by CMW for this project is presented in Table B1.

Table B1: Natural Hazard Risk Classification						
Risk Matrix		Consequence				
		Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
Likelihood	Almost Certain 5	Medium 5	High 10	Very high 15	Extreme 20	Extreme 25
	Likely 4	Low 4	Medium 8	High 12	Very high 16	Extreme 20
	Moderate 3	Low 3	Medium 6	Medium 9	High 12	Very high 15
	Unlikely 2	Very low 2	Low 4	Medium 6	Medium 8	High 10
	Rare 1	Very low 1	Very low 2	Low 3	Low 4	Medium 5

2.2 Likelihood

With respect to assessing the likelihood or chance of the risk occurring, the qualitative definitions used by CMW for this project are provided in Table B2 for each likelihood classification.

Table B2: Qualitative Natural Hazard Likelihood Definitions		
1	Rare	The natural hazard is not expected to occur during the design life of the project
2	Unlikely	The natural hazard is unlikely, but may occur during the design life
3	Moderate	The natural hazard will probably occur at some time during the life of the project
4	Likely	The natural hazard is expected to occur during the design life of the project
5	Almost Certain	The natural hazard will almost definitely occur during the design life of the project

2.3 Consequence

In terms of determining the consequence or severity of the natural hazard occurring, the qualitative definitions used by CMW for this project are provided in Table B3 for each consequence classification.

Table B3: Qualitative Natural Hazard Consequence Definitions		
1	Insignificant	Very minor to no damage, not requiring any repair, no people at risk, no economic effect to landowners.
2	Minor	Minor damage to land only, any repairs can be considered normal property maintenance no people at risk, very minor economic effect.
3	Moderate	Some damage to land requiring repair to reinstate within few months, minor cosmetic damage to buildings being within relevant code tolerances, does not require immediate repair, no people at risk, minor economic effect.
4	Major	Significant damage to land requiring immediate repair, damage to buildings beyond serviceable limits requiring repair, no collapse of structures, perceptible effect to people, no risk to life, considerable economic effect.
5	Catastrophic	Major damage to land and buildings, possible structure collapse requiring replacement, risk to life, major economic effect, or possible site abandonment.

2.4 Risk Acceptance

It is recognised that the natural hazard risk assessment provided herein is qualitative and, due to the wide range of possible geohazards that could occur, is somewhat subjective. Other methods are available to quantitatively assess an acceptable level of geotechnical related natural hazard risk, such as defining an acceptable factor of safety with respect to slope stability or acceptable differential ground settlements with respect to recommended building code limits.

Therefore, to give this qualitative natural hazard risk assessment some relevance to more commonly adopted numerical or quantitative geotechnical assessment techniques, a residual risk rating of very low to medium (risk value = 1 to 9 inclusive) is considered an acceptable result for the proposed subdivision development.

A risk rating of high to extreme (risk value ≥ 10) is considered an unacceptable result for the proposed subdivision development.

3 RISK ASSESSMENT

The natural hazards relevant to this proposed subdivision development and adjacent, potentially affected land have been assessed with respect to the criteria outlined above.

Assessment is based on proposed post development ground conditions with and without any geotechnical controls. The latent risk was first assessed with the site in its proposed developed state to consider the risks to the development and surrounding land, including assessment of land modifications from the pre-existing natural state, without any implemented geotechnical controls. The specific geotechnical mitigation measures and engineering design solutions outlined in the table below and CMW report, where relevant, were then considered to determine the natural hazard residual risk remaining after the proposed controls have been implemented.

Results of this assessment are presented in Table C1 below.

Table C1: Natural Hazard Risk Assessment Results

RMA S2 Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Earthquake	Fault Rupture	1	5	Medium 5	Low consequence for solar arrays. However stiffened foundations will be required for IL3 structures to resist ground deformation caused by major seismic event	1	4	Low 4
	Liquefaction Induced Flooding and/ or Subsidence	2	4	Medium 8	Stiffened foundations of IL3 structures to resist differential settlement due to liquefaction	2	2	Low 4
	Lateral Spread	2	4	Medium 8	Stiffened foundations of IL3 structures to resist ground deformation caused by lateral spread	2	2	Low 4
Volcanic Activity	Ash & Pyroclastic Falls	1	5	Medium 5	Proximity to active volcanoes	1	5	Medium 5
Erosion	Cut Batters	1	4	Low 4	Site is predominantly flat or low rolling hills	1	4	Low 4
Landslip	Global Slope Instability	1	4	Low 4	Site is predominantly flat or low rolling hills	1	4	Low 4
	Soil Creep	1	4	Low 4	Site is predominantly flat or low rolling hills	1	4	Low 4
	Bearing Capacity Failure	2	4	Medium 8	Pile support / Undercut and replace	1	4	Low 4
Subsidence	Expansive Soils	1	2	Very Low 2	Only expansive soils are within low hills where no construction is planned	1	2	Very Low 2

Table C1: Natural Hazard Risk Assessment Results

RMA S2 Hazard	Description	Proposed Site Latent Risk of Damage to Land / Structures			Comments and Geotechnical Control	Proposed Site Residual Risk of Damage to Land / Structures OR Acceleration/ Worsening of Hazard with Geotechnical Controls Implemented		
		Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
	Soft Soils	4	2	Medium 8	Majority of Settlement is expected to occur during construction and long term settlement will be within building code limits	4	1	Low 4
	Sensitive Soils	3	2	Medium 6	Compaction control, contractor awareness, removal if necessary	2	2	Low 4
	Effects of Dewatering	1	3	Low 3	No dewatering planned.	1	3	Low 3

Notes:

- Assessments include the impact of the proposed subdivision works on adjacent properties.
- The following reference(s) contain information on the hazards contained in this assessment and the non-geotechnical hazards that have not been included:

<https://gis.taranuadc.govt.nz/LocalMapsViewer/?map=f92ad2cb22554127b4e11388c625aaae>

APPENDIX H

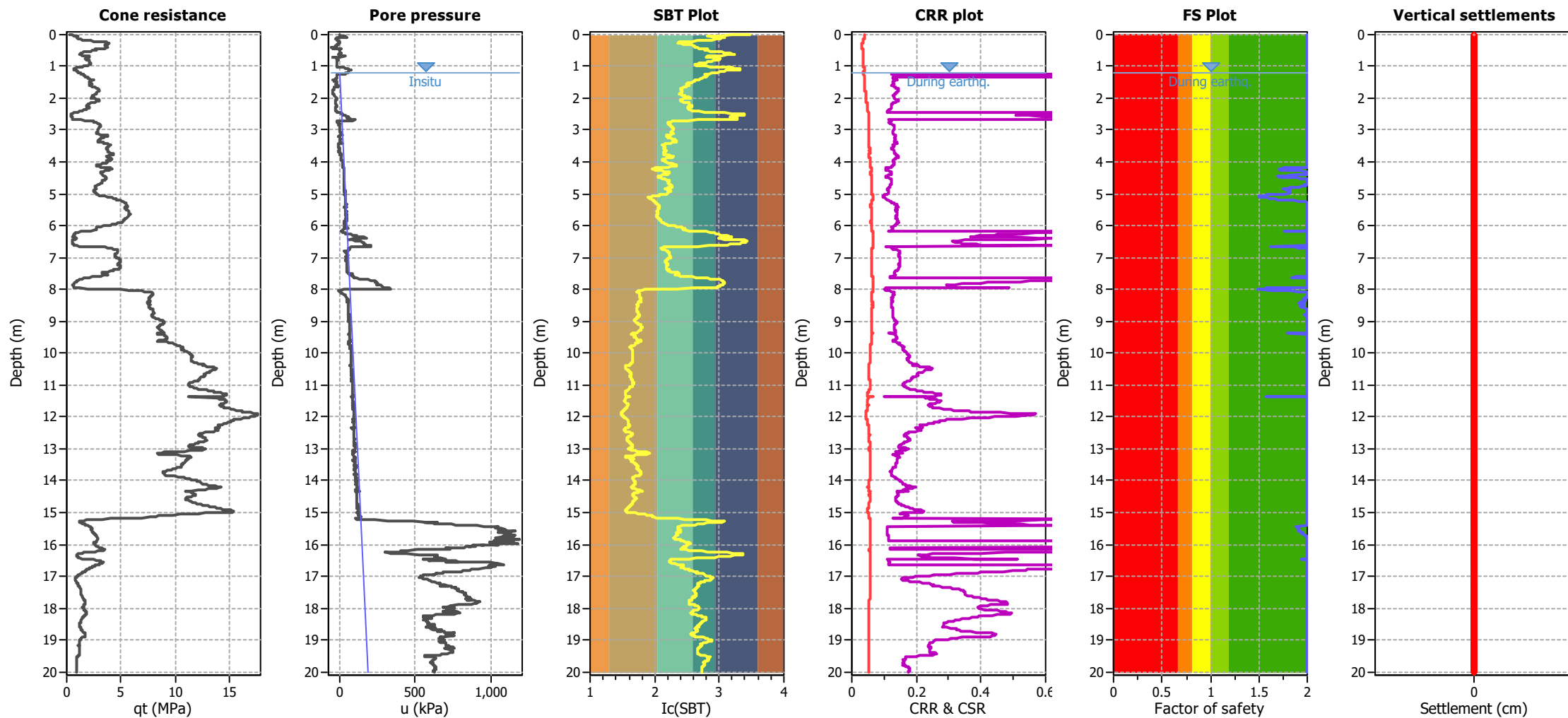
Liquefaction Results

Project:

Location:

CPT: CPT-01

Total depth: 20.01 m



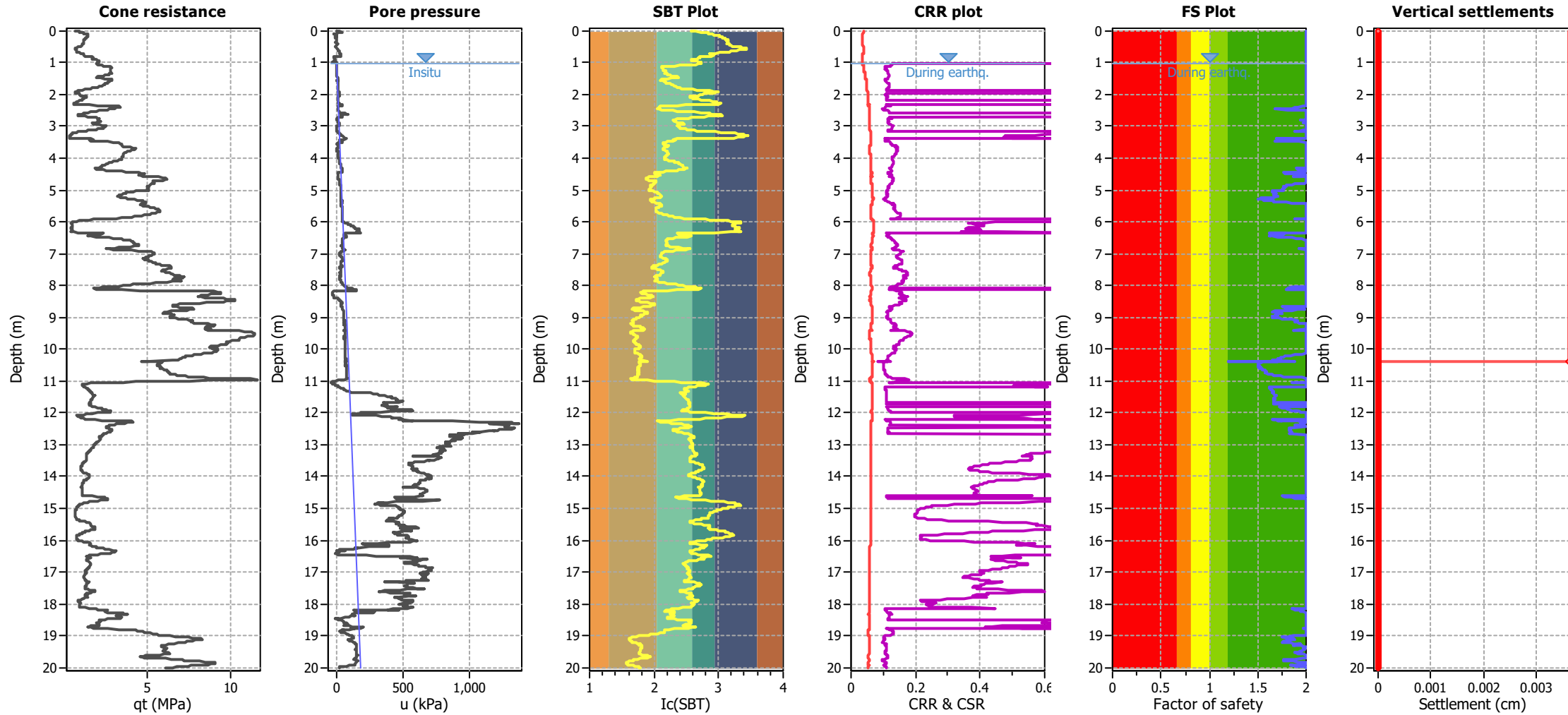
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.22 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.22 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.07	Unit weight calculation:	Based on SBT	K_0 applied:	Yes		

