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Project Number 20136.000.001

Geotechnical Investigation

12 Huna Road, 234 State Highway 30,
Whakatane, Bay of Plenty

Submitted to:
Julians Berry Farm Limited
12 Huna Road
Whakatane
Bay of Plenty 3191

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ENGEO Document Control:

Report Title	Geotechnical Investigation - 12 Huna Road, 234 State Highway 30, Whakatane			
Project No.	20136.000.001	**Doc ID**	01	
Client	Julians Berry Farm Limited	**Client Contact**	Simon Parsons	
Distribution (PDF)	S & L Land Specialists			
Date	**Revision Details / Status**	**Author**	**Reviewer**	**WP**
23/05/2022	Issued to Client	JL	MM	DF

1 Introduction

ENGEO Ltd was requested by Julians Berry Farm Limited to undertake a geotechnical investigation of the property at 12 Huna Road, 234 State Highway 30, Whakatane, Bay of Plenty (herein referred to as 'the site'). This work has been carried out in accordance with our signed agreement dated 10 March 2022.

The purpose of the assessment was to provide geotechnical advice to support a Resource Consent Application for subdivision and residential redevelopment of 14.6 hectares of horticultural and agricultural land located west of Whakatane Township. The following report identifies the main geotechnical risks to the development as identified by site investigation and observations and presents our analysis and geotechnical recommendations for future design.

Our investigation comprised the following:

- A review of published geotechnical and geological information relevant to the site including maps, literature, and GIS mapping.
- A site assessment by an experienced ground engineering professional.
- Completion of thirteen hand auger boreholes.
- Completion of twelve Cone Penetration Tests (CPTs).
- Completion of four falling head soakage tests within a reamed-out hand auger borehole.
- Production of this geotechnical report outlining the findings of our investigation and geotechnical considerations and recommendations for future development.

2 Site Description

The site consists of an approximately 11.3 hectare parcel of horticultural land; Julians berry farm, and an adjacent 3.3 hectare parcel of land largely used for pastoral agriculture.

The relief of the site is gentle, with two main landforms identified - the gently sloping elevated land in the north, and the near level low-lying land in the south. The elevated landform is oriented largely east-west, sub-parallel to the current coastline, and is currently largely covered in mature trees. The landform falls from approximately 8 m RL to 3 m RL over approximately 50 m. The lower-lying landform is near level, generally at an elevation of 2 m RL, and covers the central and southern portions of the site. A narrow drainage channel approximately 1 m deep is located along the southern site boundary

Several commercial buildings with an associated carpark belonging to the berry farm are located along the western site boundary. Three small animal shelters are located within small pens north of the commercial buildings. A pump building and chemical storage shed is located to the north of the site along the toe of the elevated landform. Three dwellings are located in the north-eastern corner of the site.

The site is surrounded by agricultural land to the north and west, State Highway 30 to the south, and a residential development to the east. The Kopeopeo Canal is located approximately 70 m southeast of the site.

A site plan is presented in Figure 1 below:

Figure 1: Site Plan

Site boundaries in red. Image taken from LINZ. NTS.

2.1 Development Description

ENGEO have been provided concept plans of the proposed development at the Julians berry farm site. These plans show a total of 50 residential lots, ranging from 400 m^2 to 1,465 m^2 in area, with a stormwater reserve occupying a strip along the southern site boundary and a commercial development on the western site boundary in the location of the existing commercial buildings. Stormwater is to be managed by a combination of swales, retention, and stormwater ponds. A single new road is proposed to connect from Huna Road in the west, with many of the lots served directly by this road and the remainders by right-of-ways or joint access lanes. We are not aware of any intention to connect directly to SH30 in the south.

The elevated landform to the north of the site is planned to be cut by approximately 4 m and the lower lying portion is to be filled by up to approximately 3 m.

There are currently no concept plans for the pastoral land in the east of the site, however, we understand that the proposed future land use is residential. We anticipate the proposed new subdivision road to be extended to service these lots.

An excerpt of the proposed scheme is shown below in Figure 2:

Figure 2: Development Concept Plans – Berry Farm Site

Excerpt from S&L Concept Plan 1 Ref: 20-30851-01-C1. NTS.

3 Desktop Study

3.1 Regional Geology and Seismicity

The institute of Geological and Nuclear Sciences (GNS) map this site as underlain by late Quaternary (Holocene) age sediments comprising swamp deposits, peat and overbank sands and silt. We anticipate the elevated landform in the north to be underlain by dune sands or older alluvium, with young swamp deposits forming the lower-lying land in the south.

The nearest mapped (GNS) active fault to the site is the Edgcumbe Fault which intersects the north-western corner of the site. The Edgcumbe Fault is a normal fault with an unknown slip rate and a recurrence interval of less than 2000 years. Rupture of this fault was responsible for the magnitude 6.5 Edgcumbe earthquake in 1987.

The client has discussed planning constraints around the Edgecumbe Fault with the Bay of Plenty Regional Council. We have been informed that GNS have already assessed the risk posed by this fault and that it was determined that the Edgcumbe fault does not extend beneath the Julian's berry farm site. We also understand GNS indicated that seismic events on this fault are more likely to occur further north along the fault, nearer to white island. ENGEO has not been provided with a copy of this report to review.

3.2 Historic Aerial Photography

ENGEO reviewed limited historical aerial photographs held on Retrolens and Google earth dating from 1944 to 2021.

In 1944 the site was used for agriculture and comprised a number of predominantly grassed paddocks with sporadic small trees or bushes. Small farm buildings are situated in the present day location of the dwellings. The northern site boundary is lined with trees at this time.

Limited change is seen between 1944 and 1961, with two small buildings constructed immediately west of the farm buildings in the north of the site.

By 1982 these buildings had been demolished or removed, and a number of trees along the northern site boundary had been felled. Many of the trees within the paddocks were removed by this time. There is evidence of construction occurring in the property immediately north of the site, adjacent to the north-western boundary.

In 2002 the site arrangement appears to be in general keeping with the present day, with the western portion of the site in use as horticultural land and the eastern portion of the site comprising paddocks. The dwellings in the northeast corner of the site are present by this time and the elevated landform along the northern edge of the site is largely covered by trees. Only one of the existing commercial buildings has been constructed by this time and the pump building and chemical storage buildings had not yet been constructed. These appear to have been completed between 2014 and 2017.

No geotechnically significant changes were noted between 2017 and 2021.

3.3 Existing Subsurface Information

ENGEO reviewed the New Zealand Geotechnical database on 27 April 2022. Limited investigation results were available for the local area. Two CPTs completed approximately 340 m east of the site encountered approximately 1.8 m of soft silt, clay and organic soils overlying silty sand and sand to a depth of 20 m with groundwater encountered at approximately 1.2 m depth.

A 20 m deep CPT completed 300 m southwest of the site encountered interbedded silts and sands to 6 m depth, below which medium dense to dense sands were encountered to termination depth. Groundwater was encountered at 3.1 m depth.

The results of these investigations are broadly in accordance with the mapped geology.

3.4 Flooding

Flooding data for the site was not available on Bay of Plenty Regional Council's online GIS map, however, the site was not mapped as having been vulnerable to historical flooding. Notwithstanding this, a large portion of the site is low lying and close to waterways. As a result, the site may be at risk of flooding in the future and a minimum freeboard may be required above the 1% Annual Exceedance Probability flood event. This should be confirmed by council.

4 Site Investigation

4.1 Surface Conditions

ENGEO visited the site on 1, 3 and 5 April 2022 and made the following observations:

- The low lying portion of site is largely covered by cropped fields growing berries (Photo 1).
- The elevated landform is covered by eucalyptus trees up to approximately 25 m high (Photo 2).
- A dry drainage channel is located between two of the fields (Photo 3).
- The drainage channel to the south of the site contained standing water (Photo 4).

Figure 3: Site Photographs

Photo 1: Berry plantation facing north

Photo 2: Eucalyptus along the norther site boundary

Photo 3: Dry channel

Photo 4: Standing water in drainage channel.

4.2 Subsurface Conditions

Intrusive site investigations were carried out across three days between 1 April and 5 April 2022. These investigations included:

- 13 hand auger boreholes to a maximum depth of 3 m below ground level with Scala penetrometer testing to a maximum depth of 3.9 m.
- 12 CPTs to a maximum depth of 15 m.
- Four borehole soakage tests completed in hand auger boreholes reamed out to 100 mm diameter.

Testing locations are shown on the plan in Appendix 1. The hand auger boreholes were logged on-site by a geotechnical professional from ENGEO in accordance with NZGS: 2005 guidelines. The CPTs were carried out by Topdrill. Full geotechnical logs and CPT test results are presented in Appendix 2. A summary, of ground conditions encountered on-site is included in Section 4.2.1 below.

4.2.1 Site Investigation Results

The results of the site investigation generally conform to the anticipated geology for each landform.

The elevated landform was underlain by:

- Shallow topsoil, typically been 0.3 and 0.7 m, locally up to 1.1 m in HA11.
- Loose to medium dense sands and silty sands, interpreted as dune deposits, to depths of between 1.5 m in CPT08 and 3.75 m in CPT01. Density typically increased with depth.
- Older, medium dense to dense well graded sand to a depth of 15 m below ground level where the CPTs terminated.

The lower-lying landform was underlain by:

- Variable depths of topsoil, ranging from 0.25 m to up to 0.5 in HA12 m in HA11. Topsoil depth is anticipated to vary away from test locations, particularly where soils have been tilled to grow crops.
- Firm to very stiff interbedded clays and silts, interpreted as young alluvium, to depths of between 1.1 m in CPT09 to 3.5 m in CPT03. In CPT07, soft soils were encountered interbedded within these strata.
- Older medium dense to dense well graded sands to a depth of 15 m.

No spatial pattern in the depth of the cohesive soils was identified suggesting that the contact with the underlying sand is undulating.

A generalised summary of ground conditions is presented in Table 1 below:

Table 1: Generalised Summary of Ground Conditions

Stratum	Lithology	Depth Range (m bgl)	Undrained Shear Strength Range kPa (average)	CPT Tip Resistance MPa (average)
Topsoil	Sandy SILT; dark brown. Low plasticity	0 – 1.1-	N/A	N/A
Dune Deposits (Elevated Landform)	Silty, fine to medium SAND; brown. Well graded. AND / OR Fine to medium SAND; light grey to light brown or brown. Well or poorly graded.	0.3 – 3.75	N/A	3
Young Alluvium (Lower-lying Landform)	SILT with varying portions of sand, gravel and clay; grey. Sand is fine to coarse. Gravel is fine to medium, subrounded pumice. AND Silty CLAY with some sand; grey to dark grey locally with orange streaks. Sand is fine to coarse.	0.25 – 3.5	96	1
Older Sands (Lower-lying Landform)	Sand (not recovered from hand auger)	1.1 - 15	N/A	15-20

4.2.2 Groundwater

A variable groundwater table was identified across the site with standing groundwater encountered in the lower landform between 0.73 and 2.1 m depth. Standing groundwater was not encountered in any of the investigations across the elevated landform. Hole collapse of the CPTs and pore water pressure recordings indicate that groundwater in this location may have been encountered between 3.5 m and 6.1 m below ground level. The variation in elevation across the site suggests that the groundwater table is at an elevation of approximately 0.5 to 1 m RL. This is commensurate with the water observed within the drainage channel to the south of the site.

It should be borne in mind that groundwater levels may fluctuate seasonally and following rainfall and therefore the levels determined during our investigation do not purport to fully describe groundwater conditions for the site.

4.2.3 Soakage Testing

ENGEO completed four falling head soakage tests in general accordance with the methodology outlined in Section E1 of the building code. The tests were performed in boreholes HA01, HA06 and HA08 on the lower landform and HA03 on the elevated landform. All boreholes were reamed out to 100 mm diameter to a depth of 2 m. A four hour pre-soak of HA06 and HA08 was carried out prior to the commencement of the tests. A pre-soak of HA01 and HA03 was not carried out as they drained rapidly during the initial test.

The results of the soakage tests are included in Appendix 3. Unfactored soakage rates for each borehole are presented below:

Table 2: Unfactored Soakage Rates

Borehole	Unfactored Soakage Rate (litres/m^2/hour)	Depth to Groundwater
HA01	75	0.6
HA03	344	-
HA06	32	0.6
HA08	54	0.6

Boreholes on the elevated landform shown in green.

The soakage rate in HA03 is notably higher than the boreholes completed on the lower landform. This is due to the sandier dune deposits being of much higher permeability than the finer grained, cohesive soils of the young alluvium.

5 Geotechnical Assessment

5.1 Site Soil Class

For the purposes of structural design, we recommend adopting the soil classification of ‘Class D – Soft or Deep Soil Site’ in accordance with NZS 1170.5:2004. This classification has been selected based on the results of our site investigation and our technical experience in the area.

5.2 Seismic Hazards

Potential seismic hazards resulting from nearby moderate to major earthquakes can generally be classified as primary and secondary. The primary effect is ground rupture, also called surface faulting. The common secondary seismic hazards include ground shaking, ground lurching, regional subsidence or uplift, soil liquefaction, lateral spreading, landslides, tsunamis, flooding, or seiches.

5.2.1 Ground Rupture, Ground Lurching and Regional Uplift Subsidence

As mentioned in Section 3.1, the Edgecumbe Fault is mapped as crossing the north-western corner of the site. We have been informed that a GNS study has been completed, which determined that the fault does not underlie the site and that this fault segment is considered less likely to rupture. Based on this assessment we understand that the Bay of Plenty Regional Council and GNS do not consider the site to be at risk of fault related ground rupture, ground lurching or regional subsidence as a result of movement on the identified fault.

Notwithstanding the above, in seismically active areas there is always a risk that unmapped active faults may be present proximal to any given site particularly when the faults may have a low recurrence interval and could potentially be buried under younger sediment. It is ENGEO's opinion that the risk of this is no greater at this site than any other in the Whakatane area.

5.2.2 Ground Shaking

Ground shaking and subsequent effects on structures, infrastructure and engineering systems can be extensive. The intensity, frequency and duration of ground shaking drives the effect of earthquake loading on structures, while the severity of ground shaking drives the level of ground deformation.

The level of ground shaking to which a building must be designed to withstand is dependent on the building's Importance Level as described in clause A3 of the Building Code. As the planned development of the site is ultimately residential and commercial, we have assumed any buildings constructed within the site will be Importance Level 2 or lower. According to NZS 1170.5:2004, Importance Level 2 buildings are required to retain their structural integrity and not collapse or endanger life during an earthquake with a 500 year return period; the ultimate limit state (ULS) design seismic loading. They are further required to sustain little or no structural damage during an earthquake with a 25 year return period; the serviceability limit state (SLS) design seismic loading.

Peak horizontal ground accelerations (a_{max}) for the Whakatane area are provided in MBIE / NZGS Module 1 (2021) as the following:

- **0.44 g for ULS**
- **0.11 g for SLS**

The effective earthquake magnitude can be taken as 6.1.

Importance levels and recommended ground accelerations for design will be revisited and confirmed at issue of the Geotechnical Completion Report.

5.2.3 Liquefaction and Lateral Spreading

Soil liquefaction and lateral spread result from loss of strength during cyclic loading, such as that imposed by earthquakes. Soils most susceptible to liquefaction are typically identified as clean, loose, saturated cohesionless materials. Empirical evidence indicates that some silty sands, low plasticity silts and low plasticity clays are also potentially liquefiable. Lateral spreading occurs as a result of liquefied material moving toward a sloping area or free face. This is most common in sloping ground, backfills behind retaining walls, open stormwater channels and water frontage areas. We have assessed the potential of liquefaction triggering and liquefaction induced settlement occurring at the site by performing liquefaction analyses on the CPT data based on the liquefaction triggering methodologies presented in Boulanger and Idriss (2014).

Our analyses also adopted the following:

- SLS and ULS ground movement parameters as outlined in section 5.2.2.
- Groundwater levels as recorded *in situ* by the CPT tests.
- The Zhang, Robertson and Brachman (2002) procedure for estimating volumetric strain and vertical settlement for the CPT analyses.
- The Boulanger and Idriss relationship between fines content and Ic with a fitting parameter (CFC) of 0.0 for the CPT analysis (no soil laboratory testing available for calibration of the parameter).

Full results of our liquefaction analysis are presented in Appendix 4. Table 3 provides a summary of the liquefaction analysis.

Table 3: Liquefaction Analysis

Design Case	CPT	Calculated Vertical Settlement	Calculated Settlement (Indexed to 10 m)	Lateral Spread	Liquefaction Potential Index (LPI)	Liquefaction Severity Number (LSN)
SLS	CPT01	< 5 mm	< 5 mm	0 mm	0	0
	CPT02	< 5 mm	< 5 mm	0 mm	0	< 1
	CPT03	8 mm	8 mm	0 mm	0	3
	CPT04	< 5mm	< 5mm	0 mm	0	0
	CPT05	< 5mm	< 5mm	0 mm	0	0
	CPT06	< 5mm	< 5mm	0 mm	0	0
	CPT07	< 5 mm	< 5 mm	0 mm	< 1	0
	CPT08	< 5 mm	< 5 mm	0 mm	0	0
	CPT09	< 5mm	< 5mm	0 mm	0	0
	CPT10	< 5 mm	< 5 mm	0 mm	0	< 1
	CPT11	< 5 mm	< 5 mm	0 mm	0	0
	CPT12	< 5 mm	< 5 mm	0 mm	0	0

Design Case	CPT	Calculated Vertical Settlement	Calculated Settlement (Indexed to 10 m)	Lateral Spread	Liquefaction Potential Index (LPI)	Liquefaction Severity Number (LSN)
ULS	CPT01	70 mm	70 mm	0 mm	8	12
	CPT02	75 mm	55 mm	0 mm	11	22
	CPT03	75 mm	75 mm	0 mm	15	28
	CPT04	30 mm	25 mm	0 mm	2	3
	CPT05	50 mm	25 mm	0 mm	5	9
	CPT06	30 mm	20 mm	0 mm	4	7
	CPT07	20 mm	5 mm	25 mm	3	2
	CPT08	45 mm	20 mm	0 mm	3	3
	CPT09	25 mm	15 mm	0 mm	2	3
	CPT10	65 mm	60 mm	0 mm	11	12
	CPT11	30 mm	25 mm	0 mm	4	5
	CPT12	15 mm	10 mm	40 mm	1	5

CPTs on the elevated landform shown in green.

The results of our analyses indicate that liquefaction is unlikely to occur during an SLS event with LPI values of less than 1 calculated across the site. Should liquefaction trigger under these conditions, liquefaction is predicted to occur locally with up to 8 mm of free field vertical settlement predicted in CPT05 with differential settlements likely to be less than 5 mm.