Project:

Location:

CPT: CPT-02

Total depth: 20.01 m



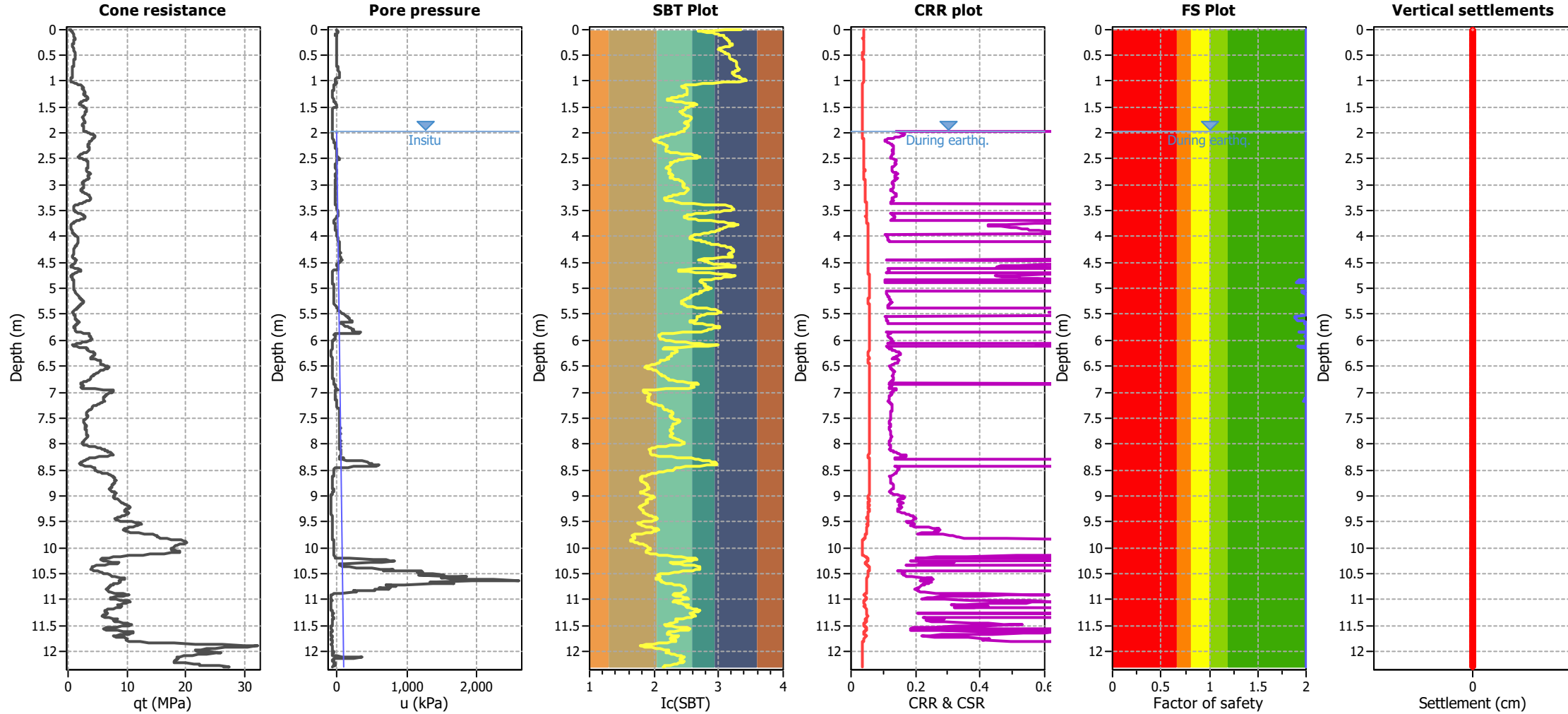
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.03 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.03 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.07	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-03

Total depth: 12.30 m

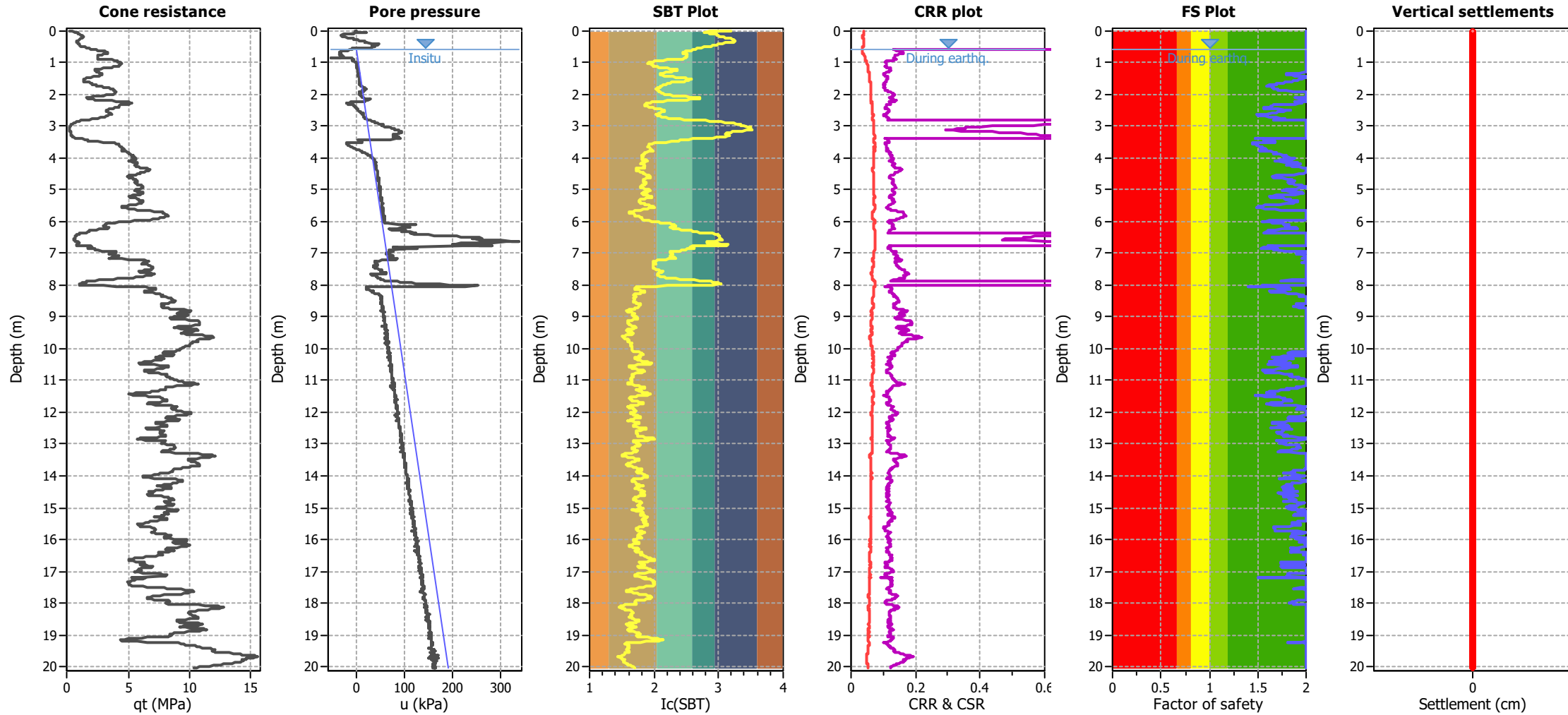


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.96 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.96 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.07	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:
Location:

CPT: CPT-04

Total depth: 20.04 m



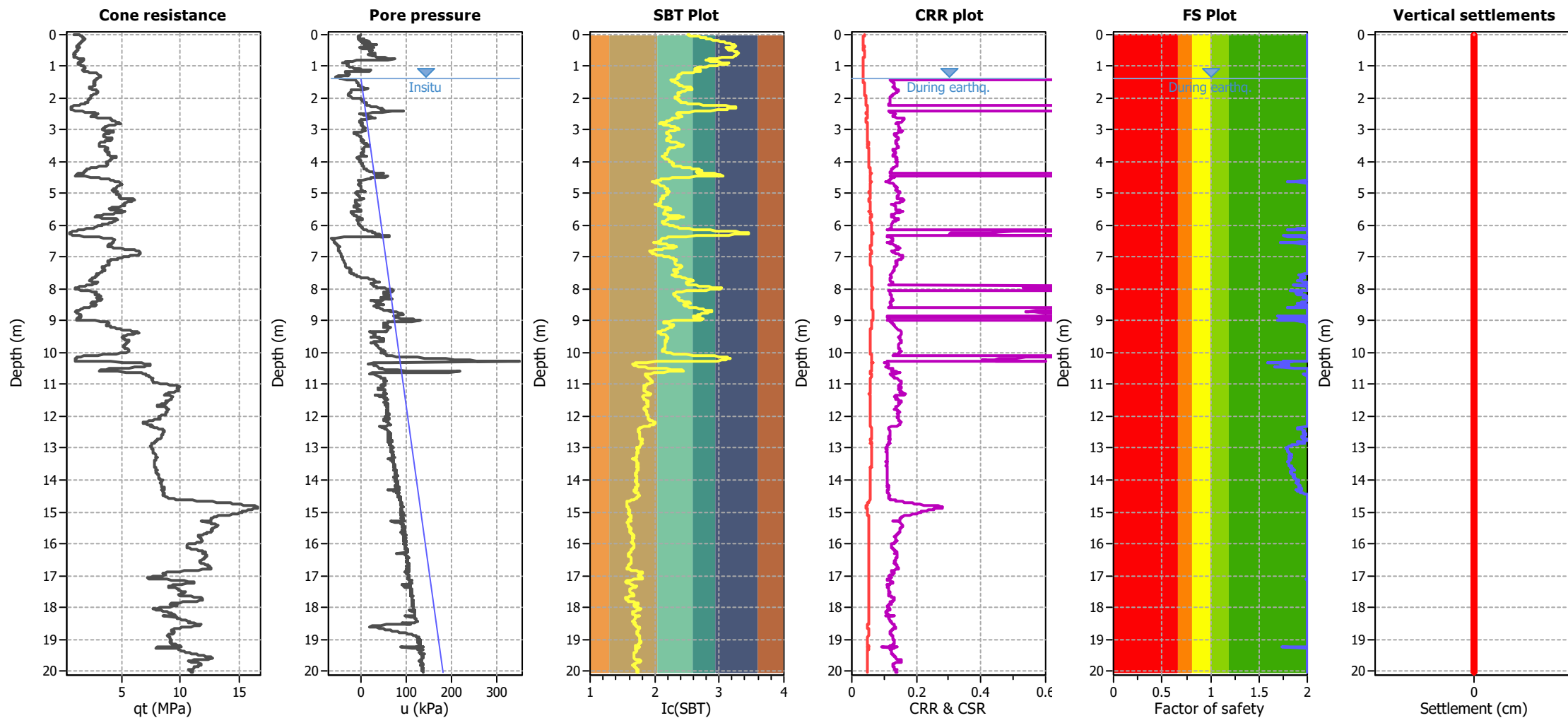
Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.58 m	Use fill:	No	Clay like behavior	applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.58 m	Fill height:	N/A	Limit depth applied:	No	N/A
Points to test:	Based on I_c value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A	Method based
Earthquake magnitude M_w :	5.90	I_c cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based	
Peak ground acceleration:	0.07	Unit weight calculation:	Based on SBT	K_0 applied:	Yes			

Project:

Location:

CPT: CPT-05

Total depth: 20.04 m



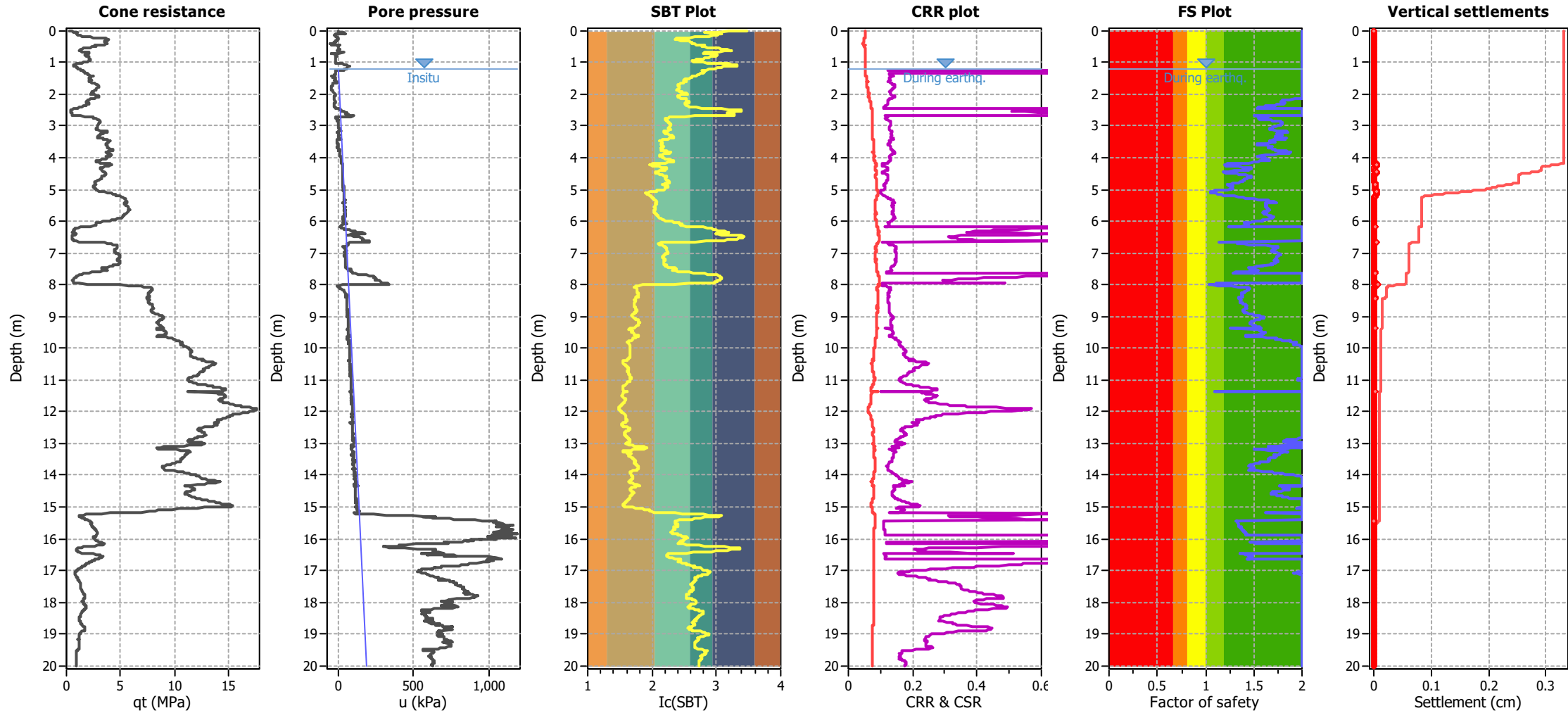
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.07	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-01

Total depth: 20.01 m



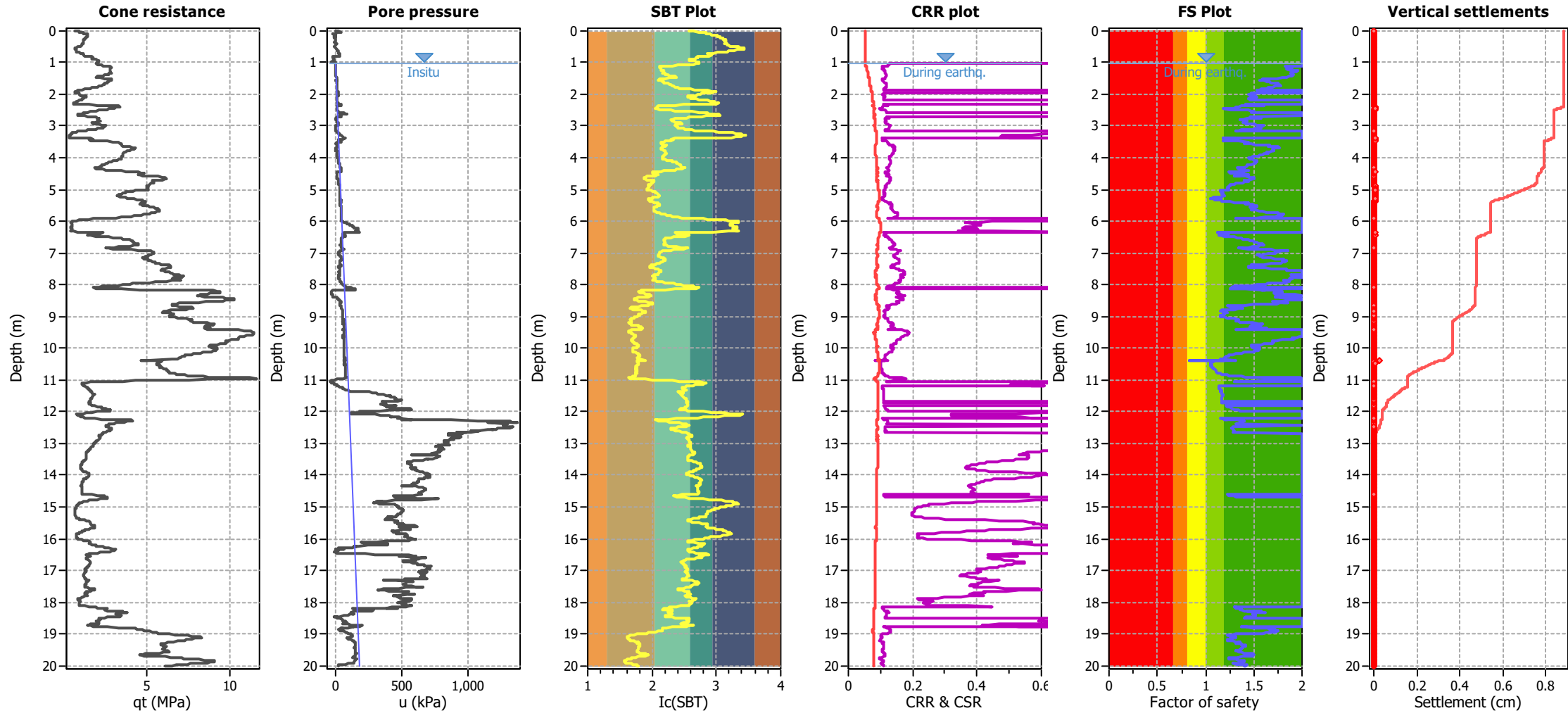
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.22 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.22 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-02

Total depth: 20.01 m



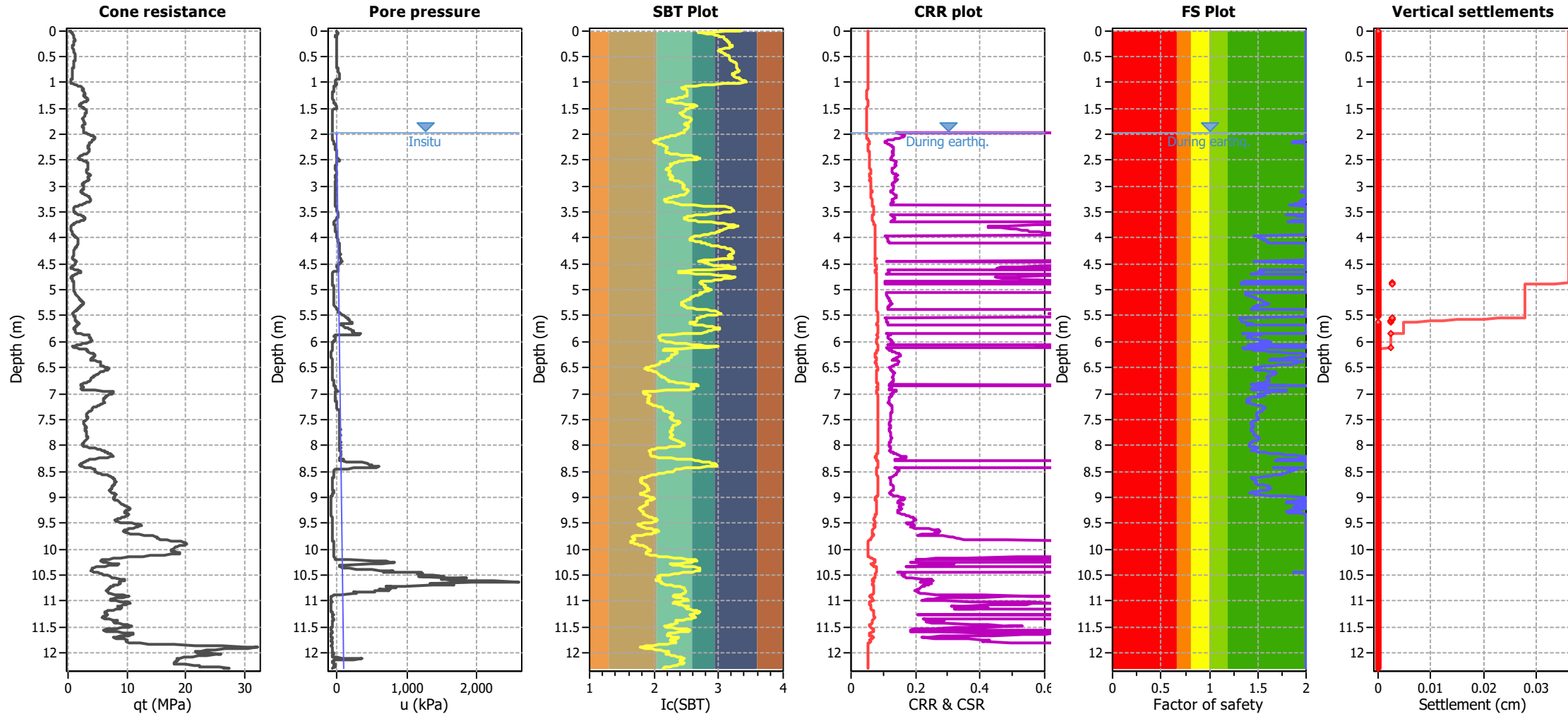
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.03 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.03 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-03