During a ULS event, our analysis predicts that liquefaction will occur within the sandy layers of the young alluvium as well as sporadically distributed looser sand layers within the older alluvium up to 1.5 m thick. The dune deposits do not liquefy as they are not encountered below the groundwater table.

On the elevated landform, ULS LPI values range from 2 to 8 indicating that generally risk of liquefaction is low with locally high-risk areas, however, LSN values of between 12 and 3 suggest that minor to no surface expression of liquefaction would be anticipated under these conditions as the dune deposits form a non-liquefiable ‘crust’ that protects the surface from the influence of liquefaction. Up to 70 mm of free field vertical settlement is predicted in this area.

For the lower landform LPI values are low across the majority of the site; typically below 5 suggesting a low risk of liquefaction triggering and LSN values below 10 predicting little to no surface expression of liquefaction in these locations. However, locally areas with a higher risk of liquefaction were identified. In CPT02, CPT03 and CPT10 LPI values were between 8 and 15 are indicative of a high to very high risk of liquefaction. LSN values for these locations vary from 12 to 28 which suggests moderate to minor surface expression of liquefaction. Up to 75 mm of liquefaction is predicted under these conditions.

The above analysis considers volumetric strain and does not account for ground loss due to ejecta (e.g. sand boils). Any liquefaction induced ground settlement may be expressed differentially across the foundation. It should be noted that due to the proposed earthworks, the non-liquefiable crust of the elevated landform will be reduced in thickness which will result in increased expression of liquefaction at the surface. The crust of the lower elevated landform will increase in thickness due to the placement of fill which will reduce the expression of liquefaction at the surface. Based on these landscape modifications we anticipate that 50% of total liquefaction induced settlement may be expressed as differential settlement.

Lateral Spreading

Both the Kopeopeo Canal, and the approximately 1 m deep drainage channel to the south of the site, form a free face towards which lateral spreading can occur. Based on the height of this channel and its distance from our investigation points many of the CPTs fall outside of the bounds of the lateral spreading calculation for the channel and the canal.

For CPT07 and CPT12 located relatively near the channel lateral spread of up to 40 mm is predicted. Based on CPT12, for an assumed free face height of 2 m located 70 m from the edge of site, up to 50 mm of lateral movement is anticipated towards the Kopeopeo canal.

Land Damage Category

The predicted liquefaction effects at the site have been assessed against the performance criteria set out in Table 3.1 of the MBIE Canterbury guidelines (Part A). The magnitude of predicted settlement and Lateral spreading under SLS and ULS conditions indicates that the site (both landforms) may be classified as Technical Category 2.

As earthworks contouring is proposed, the liquefaction susceptibility of the resultant landform will be confirmed in the Geotechnical Completion Report.

5.2.4 Static Settlement

As mentioned in Section 4.2, the young alluvial sediments were found to be generally firm to stiff, but locally interbedded with layers of softer soils. Based on the current development plans it is proposed that up to 3.0 m of fill be placed on top of these alluvial soils. We have undertaken preliminary numerical analysis of the site's susceptibility to settlement under possible future fill loads using the CPT data obtained from the site investigation. Our analysis suggests that in areas underlain by softer soils up to 100 mm of settlement may be anticipated under possible future fill loads, whereas in areas where softer soils are not encountered filling induced settlements are typically below 10 mm. Based on the above, significant differential settlements beyond the tolerances of the building code may be observed locally within the filled area.

6 Geotechnical Recommendations

Based on the conclusions of our geotechnical investigation and assessment as outlined above we consider the site to be geotechnically suitable for residential development subject to the following geotechnical recommendations being followed.

6.1 Earthworks and Site Preparation

Topsoil, buried topsoil and undocumented fill should be removed from any proposed building footprints (including a 45 degree influence zone plotted from the underside of future foundation elements), proposed roads, or areas to receive engineered fill. With reference to Section 2 and Section 4.1 the north of the site is covered with large eucalyptus trees and the southeast of the site is covered in crop plants and small trees and bushes. We recommend that all roots within any building platform area (or area to receive engineered fill) greater than 20 mm diameter be removed as part of site preparation along with all root clusters where more than 5% of the soil is occupied by roots.

It is our opinion that the natural dune sand deposits to the north of the site are geotechnically suitable for reuse as engineered fill. Compaction should be achieved utilising plant suitable for the material type, with a maximum loose-lift thickness of 200 mm. If a site-specific earthworks specification is not created for the project, then all filling shall be completed in accordance with NZS 4431:1989 and any subsequent revisions.

Temporary cuts are primarily anticipated in the north of site, within sand soils. We recommend temporary cut or fill batters in sand be at an angle no greater than 45° up to 1 m in height and battered to 30 degrees above 1 m in height. Temporary batters should not be left exposed or unretained for longer than one month during earthworks, or during inclement weather due to the risk of sloughing or erosion of the face. Cut batters in cohesive (clay) soils may be at an angle no greater than 45° for up to 1 m in height. Additional advice should be sought for any cuts below the water table. Permanent cut or fill batters should have an angle of no greater than 1V: 3H providing the fill is suitably compacted.

Where fill is placed on sloping ground it should be appropriately benched into the slope to prevent any instability resulting from the interface of fill with the natural soils.

All excavations, cut slopes and fill batters may be achieved utilising standard earthworks equipment for the soil types encountered.

The geotechnical professional shall be promptly of any areas of the foundation or any layer within the formation that rut excessively, yield or shown evidence for concentrated seepage or water movement.

6.1.1 Monitoring Requirements

As mentioned in Section 5.2.4, due to the presence of locally soft alluvial soils vulnerable to consolidation settlement, filled areas are anticipated to undergo a degree of total and differential settlement following placement of load. Based on our preliminary analysis we recommend that settlement of any placed fills should be monitored for between six to 12 months to allow for fills to achieve T90, although the duration for settlement to occur is not currently well understood. It may be possible to accelerate the monitoring period by application of a preload.

Further assessment of settlements will be necessary to inform detailed design of the landform and confirm any monitoring requirements prior to submission for Engineering Plan Approval. Subject to the final site development plans, additional assessment may also be required for specific design of commercial building foundations or heavily loaded residential foundations.

6.2 Foundation Recommendations

6.2.1 Residential

As outlined in Section 5.2.3, we consider the site to be classified as Technical Category 2 in accordance with the MBIE Canterbury Guidance. Based on this we consider a TC2 waffle slab (TC2 Ribraft or equivalent) foundation solution will provide an appropriate solution for residential building development across the site.

Foundations constructed in elevated parts of the site that are to be cut are expected to bear within dune sand deposits. As mentioned in Section 4.2, the upper 1 m of the dune sand is generally loose increasing in density to medium dense to dense with depth. Based on the proposed cut across this part of the site it is likely that foundations will bear within the medium dense to dense sands. For foundations bearing within these soils an ultimate bearing capacity of 300 kPa may be adopted for lightweight, timber framed buildings bearing on TC2 RibRaft foundations. Where loose sands are encountered at the base of foundation excavations these should be undercut to a depth of 1 m or where denser sands are encountered and recompacted in layers to achieve an engineered fill standard in accordance with the requirements of NZS4431:1989.

For the lower lying landform, where filling is planned, for foundations bearing within engineered fill an ultimate bearing capacity of 300 kPa may be adopted. Where foundations are proposed on a cut to fill line, we recommend material on the cut side be over excavated and placed as engineered fill while bulk filling is being undertaken. This is to provide a more uniform bearing layer and reduce the potential for differential foundation performance. The amount of over excavation should be confirmed once earthworks plans are finalised and prior to completing any site work. Foundation construction may not begin until after the Geo-Professional has confirmed that consolidation settlement has reached T90, or a sufficient amount of settlement has occurred that ongoing settlements will be within Building Code tolerances.

If this over excavation is not completed, then foundations built on a cut-to-fill line will require specific engineering design. An ultimate bearing capacity of 300 kPa may be adopted for a Ribraft foundation within these soils.

For the east of the site no development plans have been provided. Assuming that there are no changes to the landscape shallow foundations will bear within the young alluvium.

As required by Module 4 of the MBIE Guidelines, the above bearing capacity should be multiplied by the following capacity reduction factors:

- All ULS combination (including earthquakes) **0.5**
- Serviceability Limit State Cases **0.33**

6.2.2 Commercial

For commercial buildings, specific design of foundations will be required. Based on the proposed plans a shallow foundation solution bearing within engineered fill is likely to be more economical; the presence of shallow, liquefiable natural soils below the proposed fill area are unsuitable bearing strata for deep foundations. Depending on building loads, detailed settlement analysis may be required to support the design of these foundations.

6.3 Stormwater and Wastewater Disposal

It is understood that the proposed development will be connected to reticulated sanitary sewer systems and that stormwater will be controlled through a combination of retention and swales which direct to stormwater detention ponds.

Based on the findings of our soakage testing, disposal to ground may be an acceptable solution for lots overlying dune sand deposits. Due to the shallow groundwater table, without landform modification, disposal to ground is likely to be impracticable for the lower elevated landform. Depending on the final landform design and choice of fill material disposal to ground may be possible.

It should be noted that filling may be required to construct stormwater detention ponds and the recommendations made in Section 6.1 must be borne in mind. If fill batters steeper than 1V: 3H are necessary then specific design will be required. Additionally, site won soils are likely to be permeable when placed as engineered fill so an impermeable liner may be required.

7 Sustainability

Geotech

We encourage you to consider sustainability when assessing the options available for your project. Where suitable for the project, we recommend prioritising the use of sustainable building materials (such as timber in favour of concrete or steel), locally sourced (materials readily available to Contractors as opposed to materials requiring import), and installed in an environmentally friendly way (e.g., reduced carbon emissions and minimal contamination). If you would like to discuss these options further, ENGEO staff are available to offer suggestions.

8 Future Geotechnical Engineering Involvement

- Detailed review of landform / earthworks design and preparation of a settlement monitoring plan if required.
- Observation and certification of earthworks including all stripping, undercuts, engineered fill in accordance with any earthworks specifications.
- Lot by lot investigation on completion of earthworks to confirm suitability and specific recommendations for foundations within each lot for residential building construction.
- Specific investigation to support design of commercial building foundations.
- Specific design of stormwater pond earthworks (if required).
- Preparation of a Geotechnical Completion Report (G2) on completion of earthworks for each stage. This report should include but not be limited to the following:
    - Drawings including predevelopment landform, final landform and cut fill plans.
    - A factual account of earthworks undertaken on-site including any deviations from the agreed specification.
    - A record of geotechnical supervision and inspection history.

- A record of settlement monitoring (where required).
- Provide specific foundation recommendations for building foundations on a lot by lot basis.
- Review and provision of building restriction lines as required.
- Provide a statement of professional opinion as to the suitability of each lot for residential building construction.

- Following release of title, and prior to submission for Building Consent, a geotechnical review of all building plans may be required to check that recommendations contained in this report and any subsequent geotechnical reports have been interpreted as intended. This shall include a review of the proposed foundations, proposed earthworks, proposed retaining walls (if any) and stormwater and wastewater solutions.

9 Limitations

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

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ/ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (07) 777 0209 if you require any further information.

Report prepared by

Jamie Lott
Engineering Geologist

Report reviewed by

Max McLean, CMEngNZ (PEngGeol)
Associate Engineering Geologist

10 References

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We also acknowledge the New Zealand GeoNet project and its sponsors EQC, GNS Science and LINZ, for providing data used in this report.

APPENDIX 1:

Site Plan

Legend

- CPTs
- Site Boundary
- Hand Auger Boreholes

0 25 m 50 m

ENGEO

Produced by **Datanest.earth**

Title: Geotechnical Site Plan		
Client: Julian's Land Co.		Figure No: 1 Size: A3
Project: Julian's Berry Farm	Drawn: SF	
Date: 12-04-2022	Checked: JR	
Proj No: 20136	Scale: 1:2000	Version: Final

APPENDIX 2:

Geotechnical Logs

LOG OF AUGER HA01

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

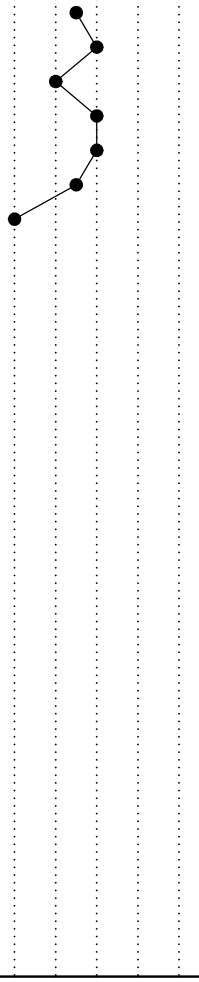
Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 01/04/2022
Hole Depth : 1.3 m
Hole Diameter : 50 mm
Shear Vane No : 3156
Logged By : JO/PS
Reviewed By : JL
Latitude : -37.948116
Longitude : 176.944094

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity. Sand is fine.				M	N/A	
	ALLUVIUM	ML	SILT with some sand; grey with orange streaks. Low plasticity. Sand is fine.				M	St	93/32
0.5		SW	Fine to coarse SAND; grey. Well graded.				W	-	
		ML	SILT with some sand; grey with orange mottling. Low plasticity. Sand is fine.			▼	W	St - VSt	51/22
1.0		ML	Clayey, sandy SILT with trace gravel; grey with orange streaks. Low plasticity. Sand is fine. Gravel is fine, angular, crushable pumice.			▽	S	St - VSt*	103/22
			No recovery. Inferred SAND.	NR			S	MD-D	
1.5			End of Hole Depth: 1.3 m Termination Condition: Practical refusal						
2.0									
2.5									
3.0									
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12



Hand auger met practical refusal at 1.3 m depth due to hole collapse.
Scala Penetrometer met target depth at 1.9 m.
Dip test showed standing water at 0.67 m BGL
TS = TOPSOIL

* = Inferred based on hand tests

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA02

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 01/04/2022
Hole Depth : 3 m
Hole Diameter : 50 mm

Shear Vane No : 3156
Logged By : JO/PS
Reviewed By : JL
Latitude : -37.949235
Longitude : 176.943615

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity; sand is fine to coarse.	M	N/A	92/19
0.5	ALLUVIUM	ML	SILT with minor sand; grey with orange streaks. Low plasticity; sand is fine.	M	-	
		SW	Fine to coarse SAND; grey. Well graded.	W	L	
		ML	Clayey SILT with some sand; grey and orange. Low plasticity; sand is fine to coarse.	W	St	74/19
1.0			1.0 m - Becomes clayey SILT with minor sand.			100/32
			1.3 m - Becomes saturated.	S	VSt	
1.5		ML	Gravelly clayey SILT; grey and orange. Low plasticity; gravel is fine to medium and angular.	S	VSt	159/50
		ML	Sandy gravelly SILT; light grey. Low plasticity; sand is fine to coarse; gravel is fine to medium and subrounded.	S	St*	
2.0		ML	Sandy SILT; dark grey. Low plasticity; sand is fine to medium. 2.0 m - Sand becomes fine to coarse.	S	St	68/41
2.5		ML	SILT with trace gravel; dark grey. Low plasticity; poor recovery; very dilatant; gravel is fine to medium, subrounded pumice.	S	St	76/51 73/31
3.0			End of Hole Depth: 3 m Termination Condition: Target depth			54/38
3.5						
4.0						

Scala Penetrometer
Blows per 100mm
2 4 6 8 10 12

Hand auger met target depth at 3 m.

* = Inferred based on hand tests

Dip test showed standing water at 1.3 m BGL
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA03

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : KE
Date : 05/04/2022 **Reviewed By** : JL
Hole Depth : 3 m **Latitude** : -37.94766
Hole Diameter : 50 mm **Longitude** : 176.945734

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity; sand is fine.				D	N/A	106/58
			0.2 m - Becomes mosit.				M		
0.5									
	DUNE SANDS	SM	Silty SAND; brown. Well graded; sand is fine to medium.				M	L-MD	
1.0									
		SW	Fine to coarse SAND; light grey to light brown. Well graded.				W	MD	
1.5									
2.0									
2.5									
3.0			End of Hole Depth: 3 m Termination Condition: Target depth						
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met target depth at 3 m.
Scala Penetrometer met target depth at 2.9 m.
Standing groundwater was not encountered
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA04

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 04/04/2022
Hole Depth : 2.2 m
Hole Diameter : 50 mm
Shear Vane No : 3156
Logged By : JO
Reviewed By : JL
Latitude : -37.948352
Longitude : 176.945152

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] Sandy SILT; dark brown. Low plasticity; sand is fine to coarse.	M	N/A	92/23
0.5	ALLUVIUM	ML	SILT with minor sand; grey with orange streaks. Low plasticity; sand is fine to medium.	W	St	62/16
		SP	Fine to medium SAND; grey. Well graded.	W	VSt	116/22
1.0		ML	Clayey SILT with some sand; grey with orange streaks. Low plasticity; sand is fine to medium.	W	VSt	127/30
1.5		ML	Sandy SILT with some gravel; grey with orange streaks. Low plasticity; sand is fine to coarse; gravel is fine, angular to subrounded pumice.	S	VSt	124/35
2.0				S	L	
			End of Hole Depth: 2.2 m Termination Condition: Practical refusal			
2.5						
3.0						
3.5						
4.0						

Graphic Symbol; Elevation (mRL); Water Level (▽)

Scala Penetrometer
Blows per 100mm
2 4 6 8 10 12
>>

Hand auger met practical refusal at 2.2 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 2.5 m depth.
Dip test showed standing water at 1.5 m BGL
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA05

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 01/04/2022
Hole Depth : 2.4 m
Hole Diameter : 50 mm

Shear Vane No : 3156
Logged By : JO/PS
Reviewed By : JL
Latitude : -37.949017
Longitude : 176.944822

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] Sandy SILT; dark brown. Low plasticity; sand is fine to medium.	M	N/A	116/27
0.5	ALLUVIUM	ML	SILT with minor sand; grey with orange streaks. Low plasticity; sand is fine to medium.	M	VSt	
		SW	Fine to coarse SAND; grey. Well graded.	W	L	
		ML	SILT with some sand; grey with orange streaks. Low plasticity; sand is fine to medium.	W	St	68/27
1.0					VSt	
		ML	CLayey SILT with some sand; grey with orange streaks. Moderate plasticity; sand is fine to coarse.	S	VSt	116/19
1.5		CH	Silty CLAY with some sand; grey with orange streaks. High plasticity; sand is fine to coarse. 1.4 m - Band of fine to medium gravel, angular, non-crushable.	S	St	108/76
			1.9 m - Poor recovery.			55/15
2.0		ML	Sandy clayey SILT; brown to dark brown. Moderate plasticity; sand is fine to medium.	S	St	68/38
2.5			End of Hole Depth: 2.4 m Termination Condition: Practical refusal			
3.0						
3.5						
4.0						

Water Level: ▽

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met practical refusal at 2.4 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 3.4 m depth.
Dip test showed standing water at 1.2 m BGL
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA06

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : JO/PS
Date : 01/04/2022 **Reviewed By** : JL
Hole Depth : 2.8 m **Latitude** : -37.949911
Hole Diameter : 50 mm **Longitude** : 176.945108

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] SILT with some sand; dark brown. Low plasticity; sand is fine.				M	N/A	111/54
0.5	ALLUVIUM	ML	SILT with some sand; grey with orange streaks. Low plasticity; sand is fine to coarse.			▼	M	VSt-St	68/46
1.0		ML	Clayey SILT with minor sand; grey with orange streaks. Low plasticity; sand is fine to coarse.				W	St	84/38
1.5			1.2 m - Becomes saturated 1.4 m - Becomes moderate plasticity.			▽	S	VSt	73/43 80/14 138/70
2.0								St	73/41
2.5		CH	Silty CLAY with some sand; grey to dark grey. High plasticity; sand is fine to coarse. 2.5 m - Becomes sandy, silty CLAY; sand is fine to coarse. 2.7 m - No recovery. Inferred sand.				S	VSt St	122/49 69/49
3.0							S	MD	
3.5			End of Hole Depth: 2.8 m Termination Condition: Practical refusal						
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 2.8 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 3.1 m depth.
Dip test showed standing water at 0.7 m BGL
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA07

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 04/04/2022
Hole Depth : 3 m
Hole Diameter : 50 mm

Shear Vane No : 3156
Logged By : JO
Reviewed By : JL
Latitude : -37.947902
Longitude : 176.94682

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] Sandy SILT; dark brown. Low plasticity.				M	N/A	
0.5	DUNE SANDS	SP	Fine to medium SAND; brown. Poorly graded.				M	L	
1.0			0.8 m - Becomes light brown.						
1.5			1.6 m - Becomes greyish brown.					MD	
2.0									
2.5									
3.0			End of Hole Depth: 3 m Termination Condition: Target depth						
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met target depth at 3 m.
Scala Penetrometer met target depth at 3.9 m.
Standing groundwater was not encountered
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA08

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 05/04/2022
Hole Depth : 2.35 m
Hole Diameter : 50 mm

Shear Vane No : 3156
Logged By : KE
Reviewed By : JL
Latitude : -37.948802
Longitude : 176.946479

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity; sand is fine to medium.				M	N/A	90/28
	ALLUVIUM	ML	SILT; brown. Low plasticity.				W	St	
0.5		SM	Silty SAND; light brown to grey. Well graded; sand is fine to coarse.				W	-	112/31
		CH	Silty CLAY; brown. Moderate plasticity.				W	VSt	128/64
1.0									
1.5		SW	Fine to coarse SAND; light brown to light grey. Well graded.				W	MD	
2.0			2.3 m - Becomes Saturated.			▽	S	D	
			End of Hole Depth: 2.35 m Termination Condition: Practical refusal						
2.5									
3.0									
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met practical refusal at 2.35 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 2.4 m depth.
Dip test showed standing water at 2.3 m BGL
TS = TOPSOIL

LOG OF AUGER HA09

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : JO
Date : 04/04/2022 **Reviewed By** : JL
Hole Depth : 2.7 m **Latitude** : -37.949374
Hole Diameter : 50 mm **Longitude** : 176.946245

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity.				M	St	84/22
0.5	ALLUVIUM	ML	SILT with some sand; grey with orange streaks. Low plasticity.				W	St	68/16
			0.6 m - Band of fine to coarse SAND; grey; 5 cm thick.						84/22
1.0						▽			101/14
1.5		CH	Silty CLAY with minor sand; grey with orange streaks. High plasticity; sand is fine to coarse.				S	St	82/16
								VSt	154/27
2.0			2.05 m - Band of gravelly SAND; grey; sand is fine to coarse; gravel is fine, angular pumice.					F	41/19
			No recovery; inferred SAND.	NR				VSt	111/59
2.5			End of Hole Depth: 2.7 m Termination Condition: Practical refusal						
3.0									
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

>>

Hand auger met practical refusal at 2.7 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 3.2 m depth.
Dip test showed standing water at 1.2 m BGL
TS = TOPSOIL

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA10

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : JO
Date : 04/04/2022 **Reviewed By** : JL
Hole Depth : 3 m **Latitude** : -37.950098
Hole Diameter : 50 mm **Longitude** : 176.947017

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm (2 4 6 8 10 12)
	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity; sand is fine to medium.				D M	N/A	57/19	
0.5	ALLUVIUM	ML	SILT with some sand; grey with orange streaks. Low plasticity; sand is fine to coarse.				W	St		
		SW	Fine to coarse SAND; grey. Well graded.				W	-	122/22	
		ML	SILT with some sand; grey with orange streaks. Low plasticity; sand is fine to coarse.			▽	W S	St-VSt	78/23 109/19	
1.5		CH	Sandy silty CLAY with minor gravel; grey with orange streaks. High plasticity; sand is fine to coarse; gravel is fine, subrounded crushable clays and pumice. 1.5 m - Band of gravelly clay. 1.7 m - Poor to no recovery.				S	VSt - H St	UTP 76/19 81/26	
2.5			2.4 m - Poor to no recovery						73/41 70/28	
3.0		CH	CLAY; bluish grey. High plasticity.				S	VSt	132/43	
4.0			End of Hole Depth: 3 m Termination Condition: Target depth							

Hand auger met target depth at 3 m.

Dip test showed standing water at 1.1 m BGL
TS = TOPSOIL

LOG OF AUGER HA11

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited
Client Ref. : 20136
Date : 05/04/2022
Hole Depth : 3 m
Hole Diameter : 50 mm
Shear Vane No : 3156
Logged By : KE
Reviewed By : JL
Latitude : -37.948709
Longitude : 176.949023

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] Sandy SILT; dark brown. Low plasticity; sand is fine to coarse.	D	N/A	90/58
0.5	TS	SW	[TOPSOIL] Silty SAND; dark brown. Well graded; sand is fine to coarse.	M	N/A	
	TS	SW	0.7 m - Becomes wet.	W		
1.0	DUNE SANDS	SW	Fine to coarse SAND; brown. Well graded.	W	VL-L	
1.3	DUNE SANDS	SW	1.3 m - Becomes brown to light brown.	W	MD	
2.0	DUNE SANDS	SW		W	D	
2.5	DUNE SANDS	SW		W	MD	
3.0			End of Hole Depth: 3 m Termination Condition: Target depth			
3.5						
4.0						

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met target depth at 3 m.
Scala Penetrometer met target depth at 2.9 m.
Standing groundwater was not encountered
TS = TOPSOIL

LOG OF AUGER HA12

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : KE
Date : 05/04/2022 **Reviewed By** : JL
Hole Depth : 2.3 m **Latitude** : -37.949452
Hole Diameter : 50 mm **Longitude** : 176.948594

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded
0.0	TS	ML	[TOPSOIL] Sandy SILT; dark brown. Low plasticity; sand is fine.				D M	N/A	85/50
0.5	ALLUVIUM	ML	SILT; brown. Low plasticity. 0.65 m - Becomes clayey.				W W	St	85/28
1.0		SW	Fine to coarse SAND; light grey. Well graded.				W	L	
		CH	Silty CLAY; light grey with orange streaks. Moderate plasticity.				W	VSt*	
1.5		CH	CLAY; light grey with orange streaks. High plasticity.			▽	W	H	
2.0		SW	Clayey, silty SAND; light grey. Well graded; sand is fine to coarse.				S	D	UTP
2.5			End of Hole Depth: 2.3 m Termination Condition: Practical refusal						
3.0									
3.5									
4.0									

Scala Penetrometer

Blows per 100mm

2 4 6 8 10 12

Hand auger met practical refusal at 2.3 m depth due to hole collapse.
Scala Penetrometer met practical refusal at 2.5 m depth.
Dip test showed standing water at 2.0 m BGL
TS = TOPSOIL

* = Inferred based on hand tests

GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

LOG OF AUGER HA13

Geotechnical Investigation
Julians Berry Farm
Whakatane
20136.000.001

Client : Julians Berry Farm Limited **Shear Vane No** : 3156
Client Ref. : 20136 **Logged By** : KE
Date : 05/04/2022 **Reviewed By** : JL
Hole Depth : 1.8 m **Latitude** : -37.950413
Hole Diameter : 50 mm **Longitude** : 176.948186

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Scala Penetrometer Blows per 100mm
0	TS	ML	[TOPSOIL] SILT with minor sand; dark brown. Low plasticity.				M	N/A		
0.5	ALLUVIUM	ML	SILT; light brown to light grey. Low plasticity.				W	VSt-St	106/25	
		SW	Fine to coarse SAND; light grey. Well graded.				W	-	82/31	
1.0		CH	CLAY; light grey with orange streaks. Moderate plasticity.			▽	W	VSt	141/39	
								St	82/17	
1.5			1.3 m - Becomes saturated.				S	VSt	171/31	
2.0			End of Hole Depth: 1.8 m Termination Condition: Practical refusal							
2.5										
3.0										
3.5										
4.0										

Hand auger met practical refusal at 1.8 m depth due to poor recovery.

Dip test showed standing water at 1.3 m BGL
TS = TOPSOIL

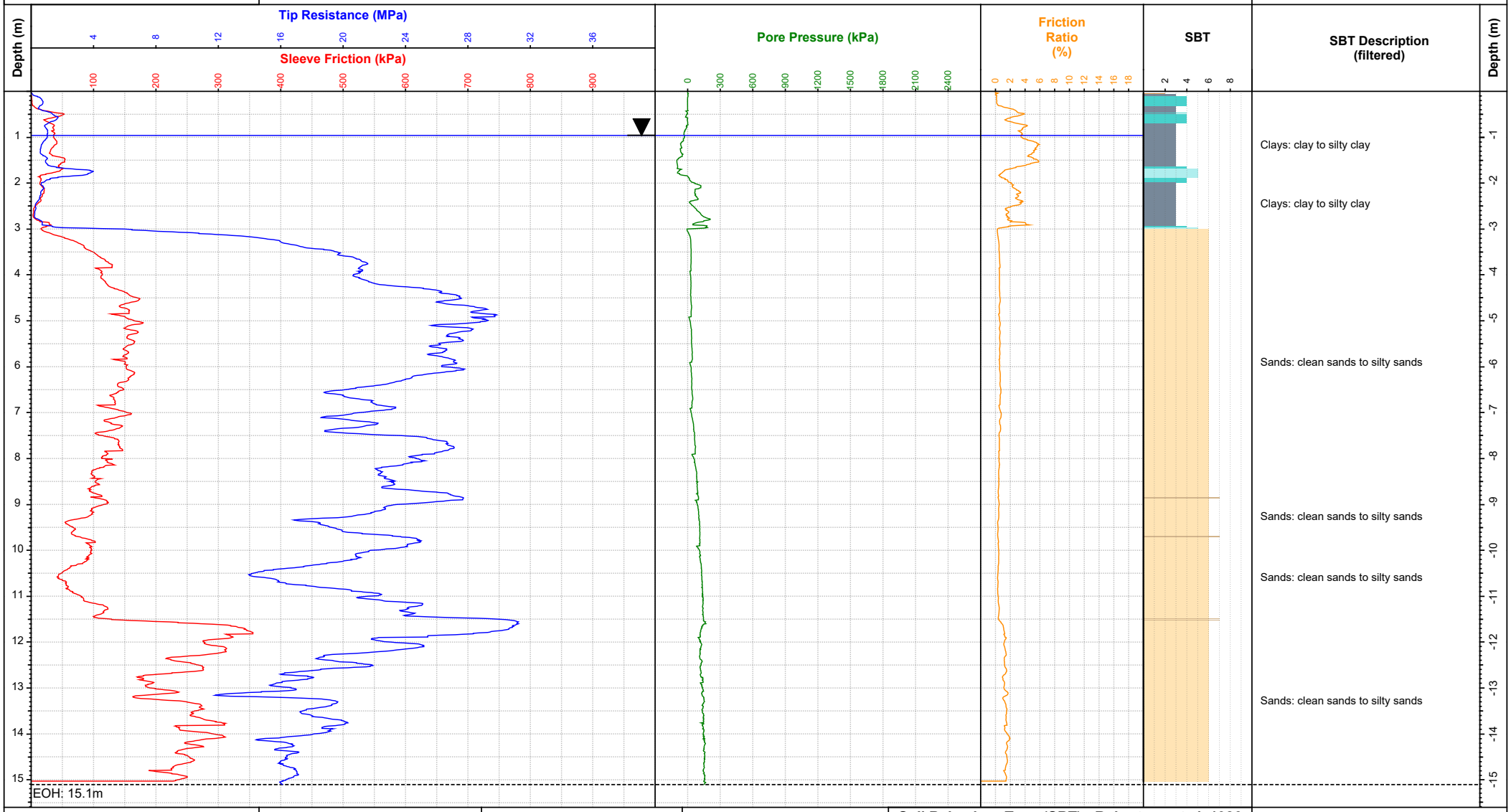
GEOTECH HAND AUGER 20136 - JULIANS BERRY FARM - LOGS.GPJ NZ DATA TEMPLATE 2.GDT 19/5/22

CONE PENETRATION TEST LOG

Topdrill Geotech

Test No: CPT12

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 0.96m

Termination Reason:
Target depth

Northing:	5792362.91
Easting:	1946840.54
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

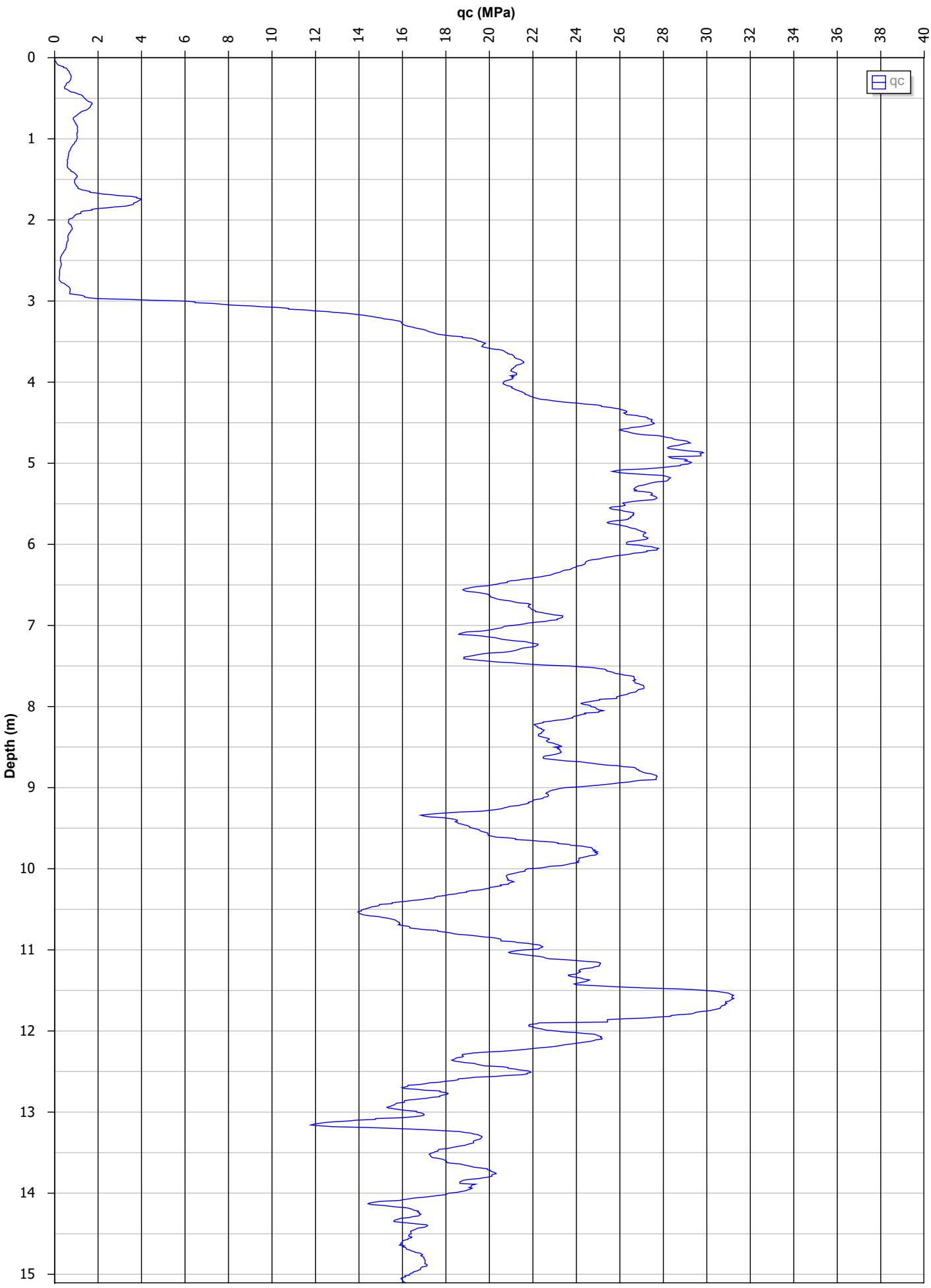
0 Undefined	5 Sand mixtures: silty sand to sandy silt
1 Sensitive fine-grained	6 Sands: clean sands to silty sands
2 Clay - organic soil	7 Dense sand to gravelly sand
3 Clays: clay to silty clay	8 Stiff sand to clayey sand
4 Silt mixtures: clayey silt & silty clay	9 Stiff fine-grained

Test No:	CPT12
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	04/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT12
Client Ref.:	20136