Total depth: 12.30 m



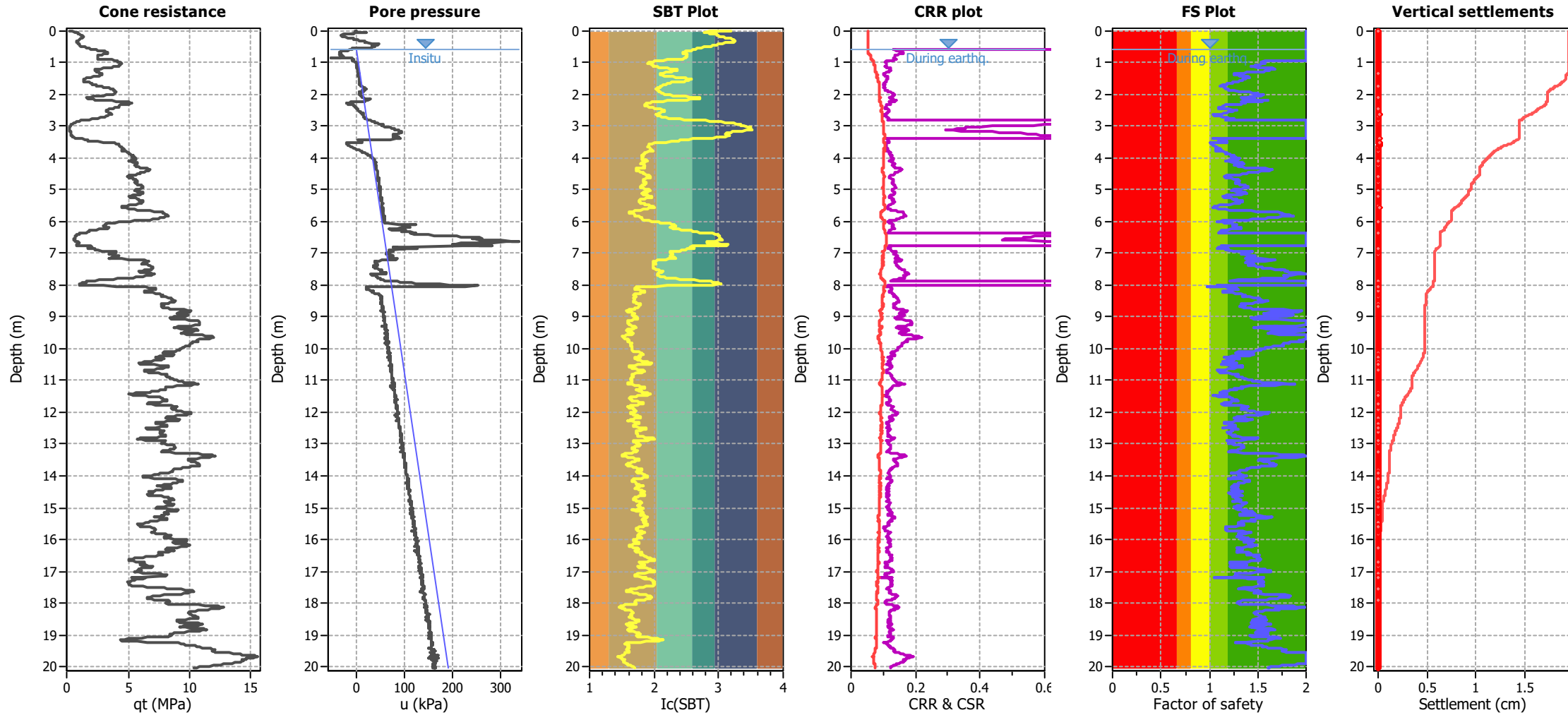
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.96 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.96 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-04

Total depth: 20.04 m



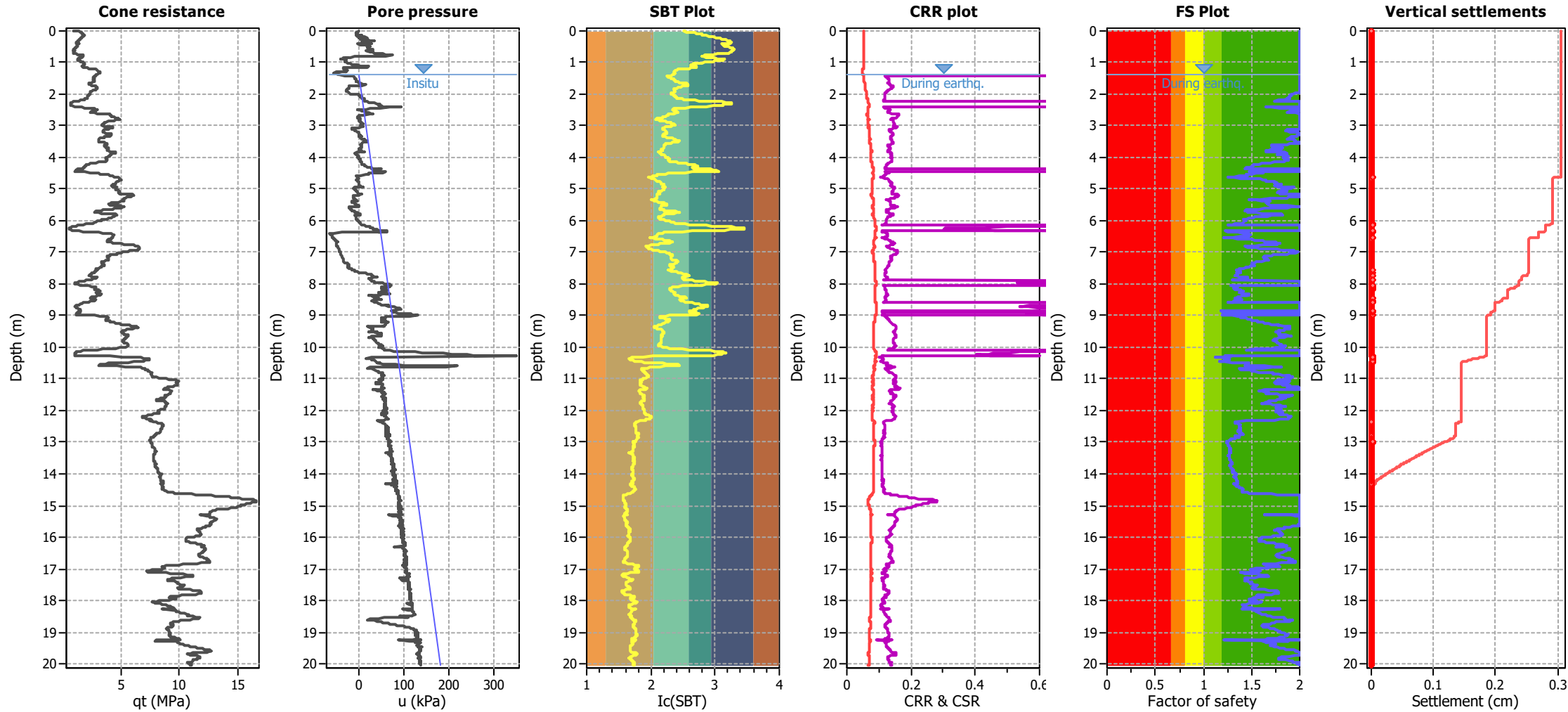
Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.58 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.58 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-05

Total depth: 20.04 m



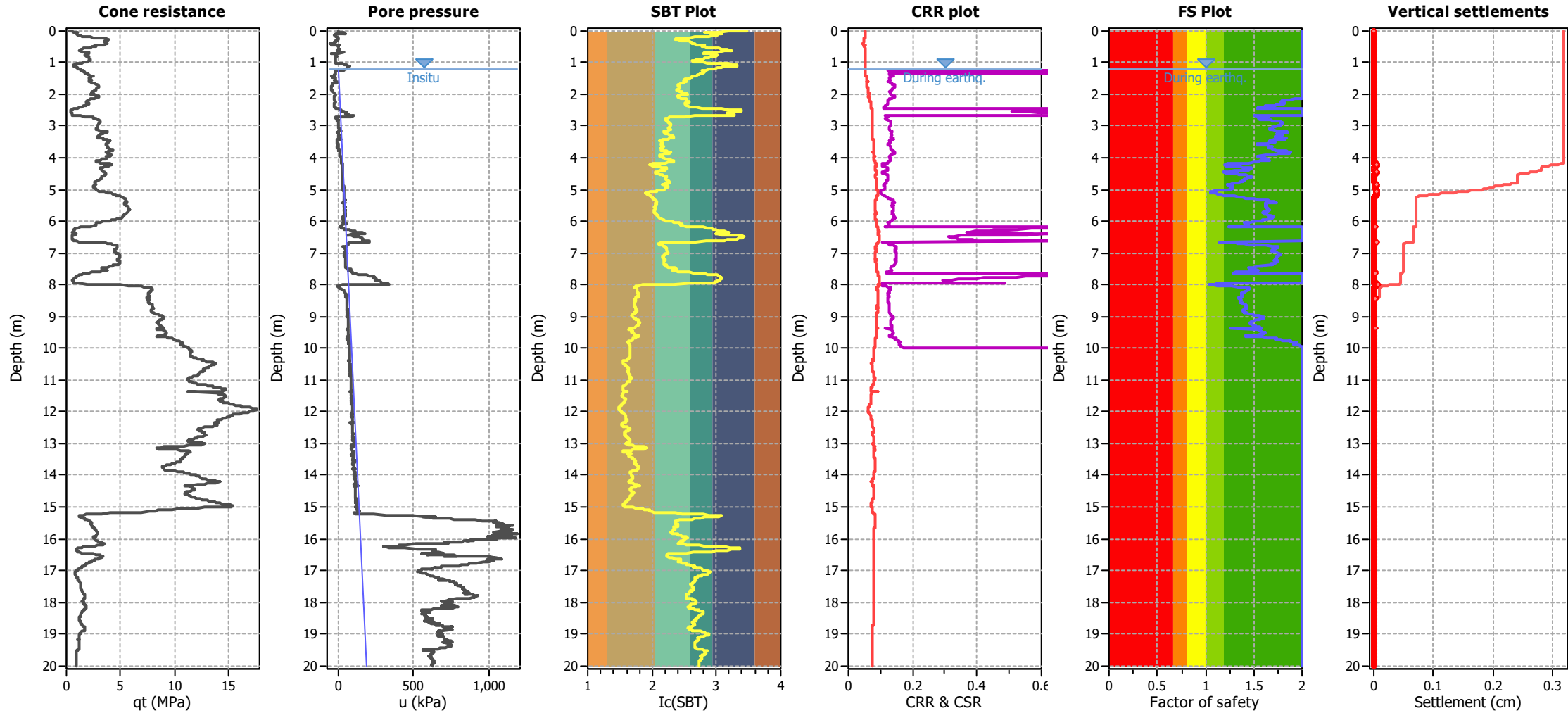
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	applied:	.
Points to test:	Based on I_c value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	I_c cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-01

Total depth: 20.01 m



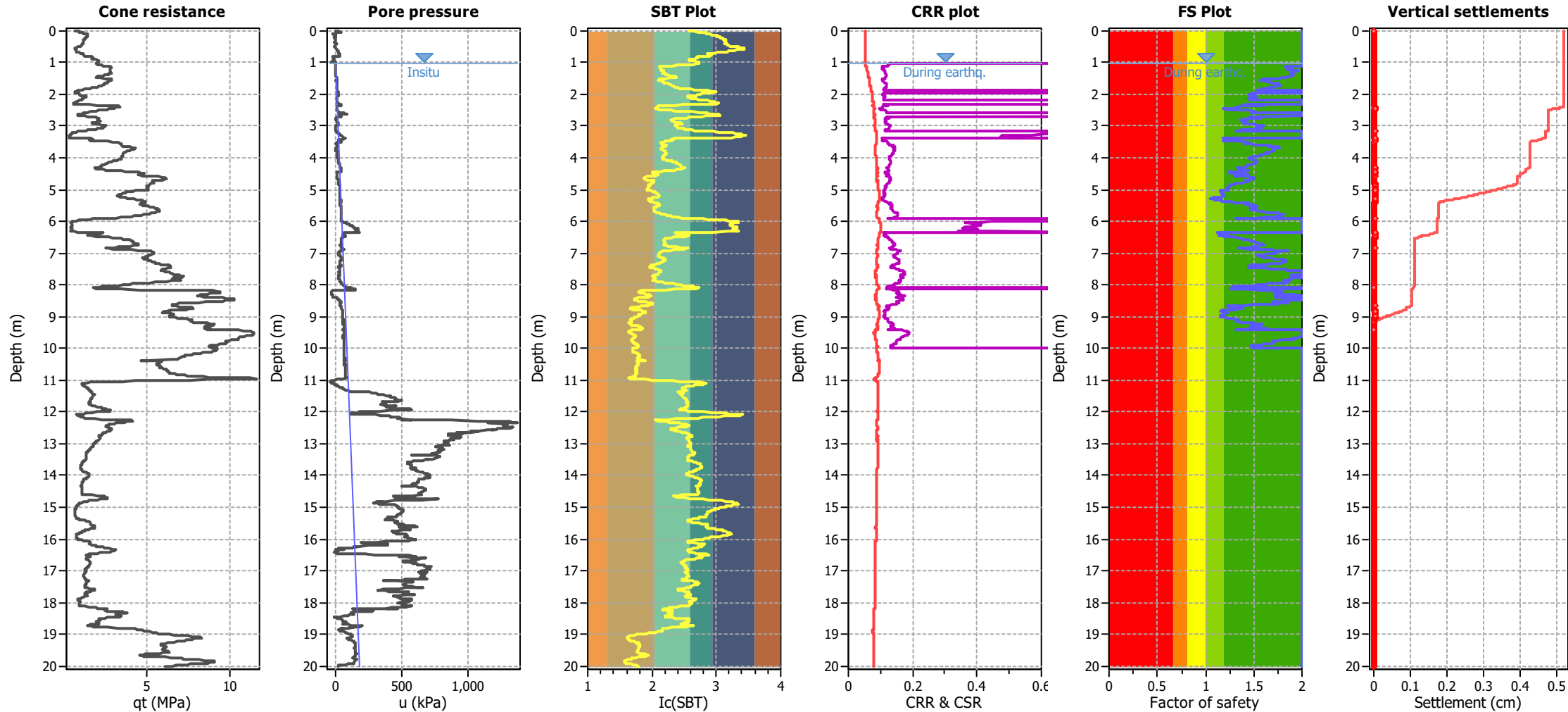
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.22 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.22 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-02