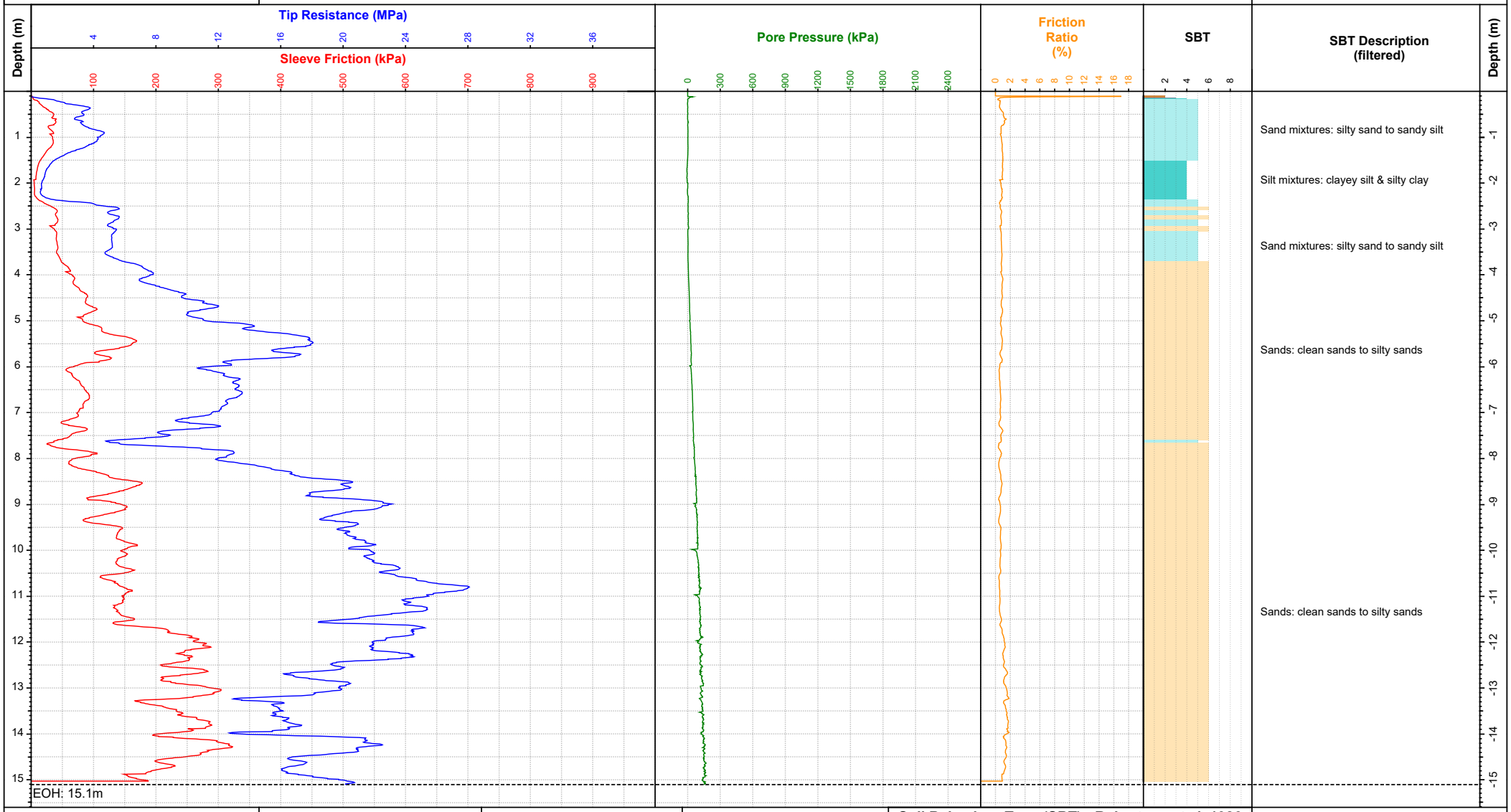


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT01

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
Hole collapsed dry at 3.50m

Termination Reason:
Target depth

Northing:	5792662.70
Easting:	1946620.94
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

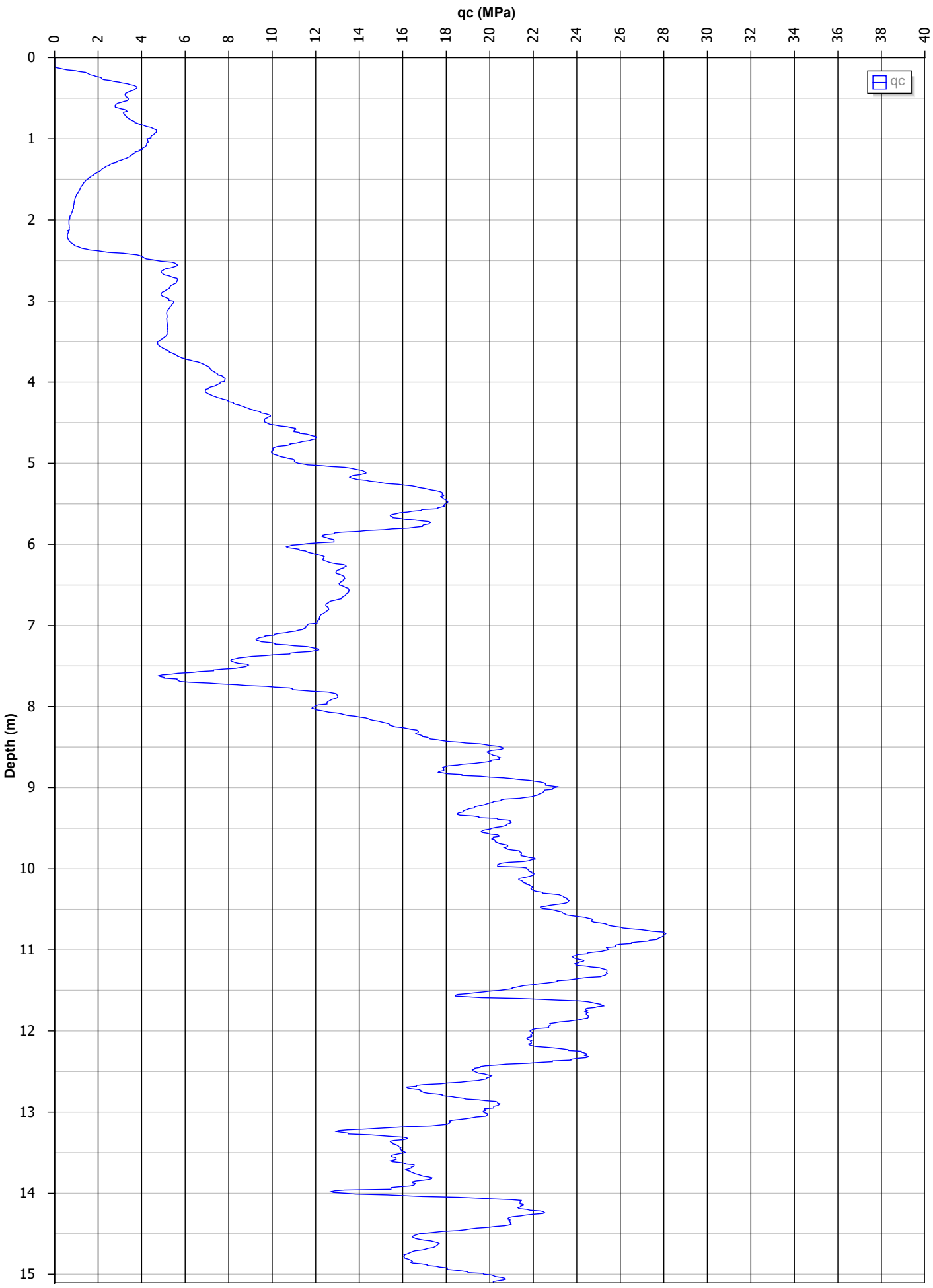
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT01
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT01
Client Ref.:	20136

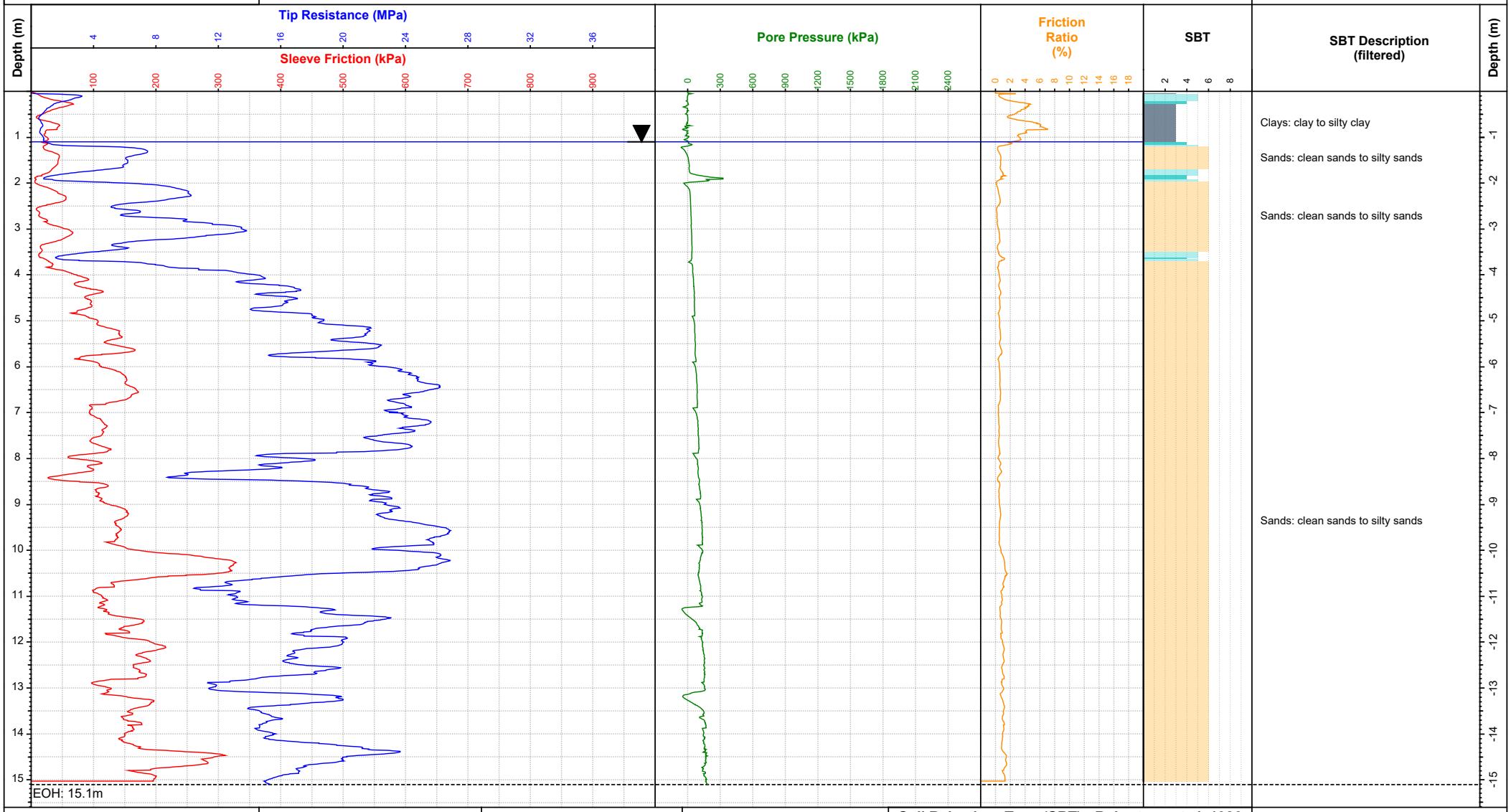


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT02

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 1.10m

Termination Reason:
Target depth

Northing:	5792601.45
Easting:	1946587.74
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

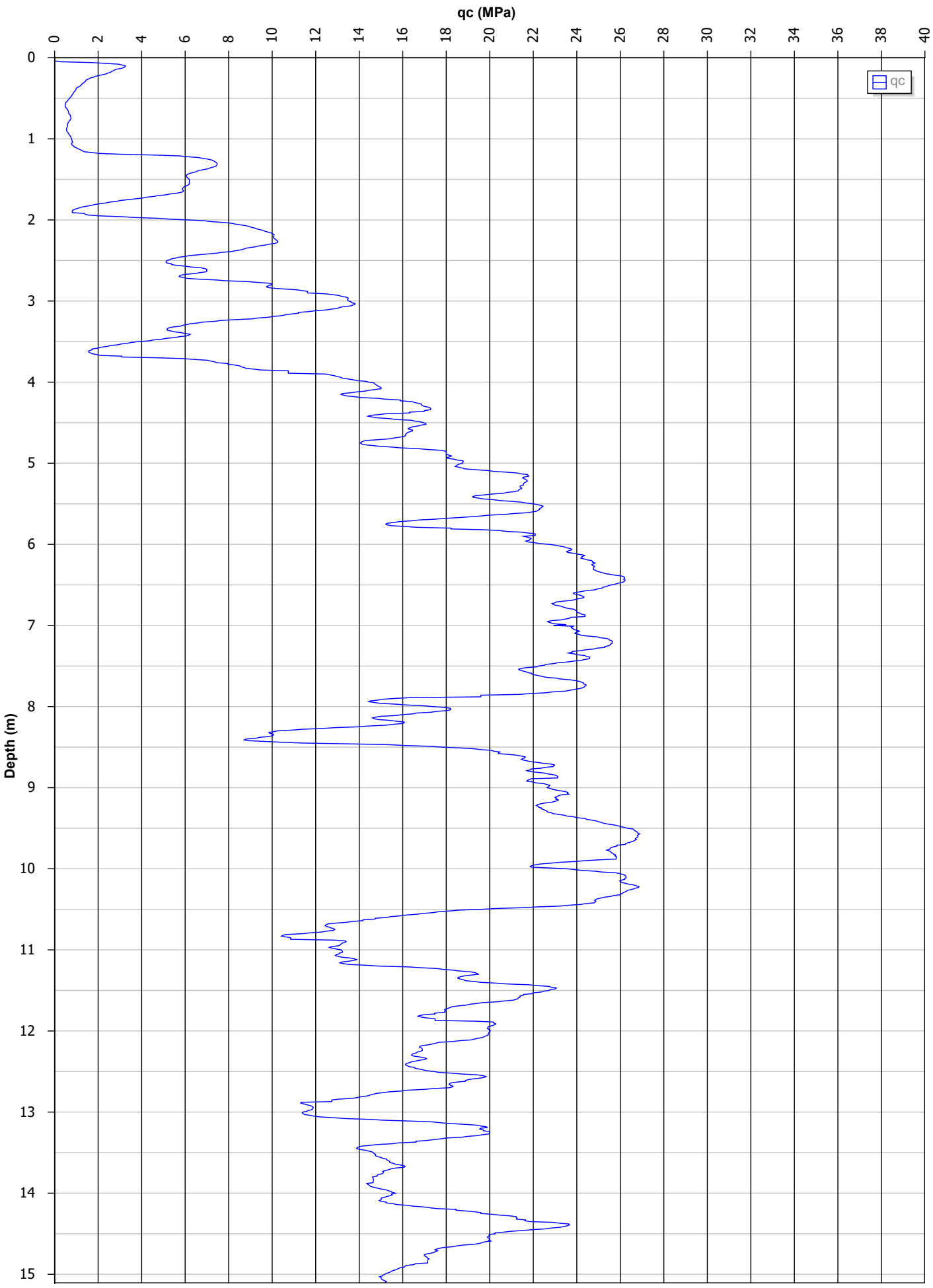
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT02
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT02
Client Ref.:	20136

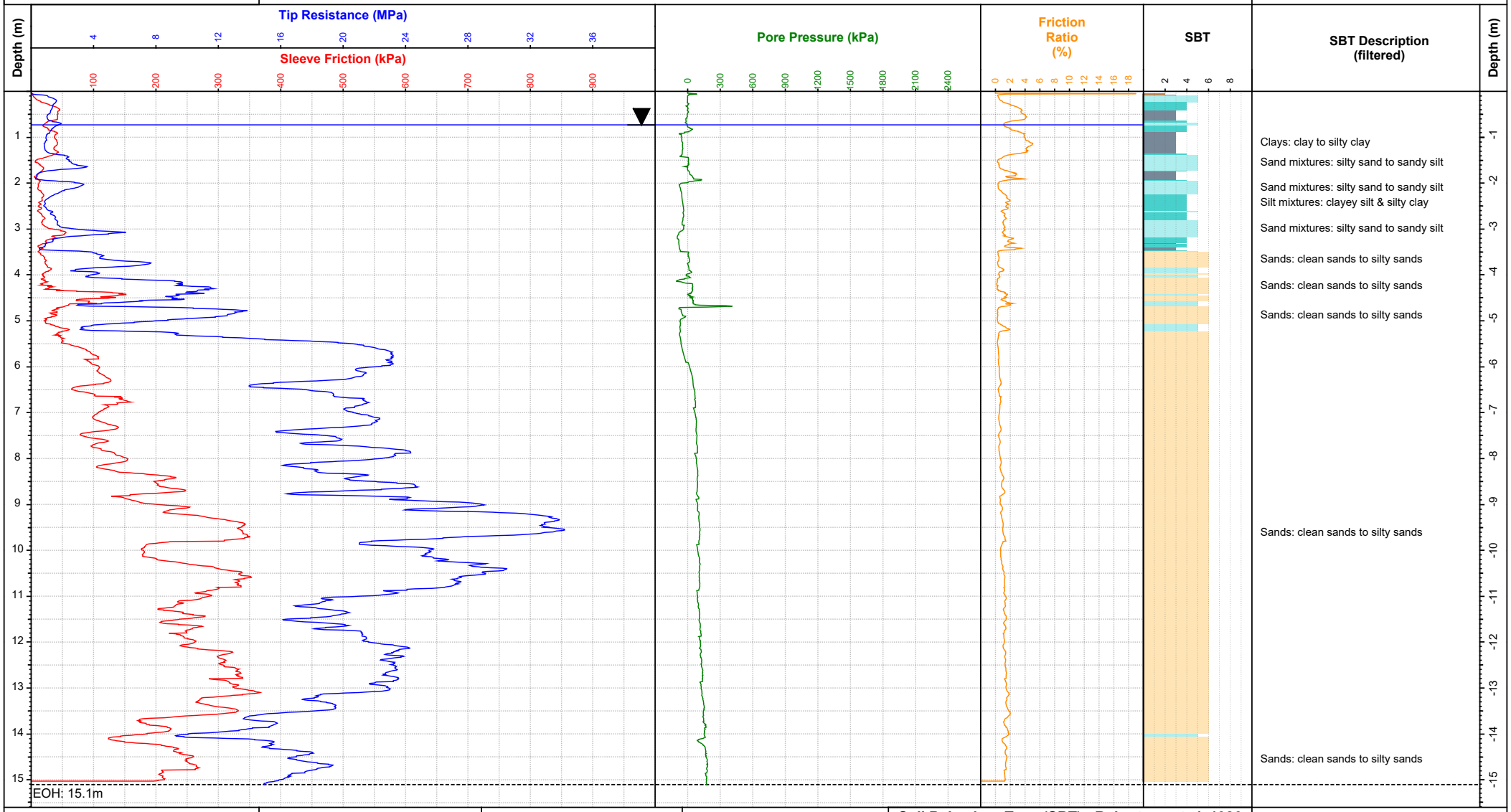


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT03

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 0.73m

Termination Reason:
Target depth

Northing:	5792475.12
Easting:	1946537.62
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