Total depth: 20.01 m



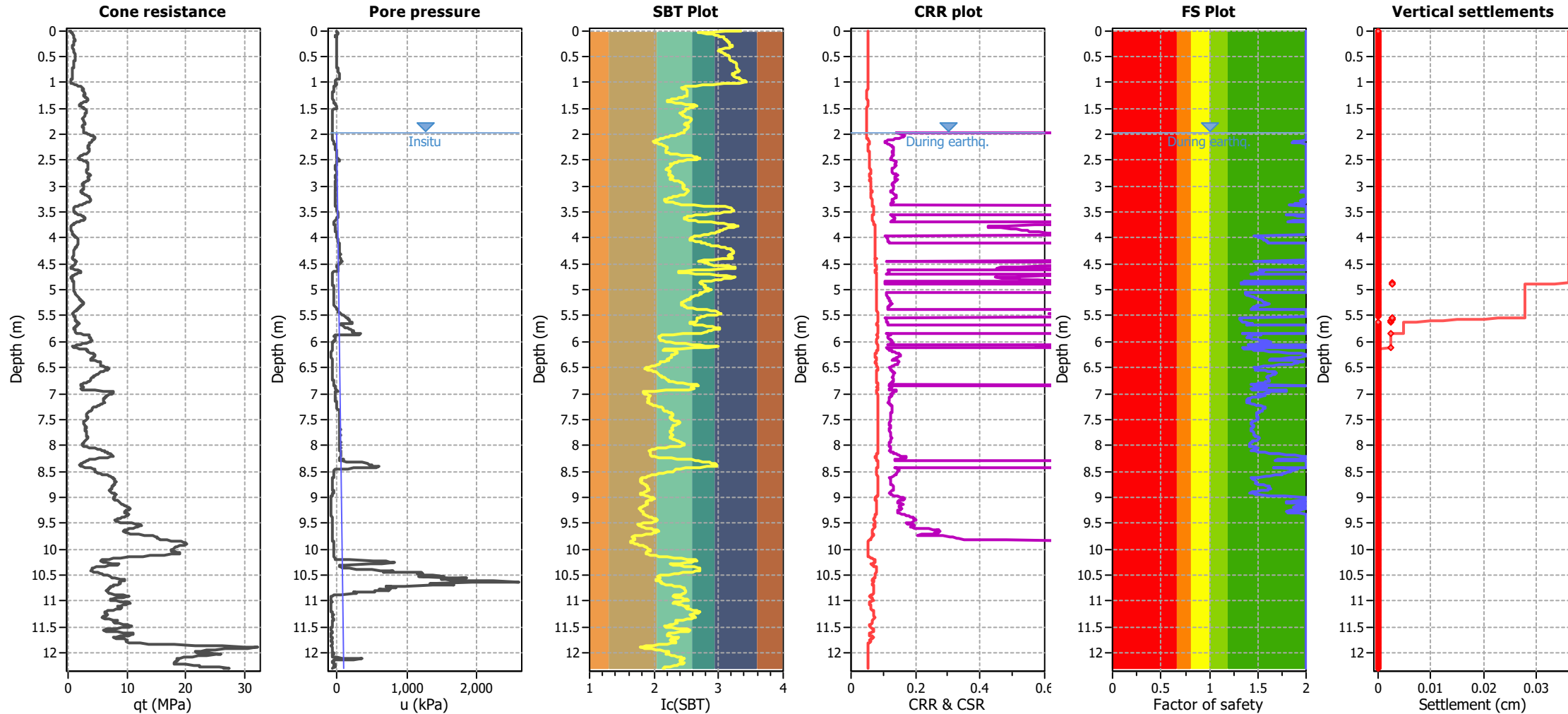
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.03 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.03 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-03

Total depth: 12.30 m

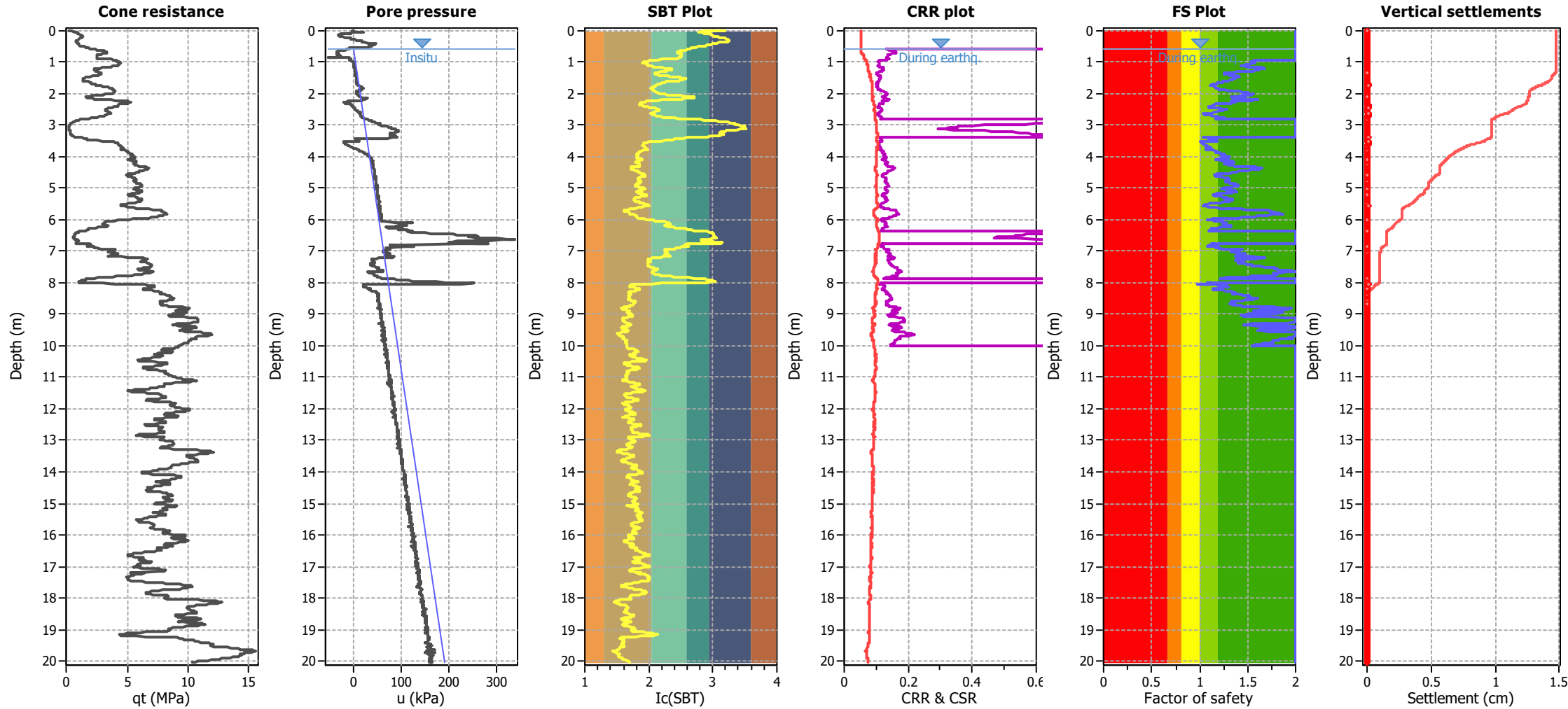


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.96 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.96 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:
Location:

CPT: CPT-04

Total depth: 20.04 m



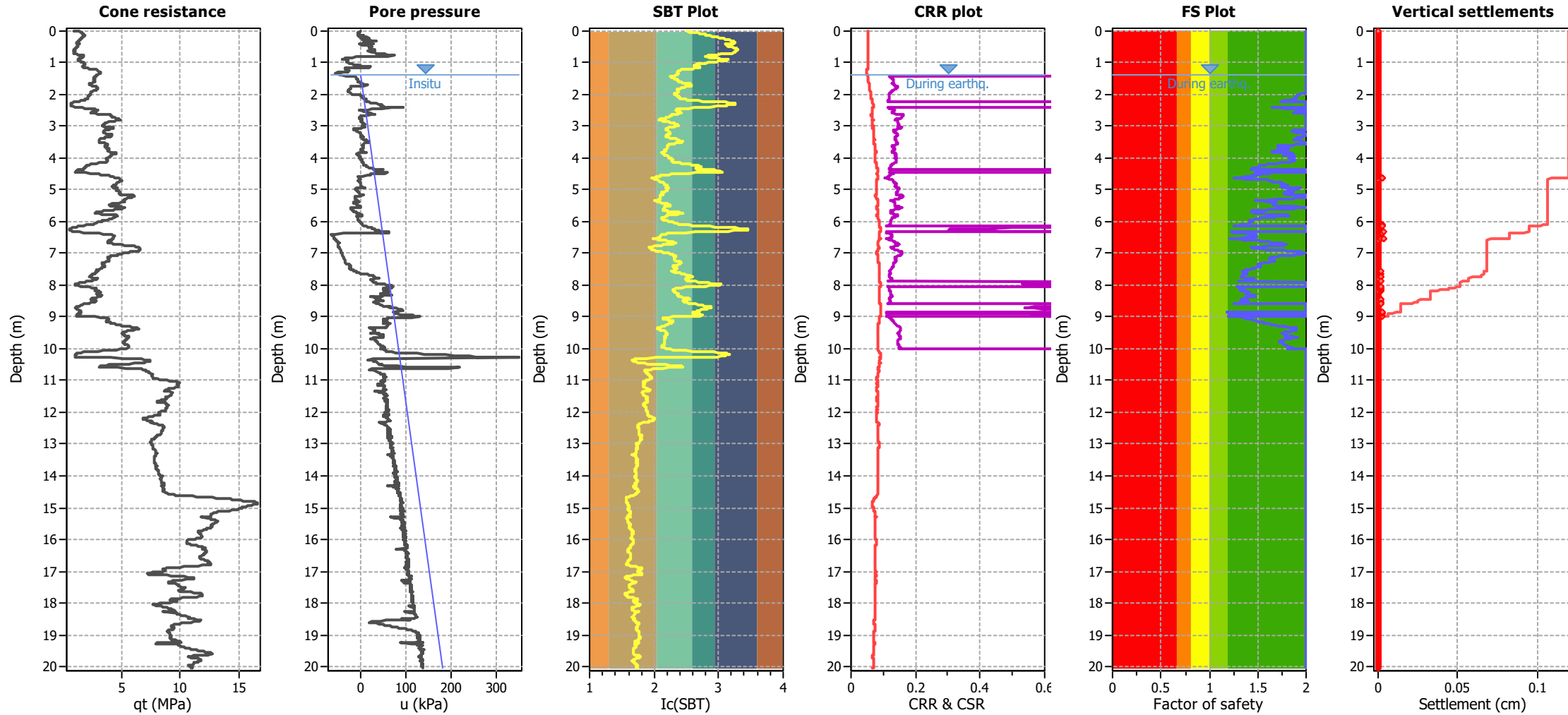
Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.58 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.58 m	Fill height:	N/A	applied:	.
Points to test:	Based on I_c value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	I_c cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_o applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-05