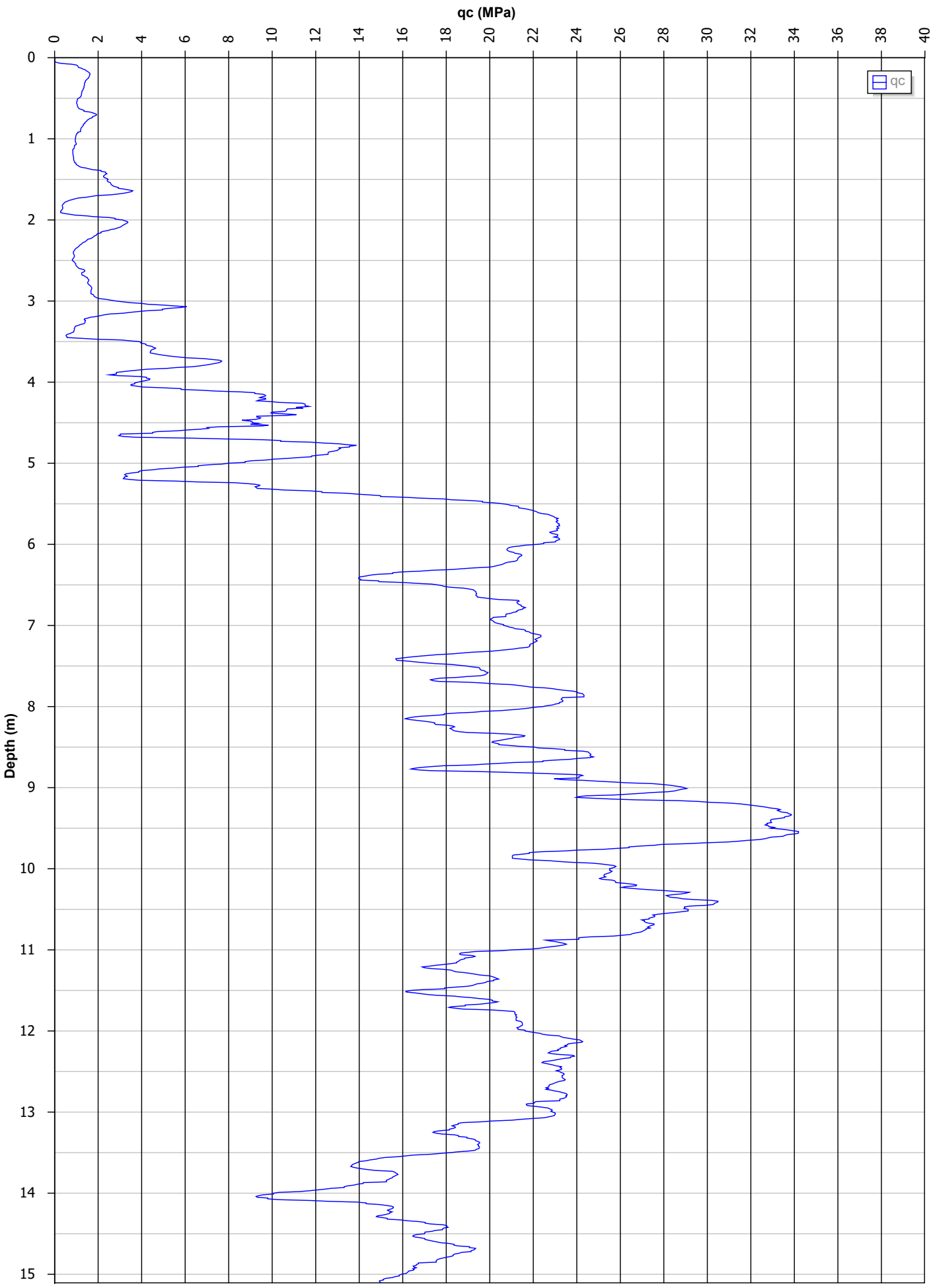
0 Undefined	5 Sand mixtures: silty sand to sandy silt
1 Sensitive fine-grained	6 Sands: clean sands to silty sands
2 Clay - organic soil	7 Dense sand to gravelly sand
3 Clays: clay to silty clay	8 Stiff sand to clayey sand
4 Silt mixtures: clayey silt & silty clay	9 Stiff fine-grained

Test No:	CPT03
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	04/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT03
Client Ref.:	20136

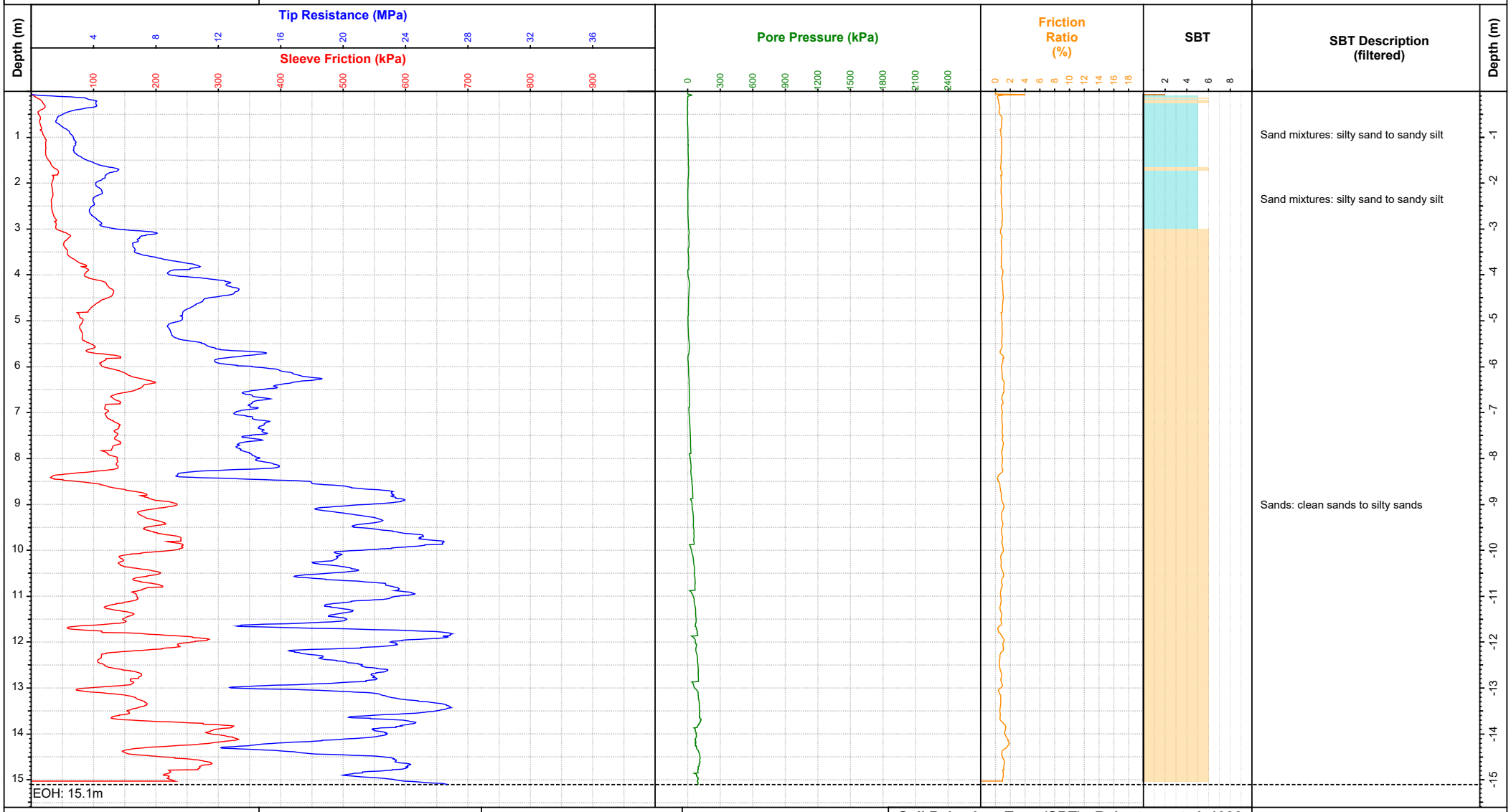


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT04

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
Hole collapsed dry at 5.50m

Termination Reason:
Target depth

Northing:	5792630.60
Easting:	1946737.31
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

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

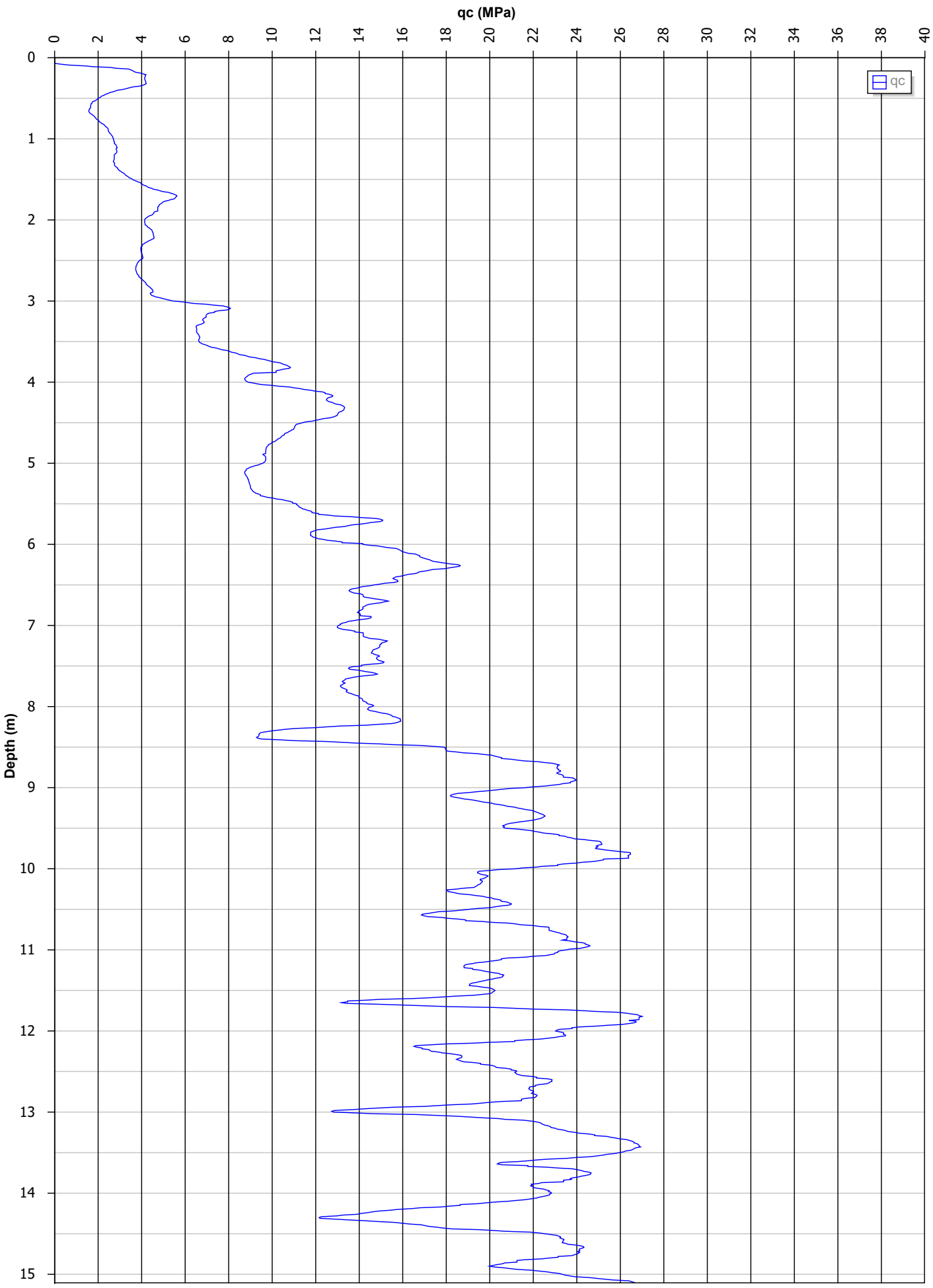
Test No:	CPT04
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

SHEET 1 OF 2

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT04
Client Ref.:	20136

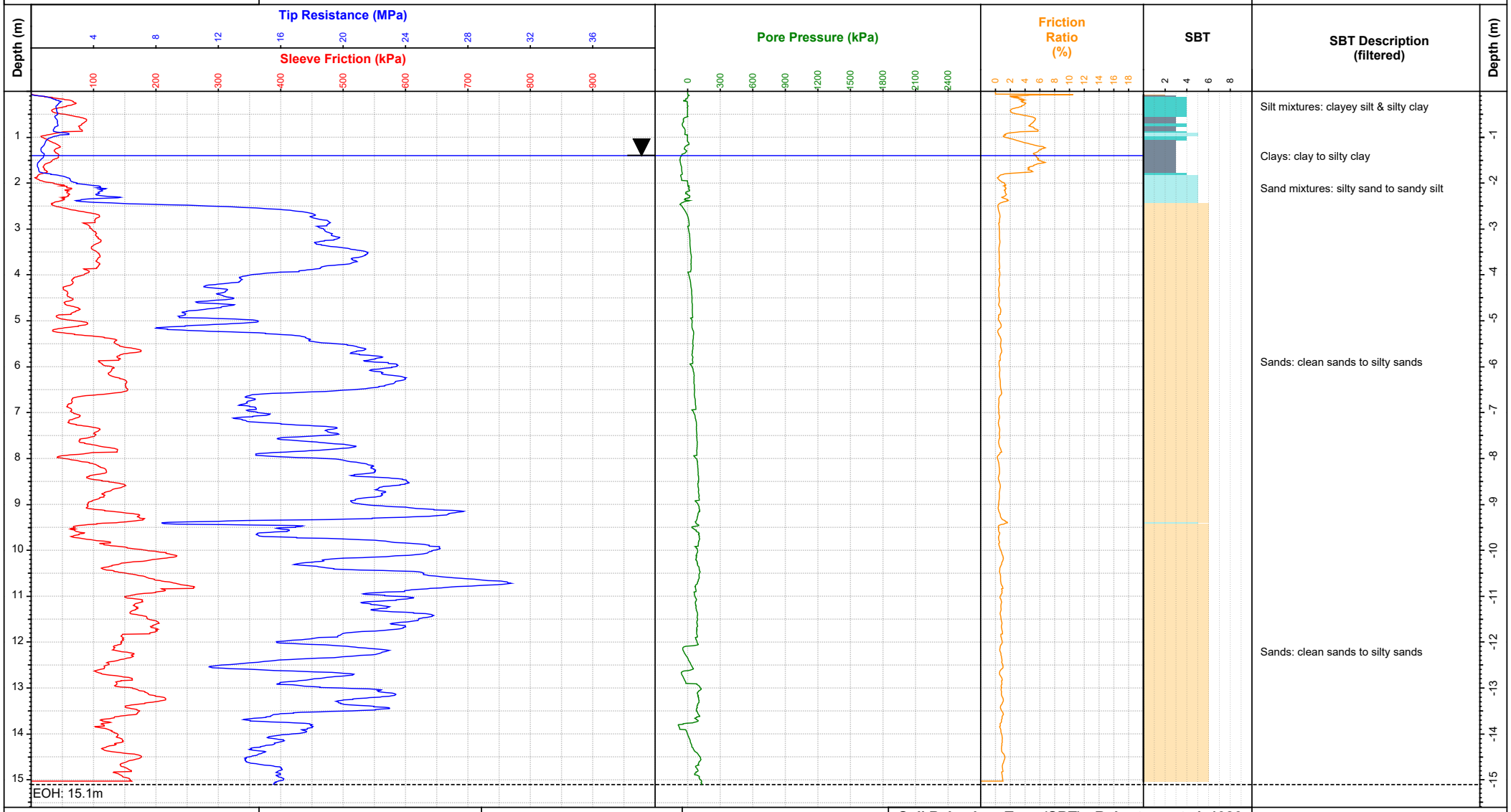


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT05

Client Ref.: 20136



SBT Description (filtered)

Silt mixtures: clayey silt & silty clay

Clays: clay to silty clay

Sand mixtures: silty sand to sandy silt

Sands: clean sands to silty sands

Sands: clean sands to silty sands

Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 1.40m

Termination Reason:
Target depth

Northing:	5792573.31
Easting:	1946683.42
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

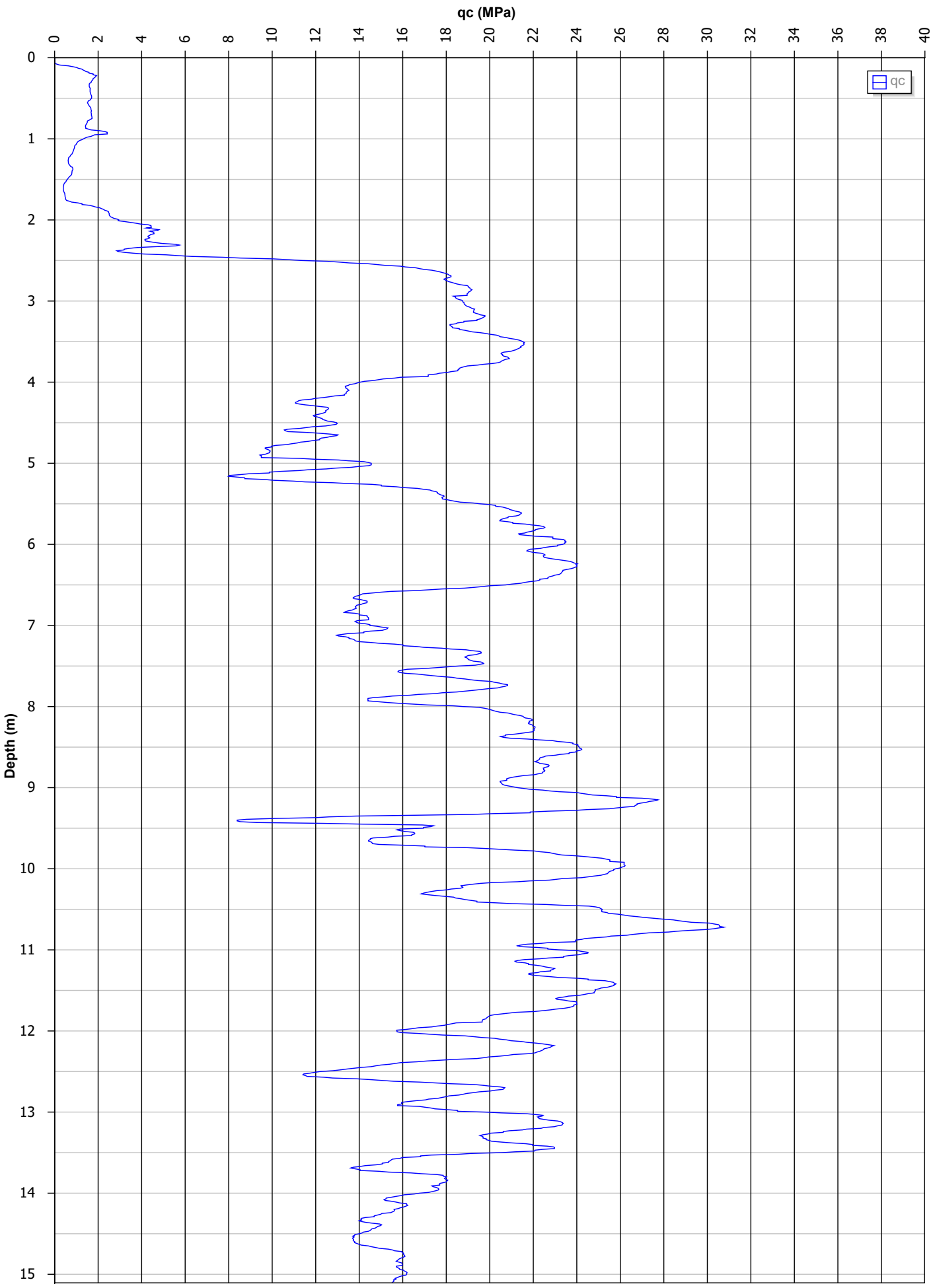
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT05
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT05
Client Ref.:	20136