Total depth: 20.04 m



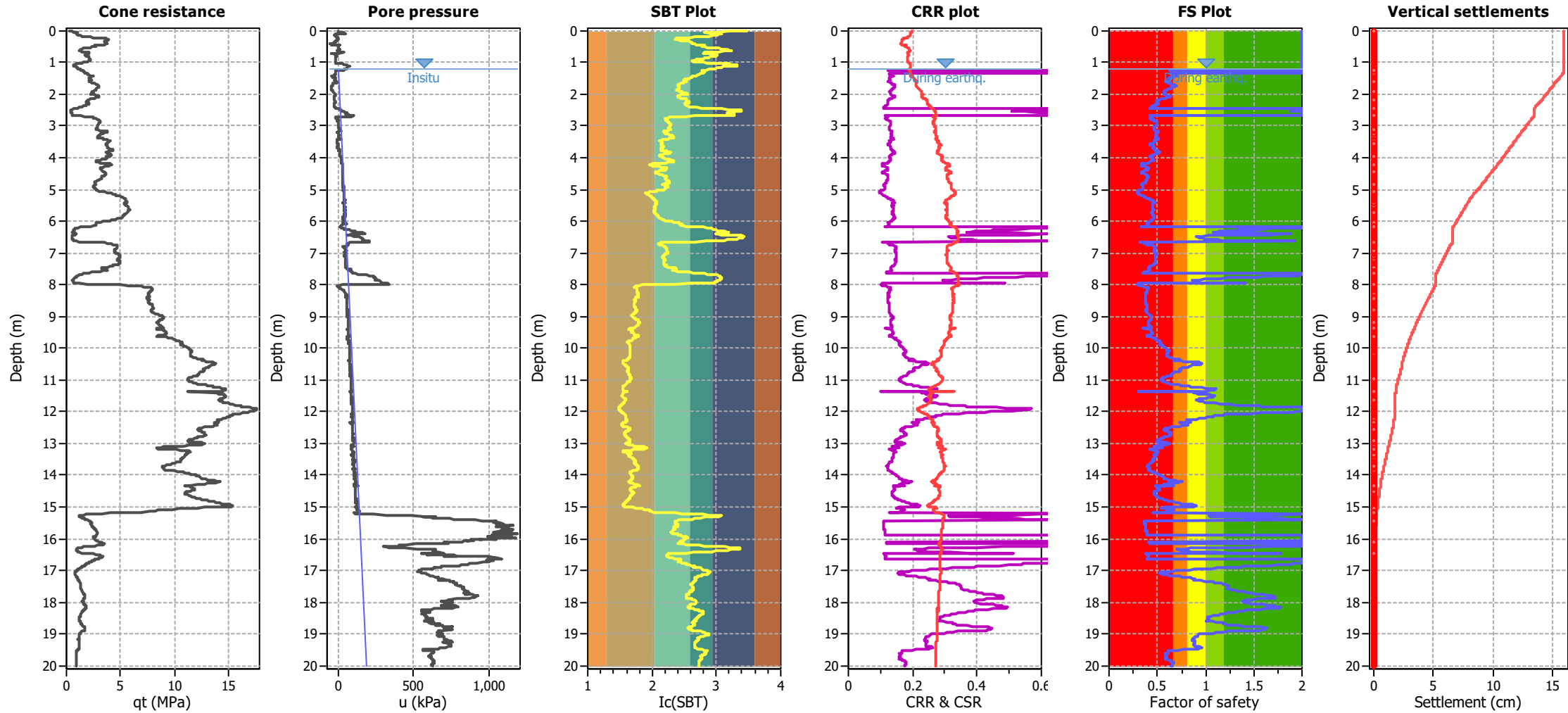
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.10	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-01

Total depth: 20.01 m



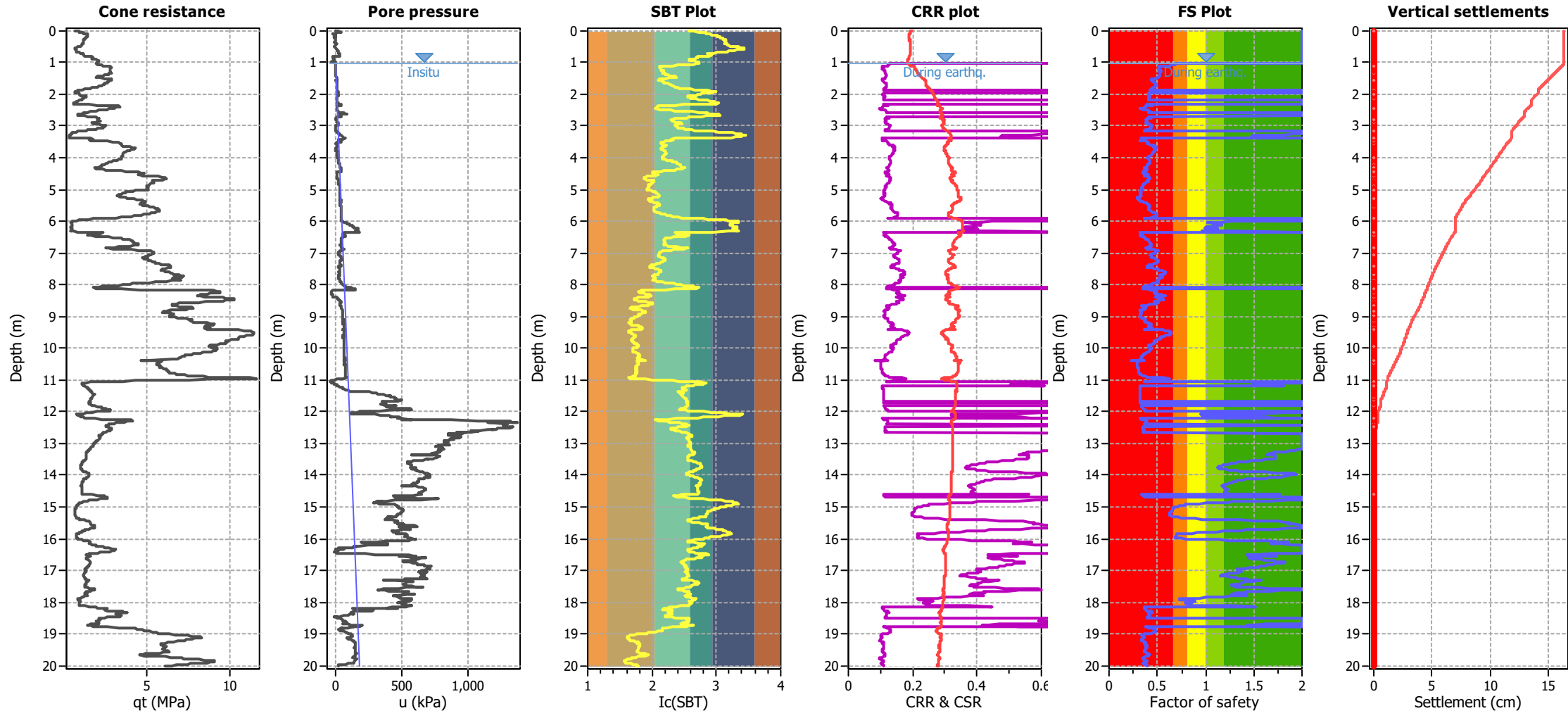
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.22 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.22 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-02

Total depth: 20.01 m



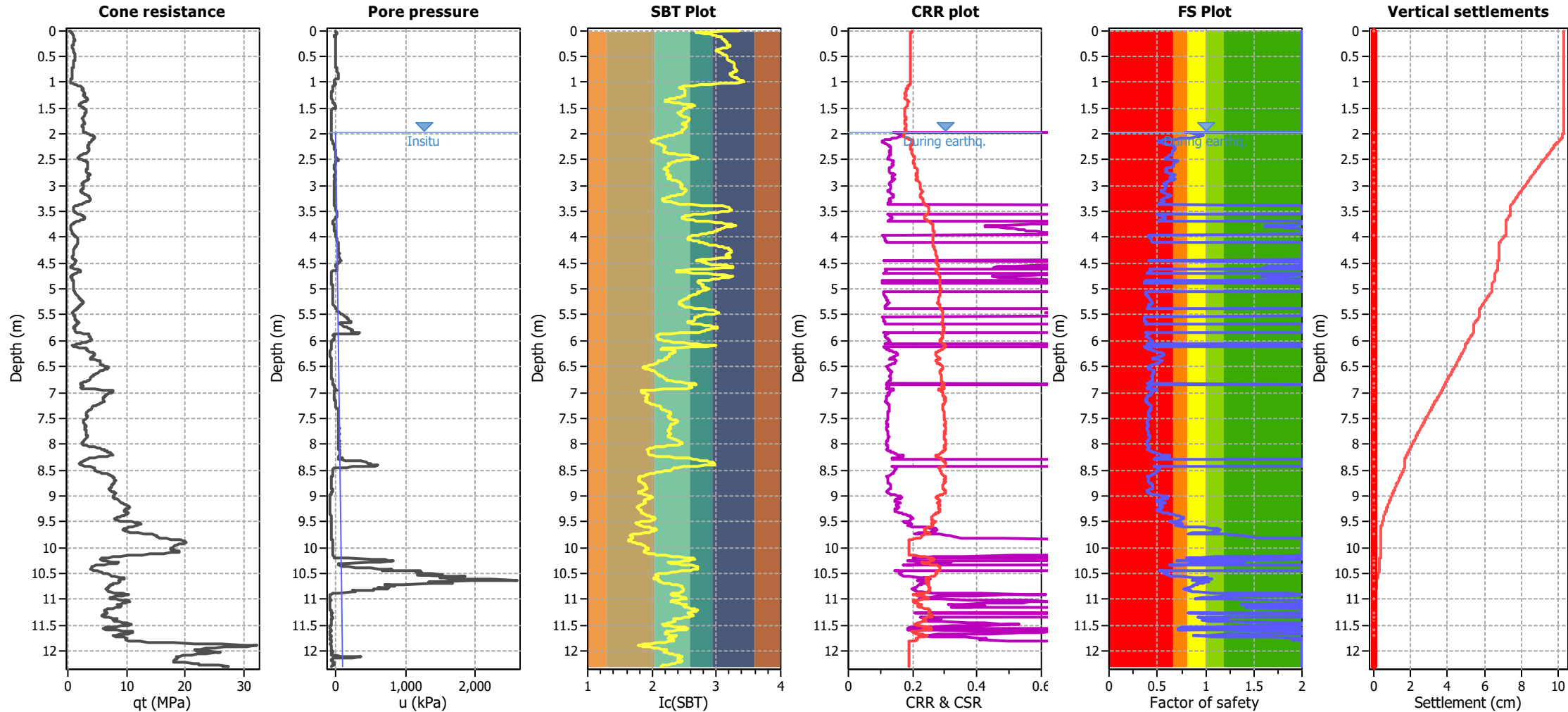
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.03 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.03 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-03