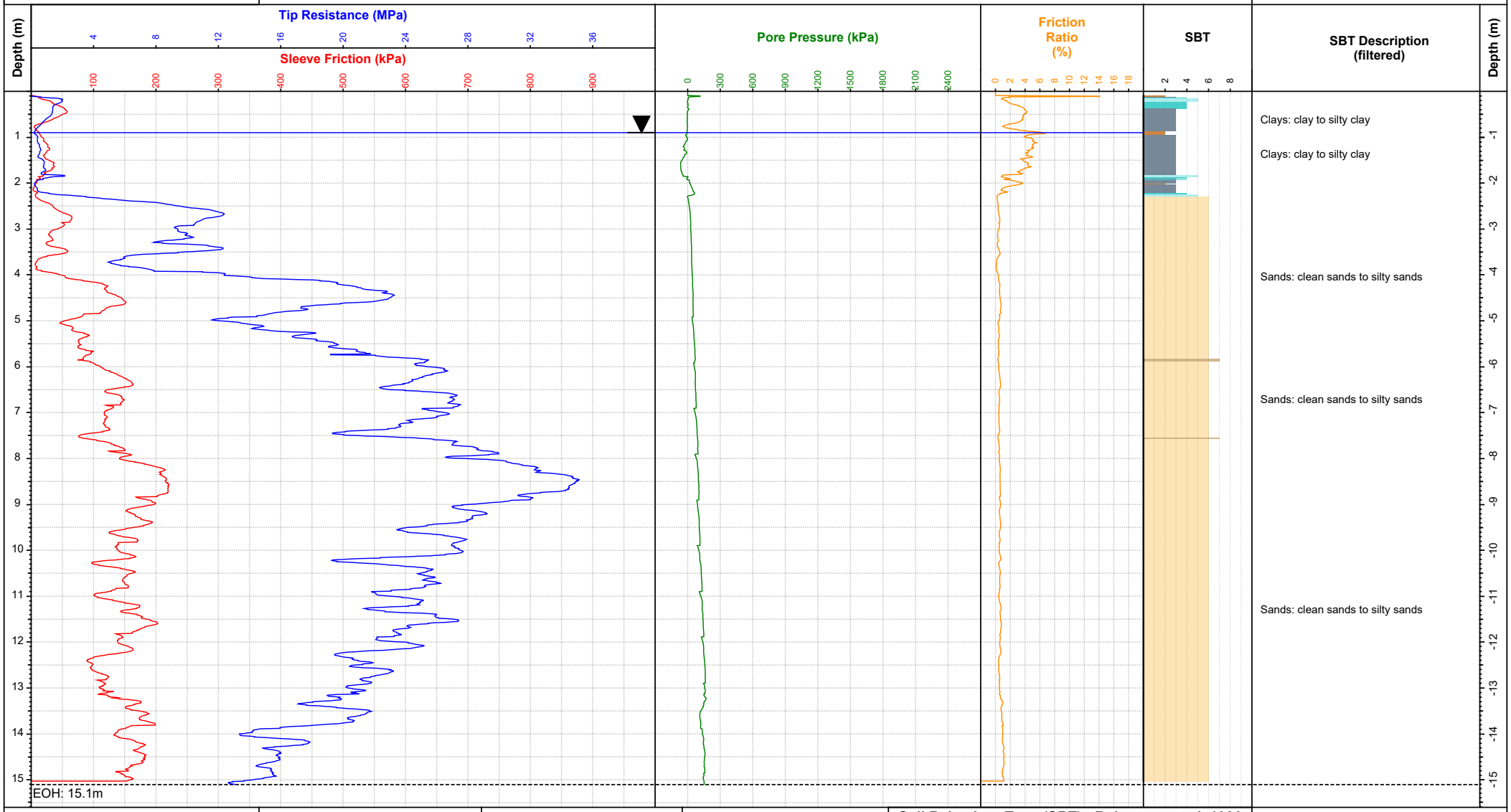


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT06

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 0.90m

Termination Reason:
Target depth

Northing:	5792500.00
Easting:	1946654.00
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

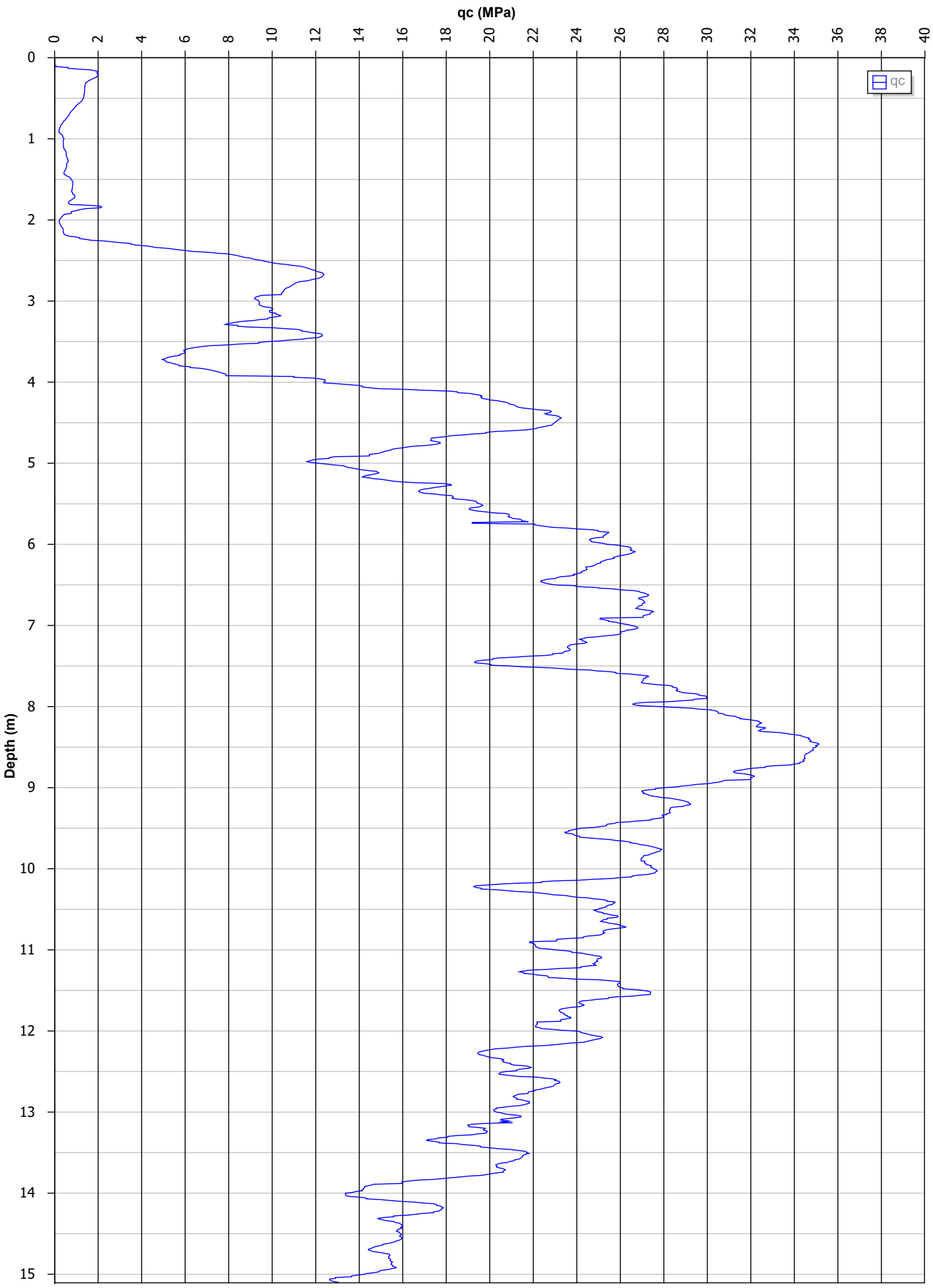
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT06
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT06
Client Ref.:	20136

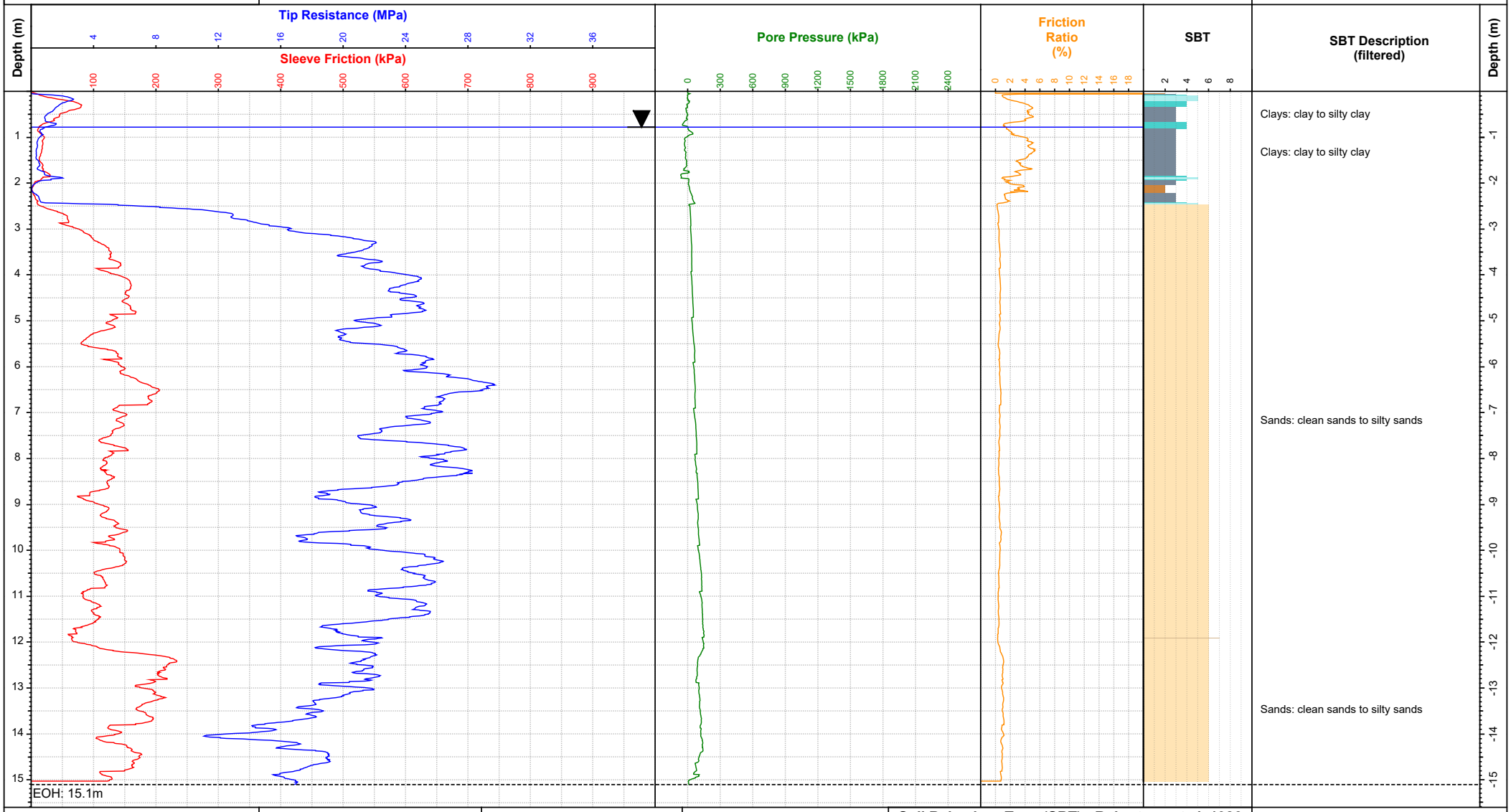


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT07

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 0.78m

Termination Reason:
Target depth

Northing:	5792401.41
Easting:	1946675.06
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

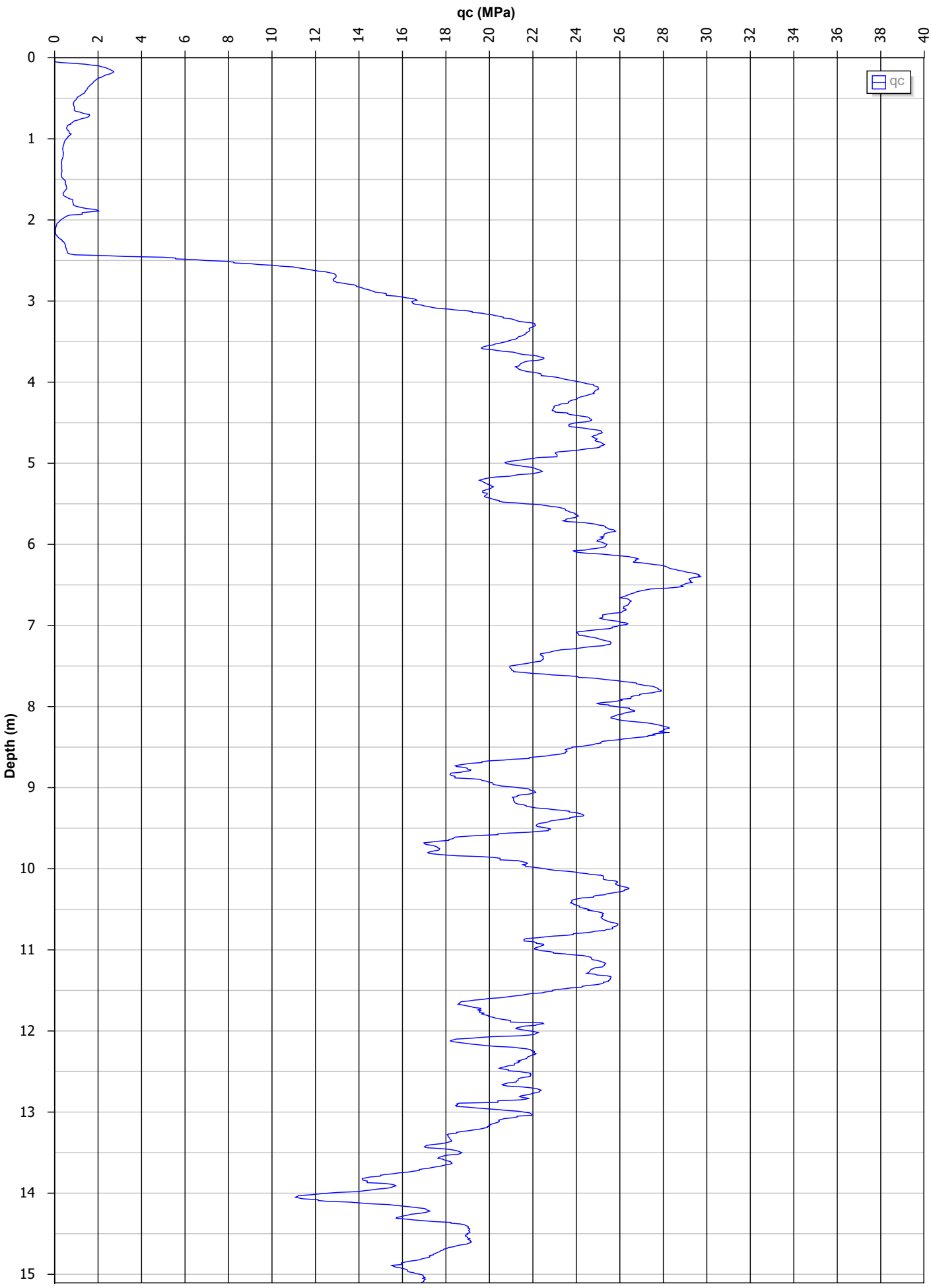
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT07
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT07
Client Ref.:	20136

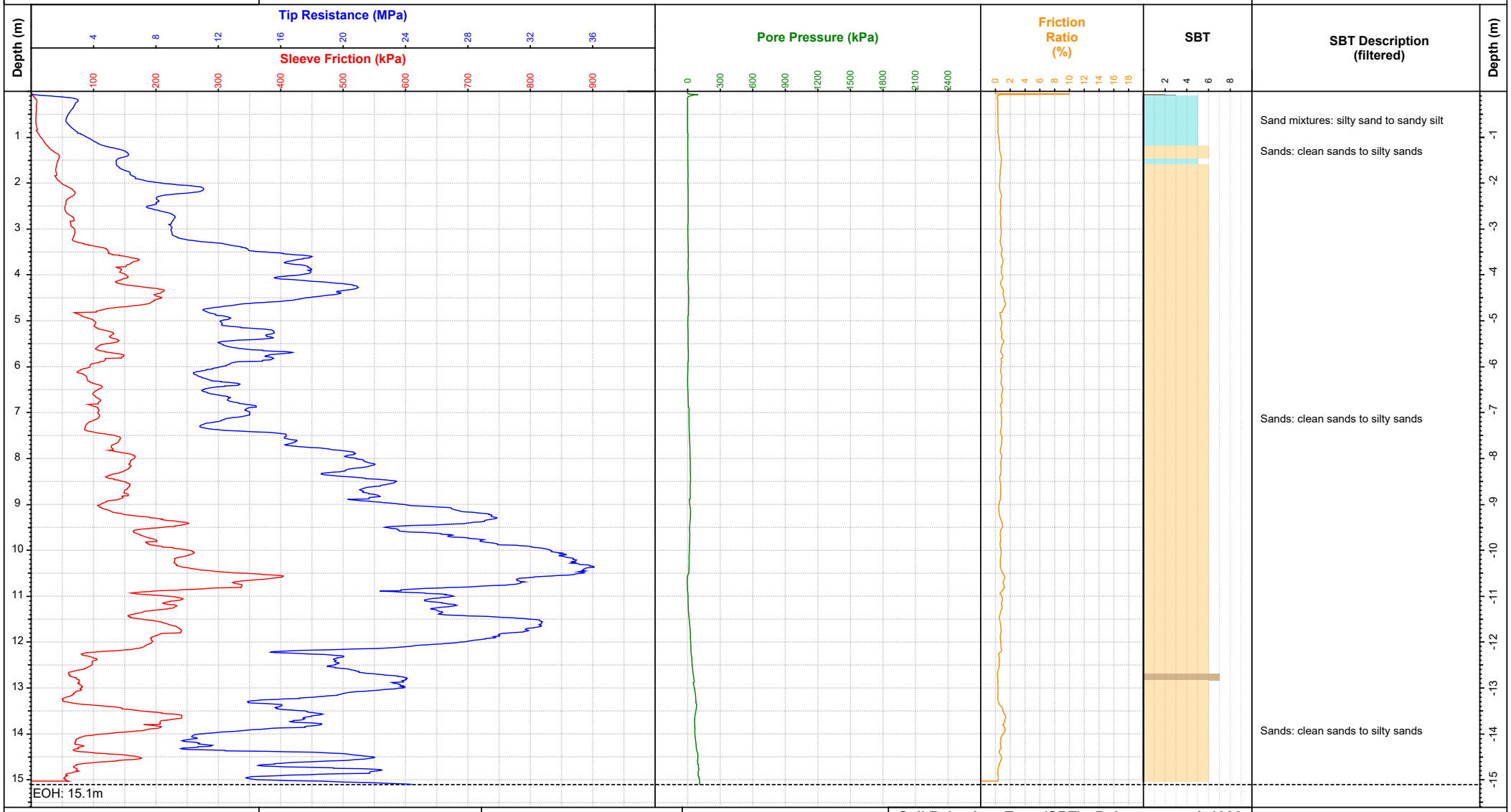


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT08

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
Hole collapsed dry at 6.10m

Termination Reason:
Target depth

Northing:	5792609.63
Easting:	1946845.25
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

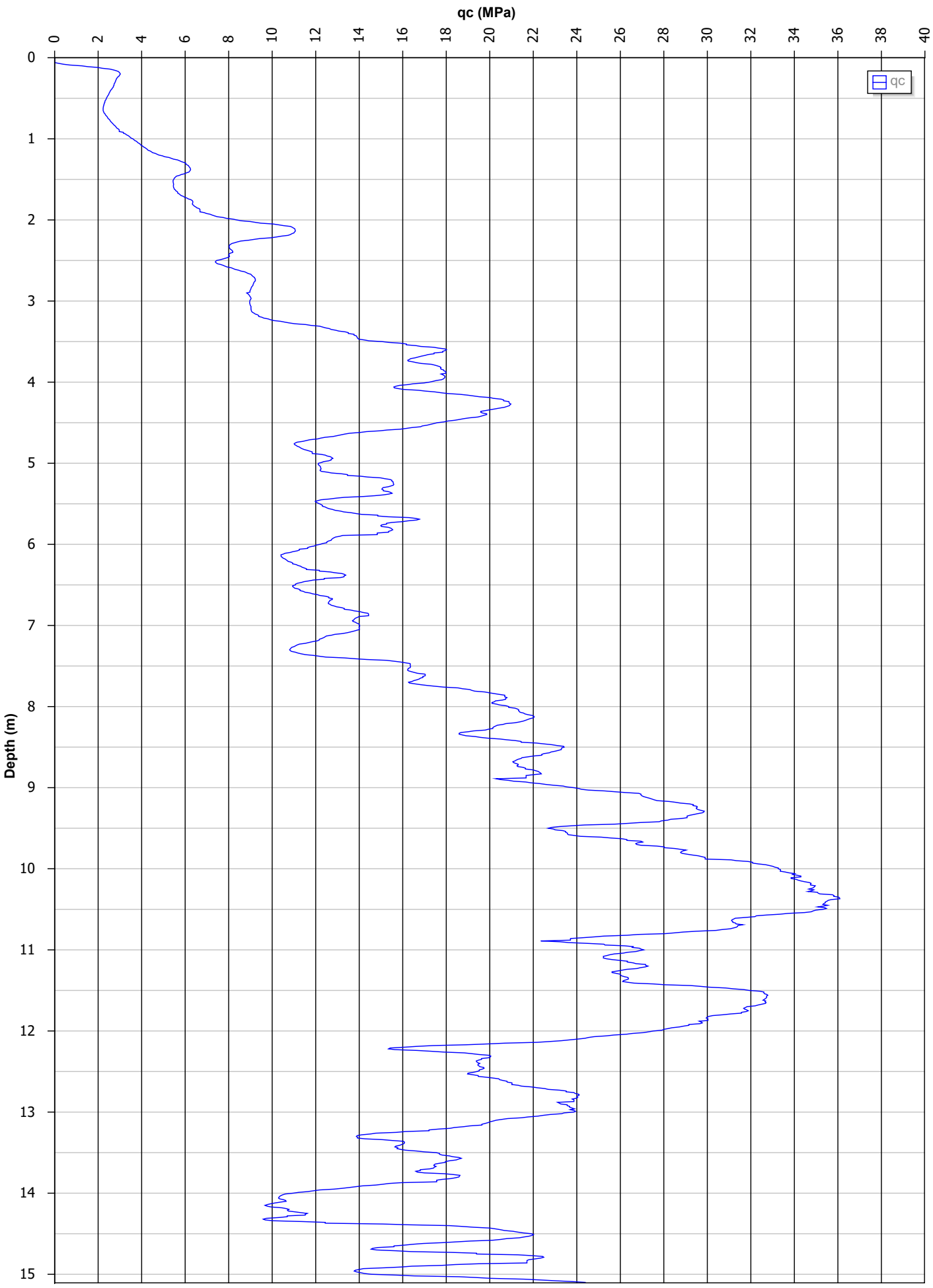
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT08
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	04/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT08
Client Ref.:	20136

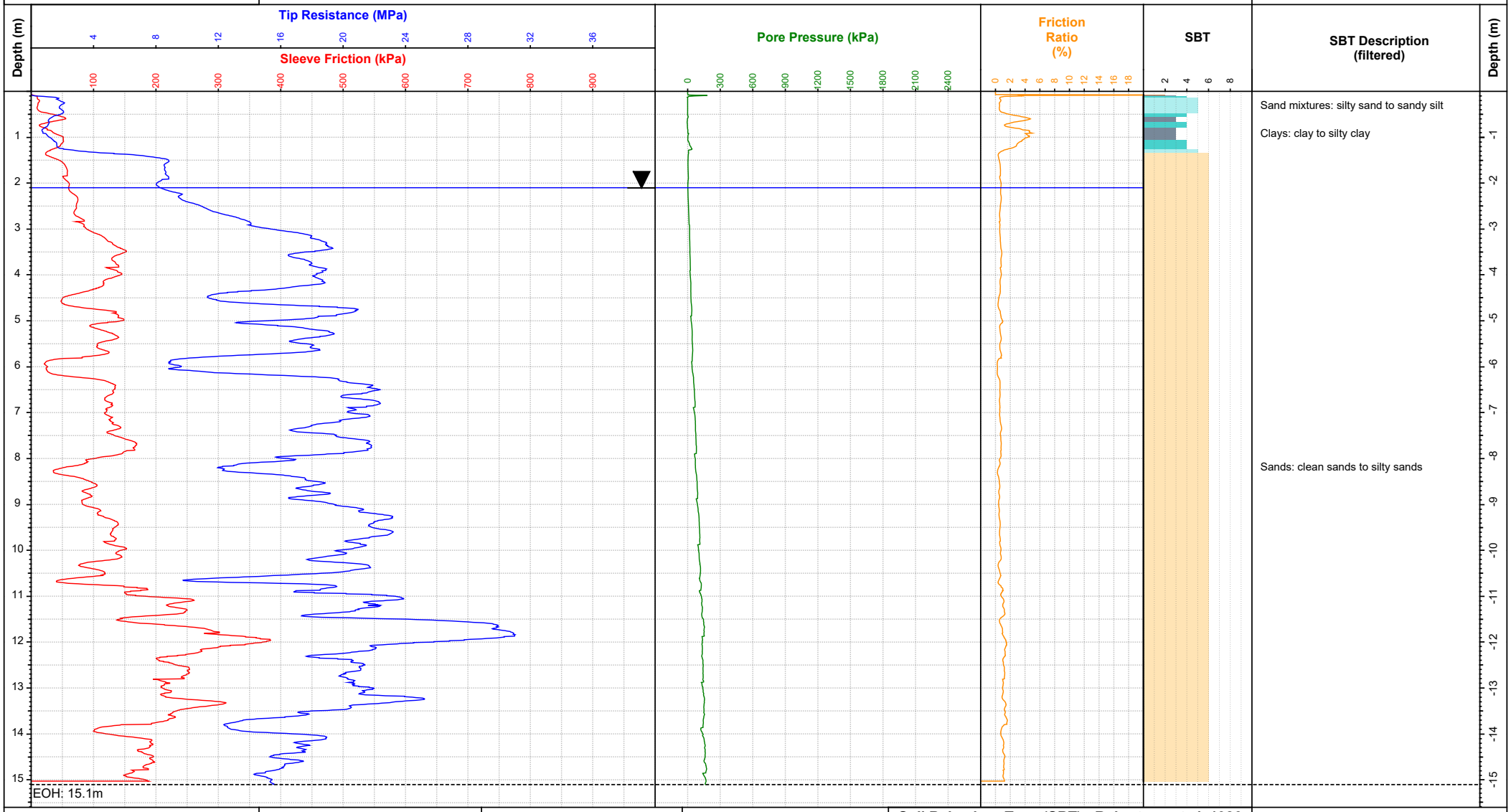


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT09

Client Ref.: 20136



SBT Description (filtered)

Sand mixtures: silty sand to sandy silt

Clays: clay to silty clay

Sands: clean sands to silty sands

Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:

GWL dipped on-site at 2.10m

Termination Reason:

Target depth

Northing:	5792510.67
Easting:	1946810.92
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

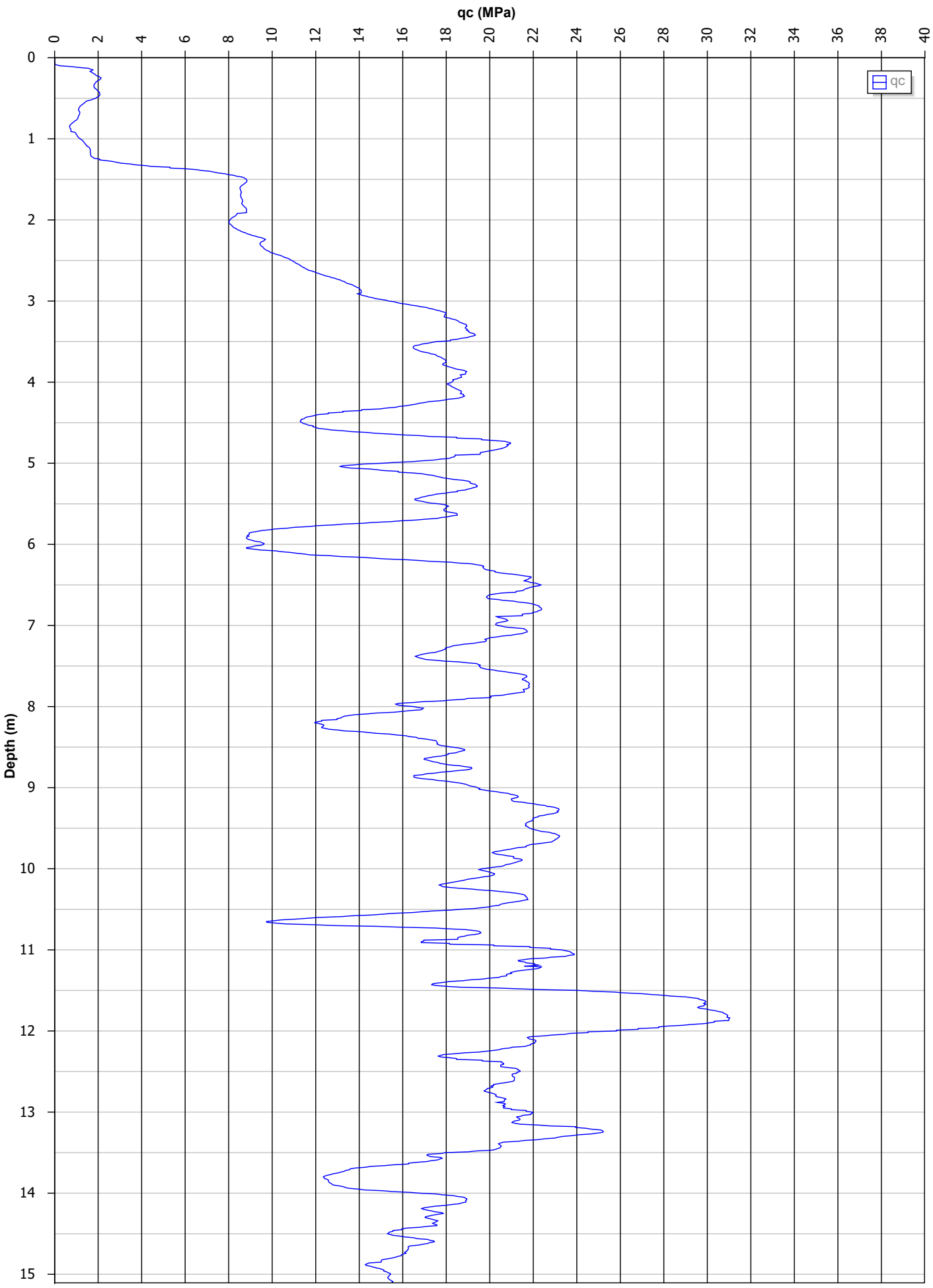
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT09
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	04/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT09
Client Ref.:	20136

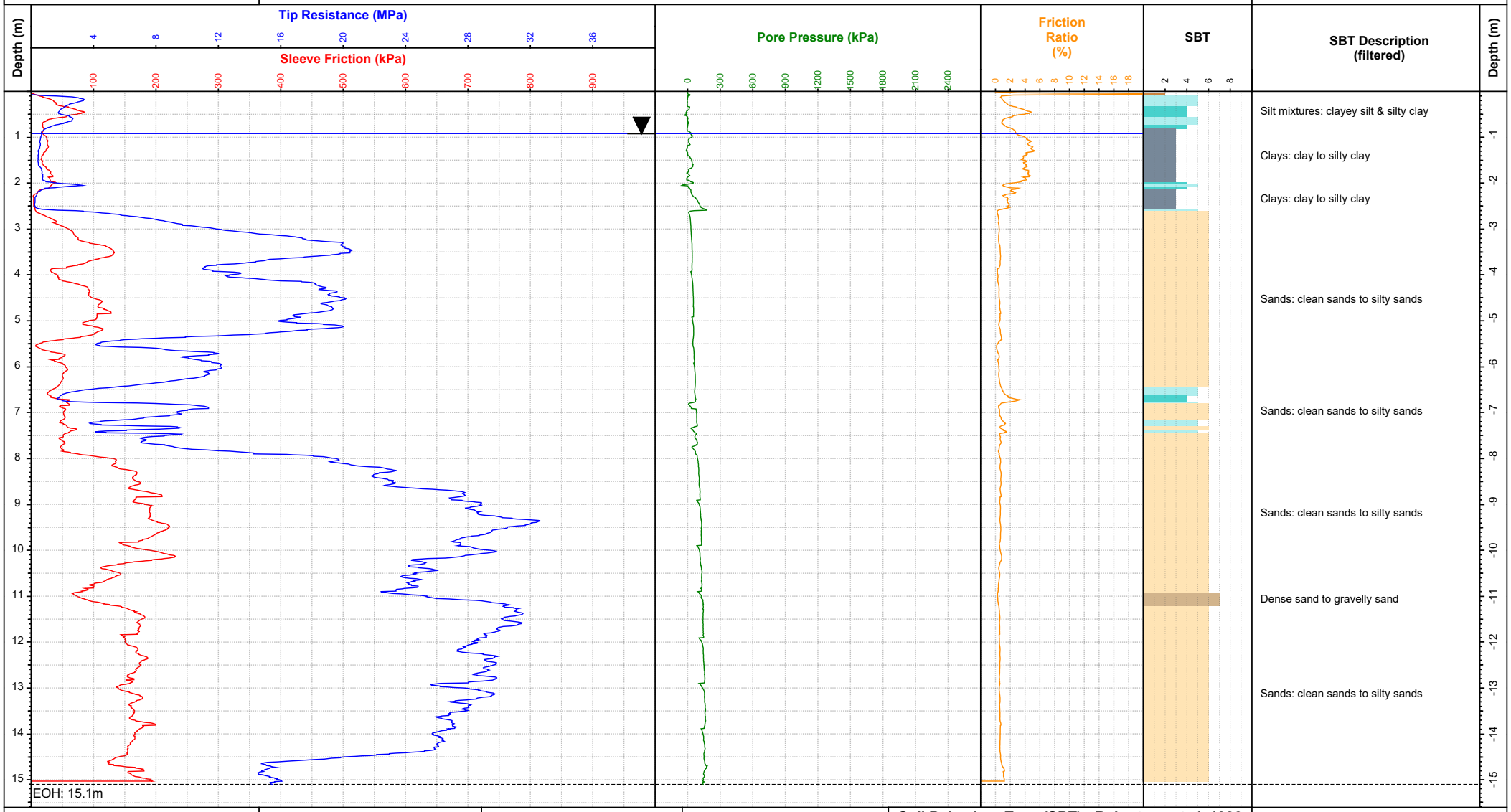


CONE PENETRATION TEST LOG

Topdrill Geotech

Test No: CPT10

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
GWL dipped on-site at 0.92m

Termination Reason:
Target depth

Northing:	5792453.00
Easting:	1946785.00
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