Total depth: 12.30 m



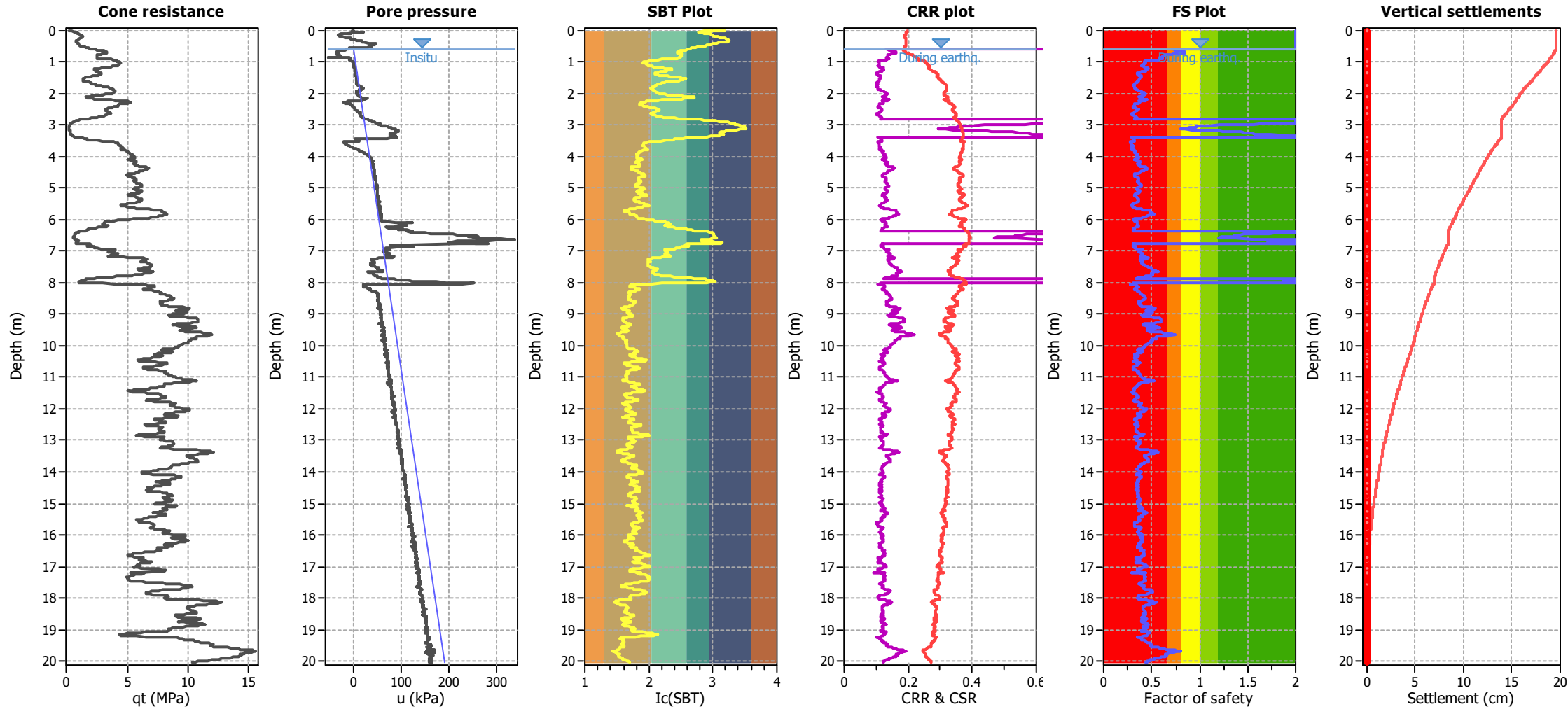
Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.96 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.96 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:

Location:

CPT: CPT-04

Total depth: 20.04 m

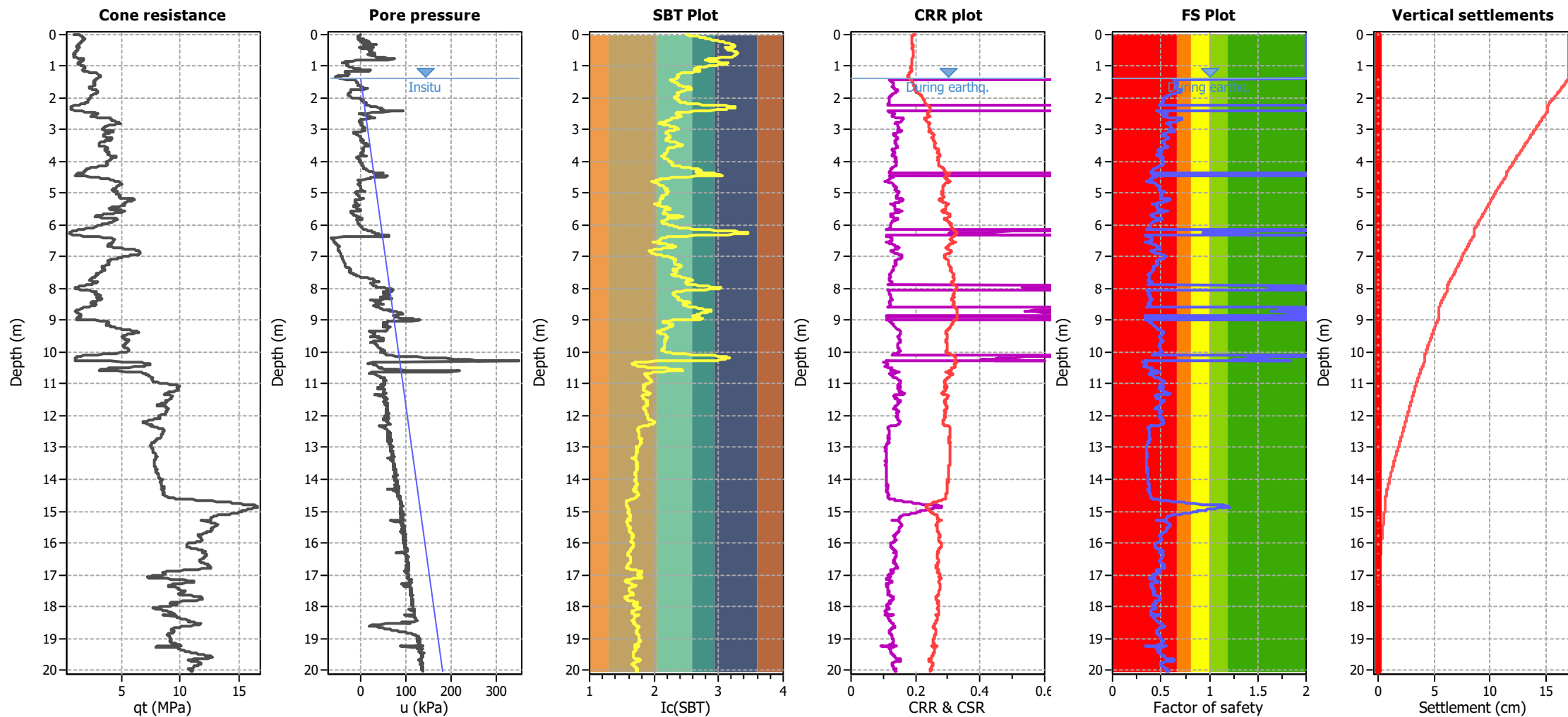


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.58 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.58 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	N/A
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based

Project:
Location:

CPT: CPT-05

Total depth: 20.04 m

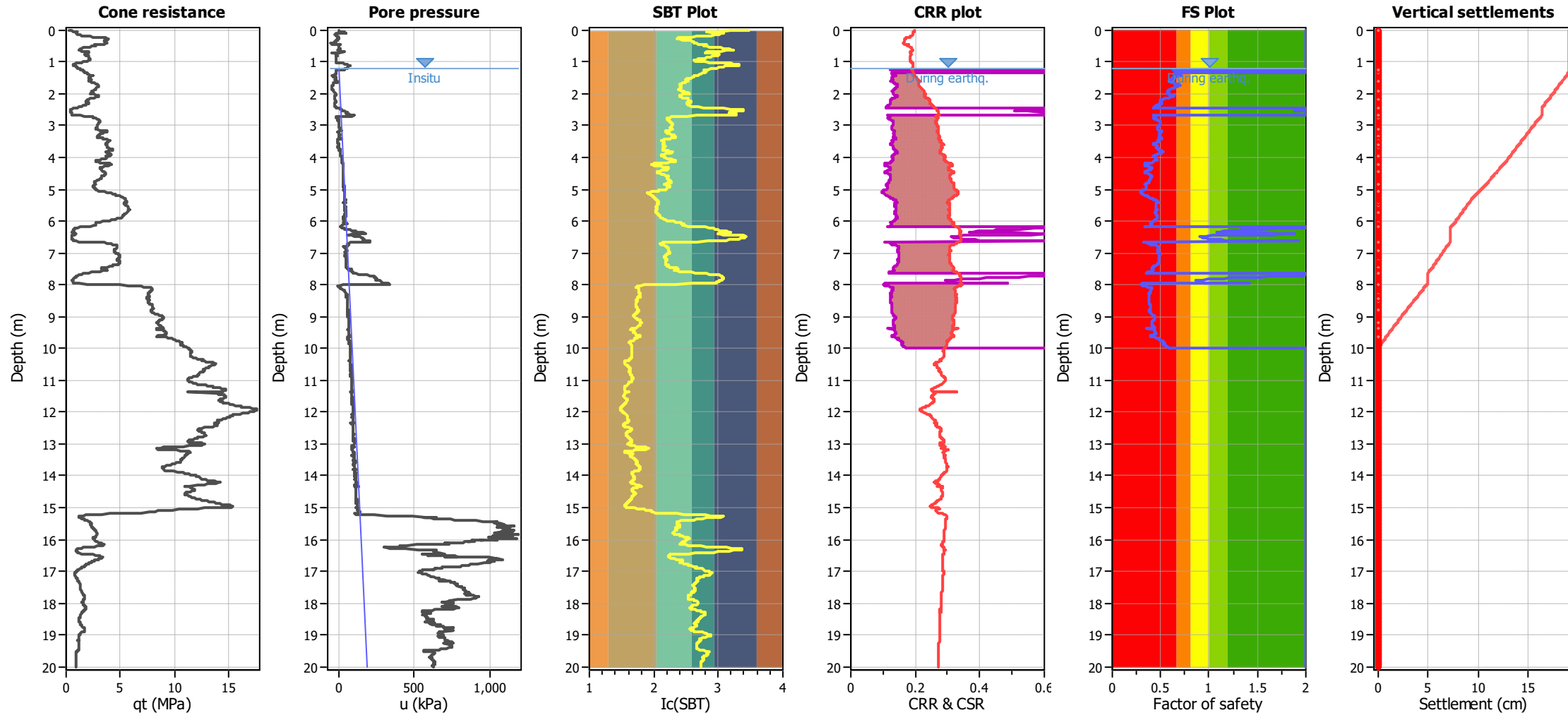


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_0 applied:	Yes		

Project: Solar Farm
Location: Hinuera, Waikato

CPT: CPT-01

Total depth: 20.01 m

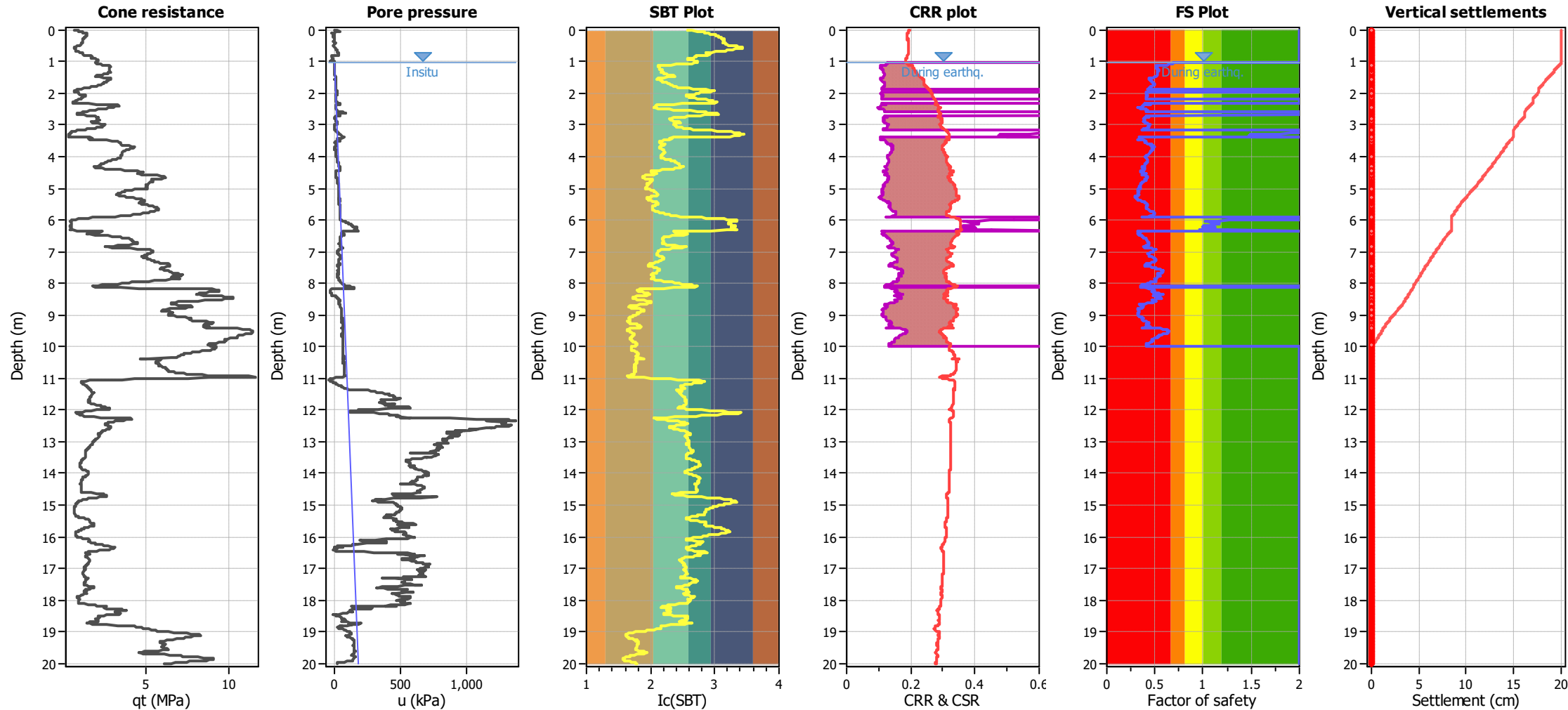


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.22 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.22 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

Project: Solar Farm
Location: Hinuera, Waikato

CPT: CPT-02

Total depth: 20.01 m

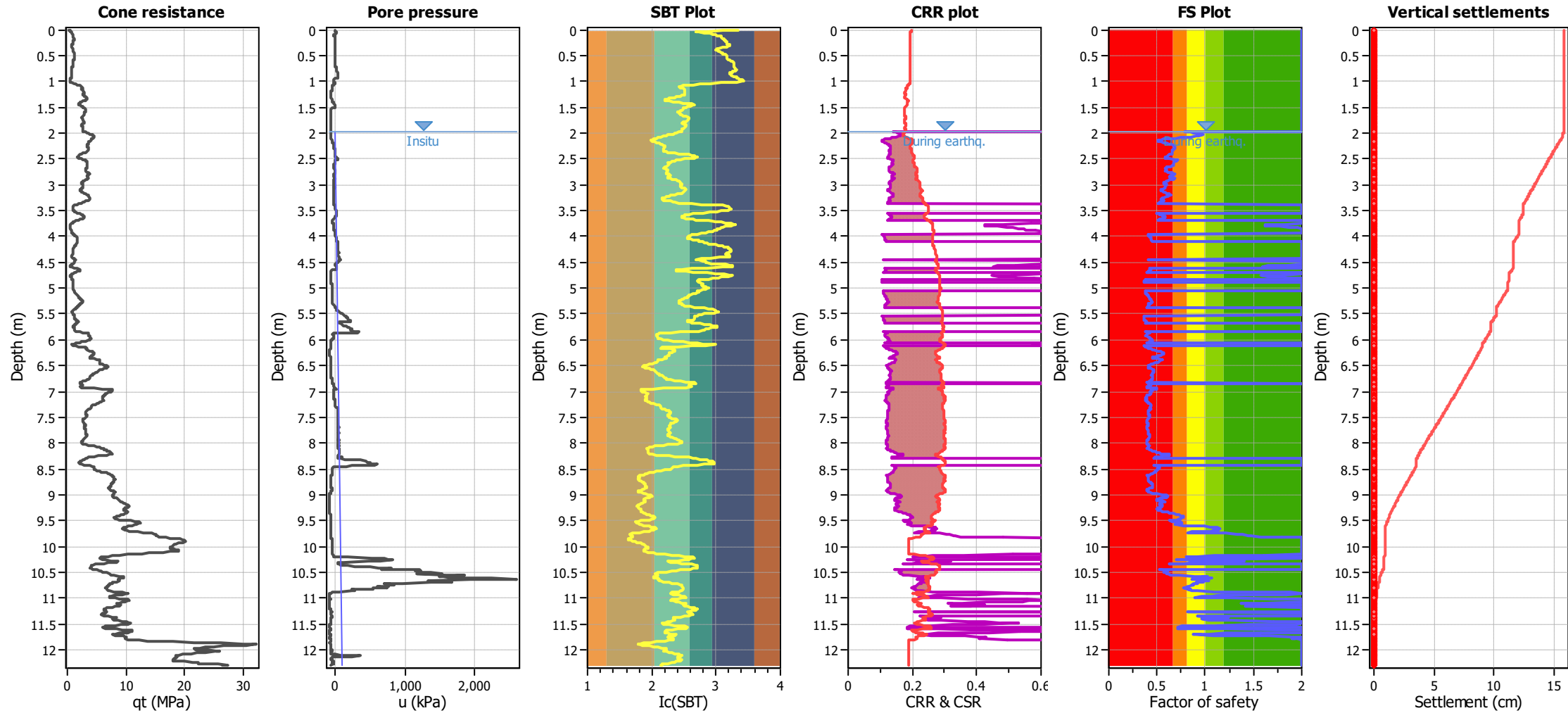


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.03 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.03 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

Project: Solar Farm
Location: Hinuera, Waikato

CPT: CPT-03

Total depth: 12.30 m

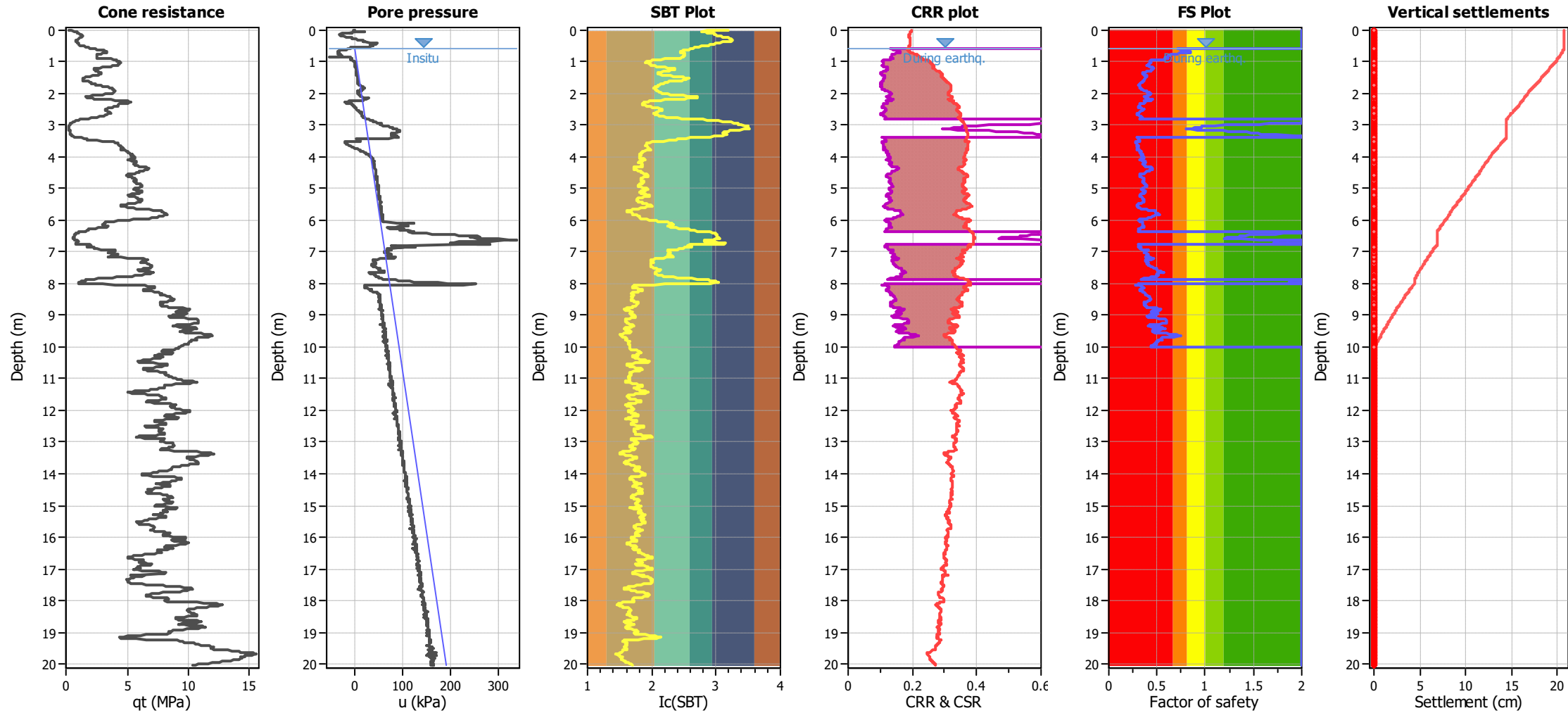


Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.96 m	Use fill:	No	Clay like behavior applied:	.
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.96 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

Project: Solar Farm
Location: Hinuera, Waikato

CPT: CPT-04

Total depth: 20.04 m

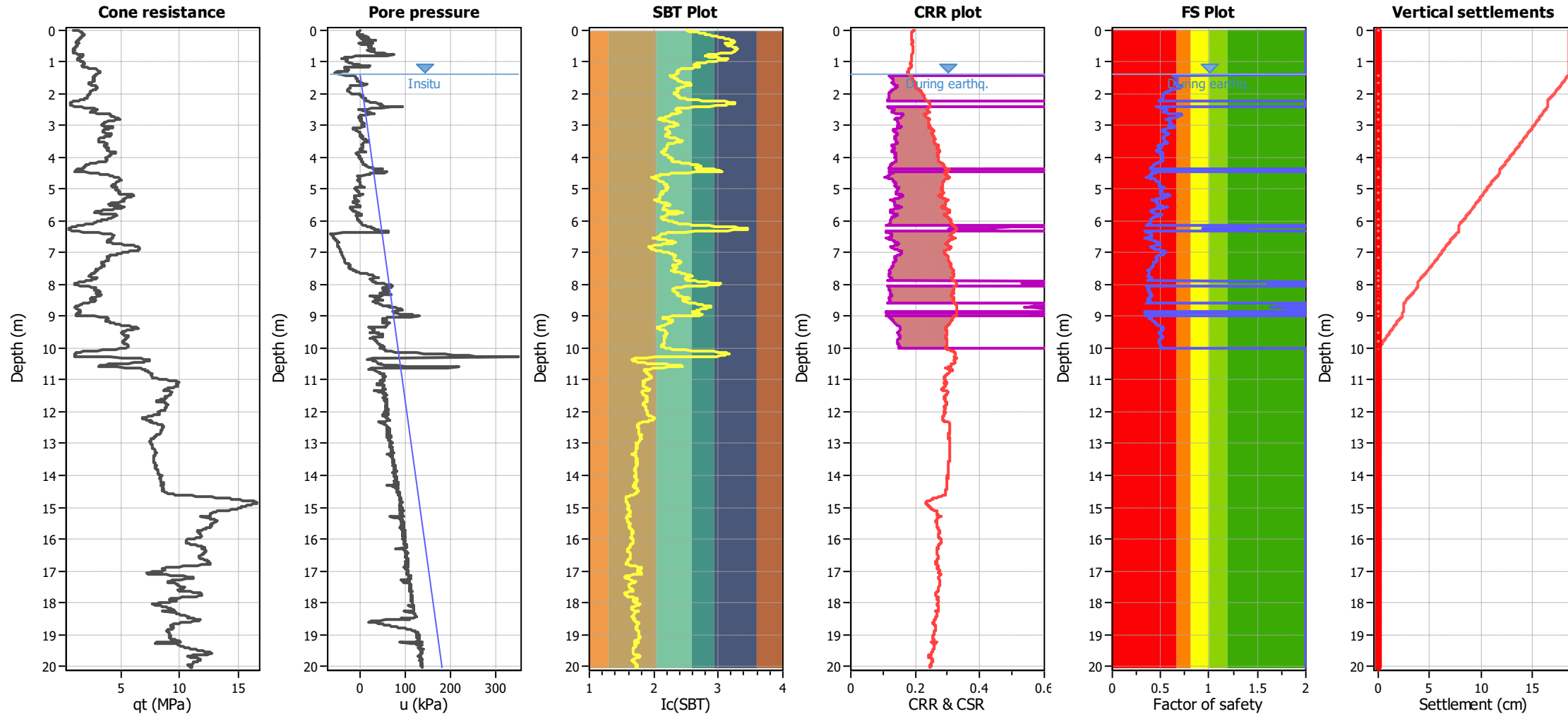


Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.58 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.58 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based

Project: Solar Farm
Location: Hinuera, Waikato

CPT: CPT-05

Total depth: 20.04 m



Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior	
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.40 m	Fill height:	N/A	applied:	.
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	Yes
Earthquake magnitude M_w :	5.90	Ic cut-off value:	2.60	Trans. detect. applied:	No	Limit depth:	10.00 m
Peak ground acceleration:	0.36	Unit weight calculation:	Based on SBT	K_σ applied:	Yes	MSF method:	Method based



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