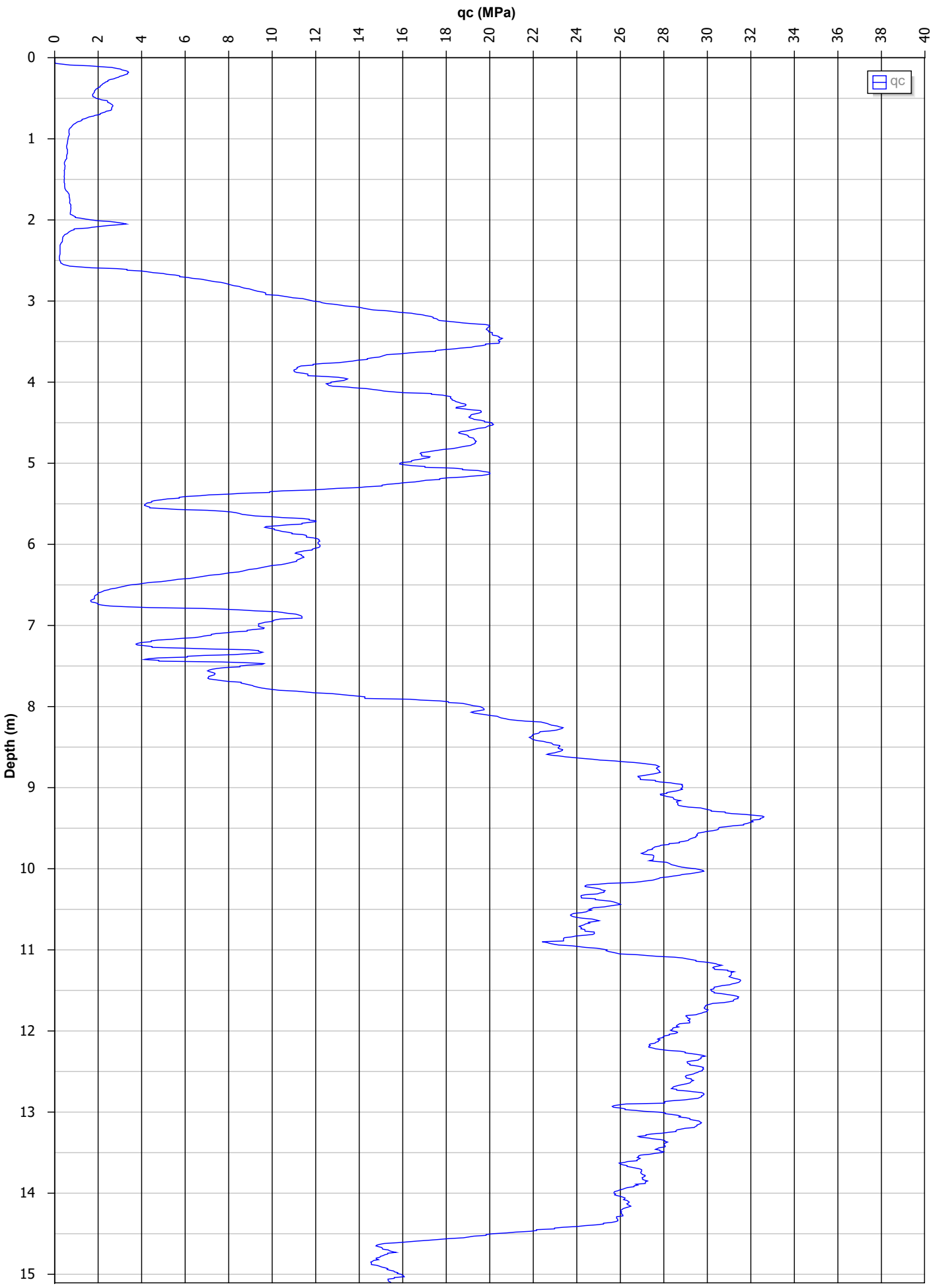
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT10
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	01/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT10
Client Ref.:	20136

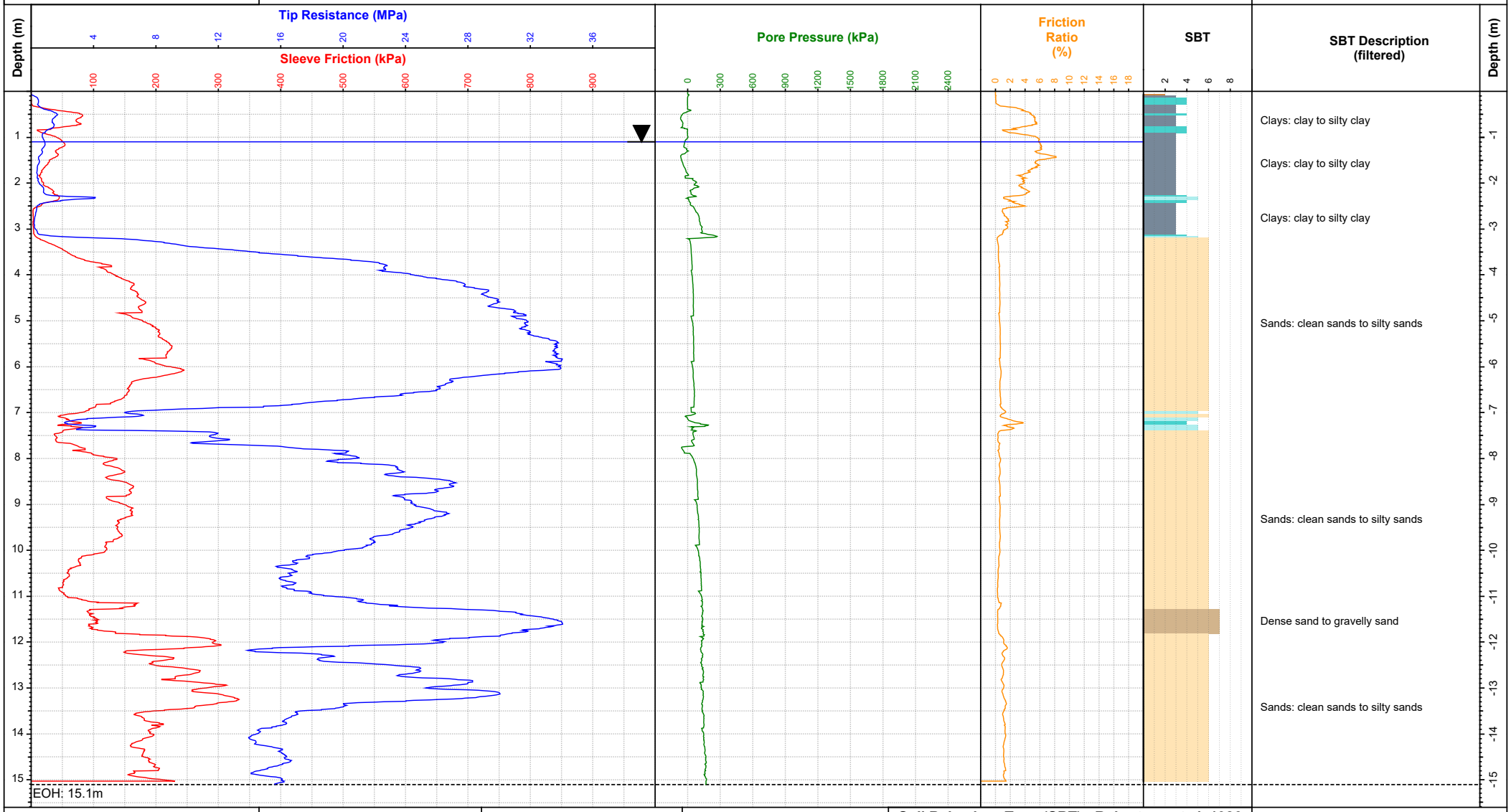


Topdrill Geotech

CONE PENETRATION TEST LOG

Test No: CPT11

Client Ref.: 20136



Client: ENGEO

Project: Julian's Berry Farm

Location: 12 Huna Road, Coastlands, Whakatane

Contractor: Topdrill Ltd

Remarks:
Hole collapsed dry at 1.10m

Termination Reason:
Target depth

Northing:	5792448.94
Easting:	1946866.41
System:	NZTM
Elevation:	Ground
Datum:	N/A
Method:	Garmin GPS

Rig:	Pagani TG 63 - 150
Cone ID:	MKs632
Cone Area:	10cm²
Sleeve Area:	150cm²
Area Ratio:	0.79
Predrill:	0.00

Soil Behaviour Type (SBT) - Robertson et al. 1986

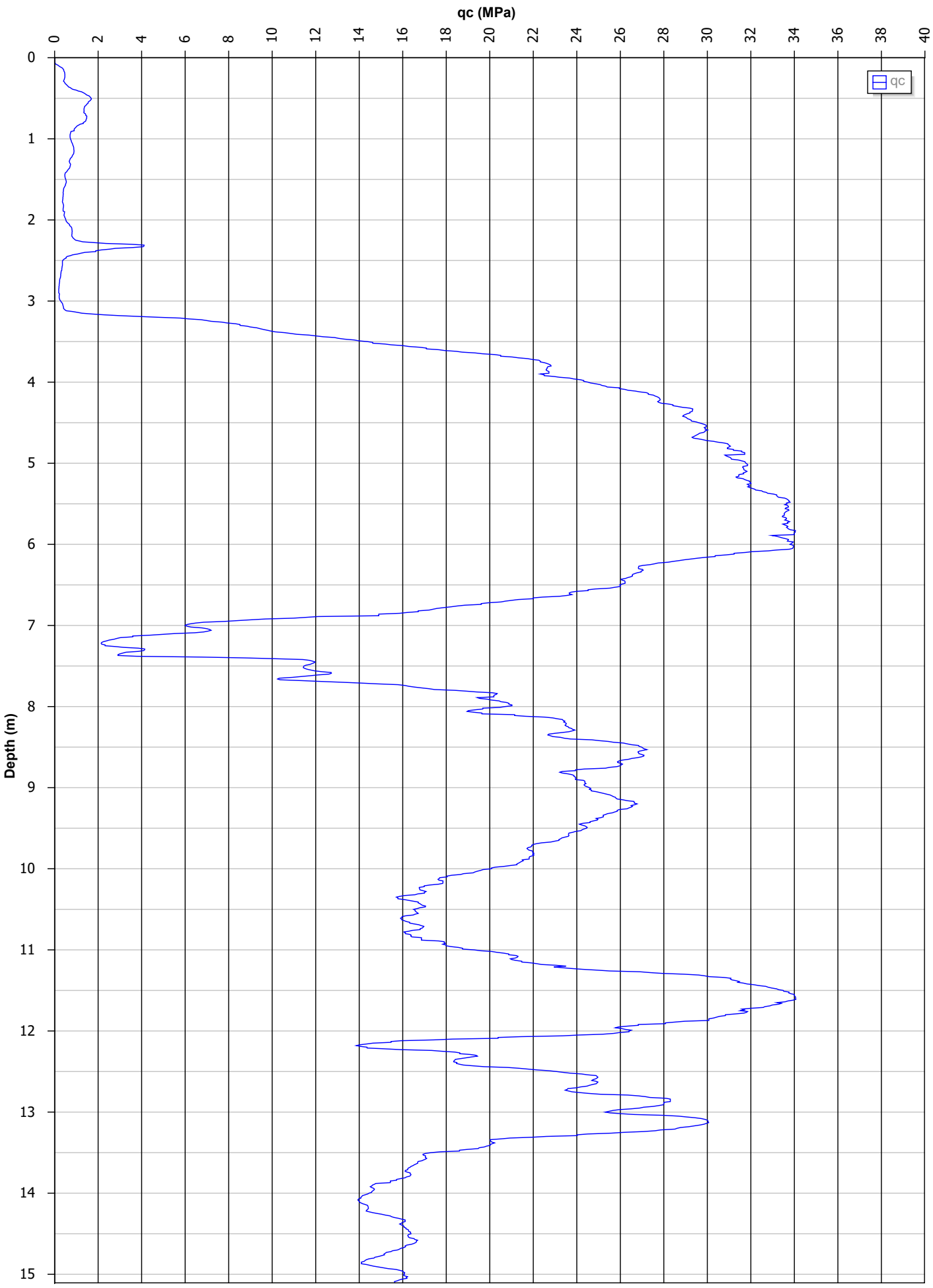
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test No:	CPT11
Topdrill Ref.:	TD20374
Client Ref.:	20136
Depth (m):	15.1
Date:	04/04/2022

Topdrill Geotech

TIP RESISTANCE (q_c)

Test No:	CPT11
Client Ref.:	20136



APPENDIX 3:

Soakage Testing

Falling Head Soakage Test - HA08

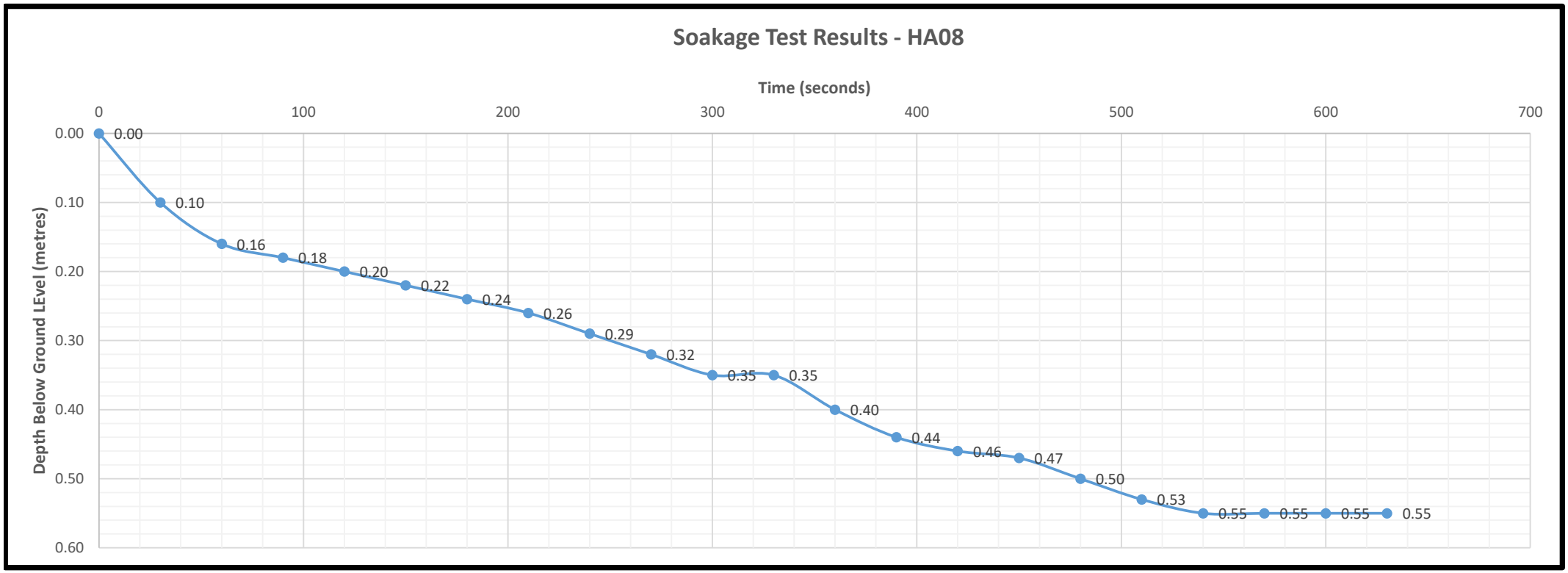
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	0.6	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time **T** (min)	Time **T** (sec)	Water Level BGL **d** (m)	Water Depth =**D**-**d** (m)	Time Steps t_0 sec	Time Steps t_1 sec	Depth Steps h_0 m	Depth Steps h_1 m	Volume Soaked $V=(h_0-h_1)*$**B** m^3	Soakage Surface Area $A=($**C**$*(h_0+h_1)/2)+$**B** m^2	Soakage Rate $SR=V/A(t_1-t_0)$ $m^3/m^2/sec$	Soakage Rate $SR*60*60*1000$ litres/m^2/hour
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.5	30	0.10	1.90	0	30	2.00	1.90	0.000785398	0.620464549	4.21941E-05	152
1	60	0.16	1.84	30	60	1.90	1.84	0.000471239	0.595331808	2.63852E-05	95
1.5	90	0.18	1.82	60	90	1.84	1.82	0.00015708	0.582765437	8.98473E-06	32
2	120	0.20	1.80	90	120	1.82	1.80	0.00015708	0.576482252	9.08265E-06	33
2.5	150	0.22	1.78	120	150	1.80	1.78	0.00015708	0.570199067	9.18274E-06	33
3	180	0.24	1.76	150	180	1.78	1.76	0.00015708	0.563915881	9.28505E-06	33
3.5	210	0.26	1.74	180	210	1.76	1.74	0.00015708	0.557632696	9.38967E-06	34
4	240	0.29	1.71	210	240	1.74	1.71	0.000235619	0.549778714	1.42857E-05	51
4.5	270	0.32	1.68	240	270	1.71	1.68	0.000235619	0.540353936	1.45349E-05	52
5	300	0.35	1.65	270	300	1.68	1.65	0.000235619	0.530929158	1.47929E-05	53
5.5	330	0.35	1.65	300	330	1.65	1.65	0	0.526216769	~~0~~	~~0~~
6	360	0.40	1.60	330	360	1.65	1.60	0.000392699	0.518362788	~~2.52525E-05~~	~~91~~
6.5	390	0.44	1.56	360	390	1.60	1.56	0.000314159	0.504225621	2.07684E-05	75
7	420	0.46	1.54	390	420	1.56	1.54	0.00015708	0.494800843	1.0582E-05	38
7.5	450	0.47	1.53	420	450	1.54	1.53	7.85398E-05	0.490088454	5.34188E-06	19
8	480	0.50	1.50	450	480	1.53	1.50	0.000235619	0.483805269	1.62338E-05	58
8.5	510	0.53	1.47	480	510	1.50	1.47	0.000235619	0.474380491	1.65563E-05	60
9	540	0.55	1.45	510	540	1.47	1.45	0.00015708	0.466526509	1.12233E-05	40
9.5	570	0.55	1.45	540	570	1.45	1.45	0	0.463384916	~~0~~	~~0~~
10	600	0.55	1.45	570	600	1.45	1.45	0	0.463384916	~~0~~	~~0~~
10.5	630	0.55	1.45	600	630	1.45	1.45	0	0.463384916	~~0~~	~~0~~
									Considered Average	1.49265E-05	54
									Design Rate	7.46323E-06	27

Notes: The average does not include the struck out values as they are considered outliers

litres/m^2/hour can have the units reduced to mm/hour however TCC recomends the use of litres/m^2/hour to reduce confusion in subsequent calculations


Soakage Test Results - HA08
Time (seconds)
0
100
200
300
400
500
600
700
Depth Below Ground LEvel (metres)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.00
0.10
0.16
0.18
0.20
0.22
0.24
0.26
0.29
0.32
0.35
0.35
0.40
0.44
0.46
0.47
0.50
0.53
0.55
0.55
0.55
0.55

Falling Head Soakage Test - HA01 (HAST01)

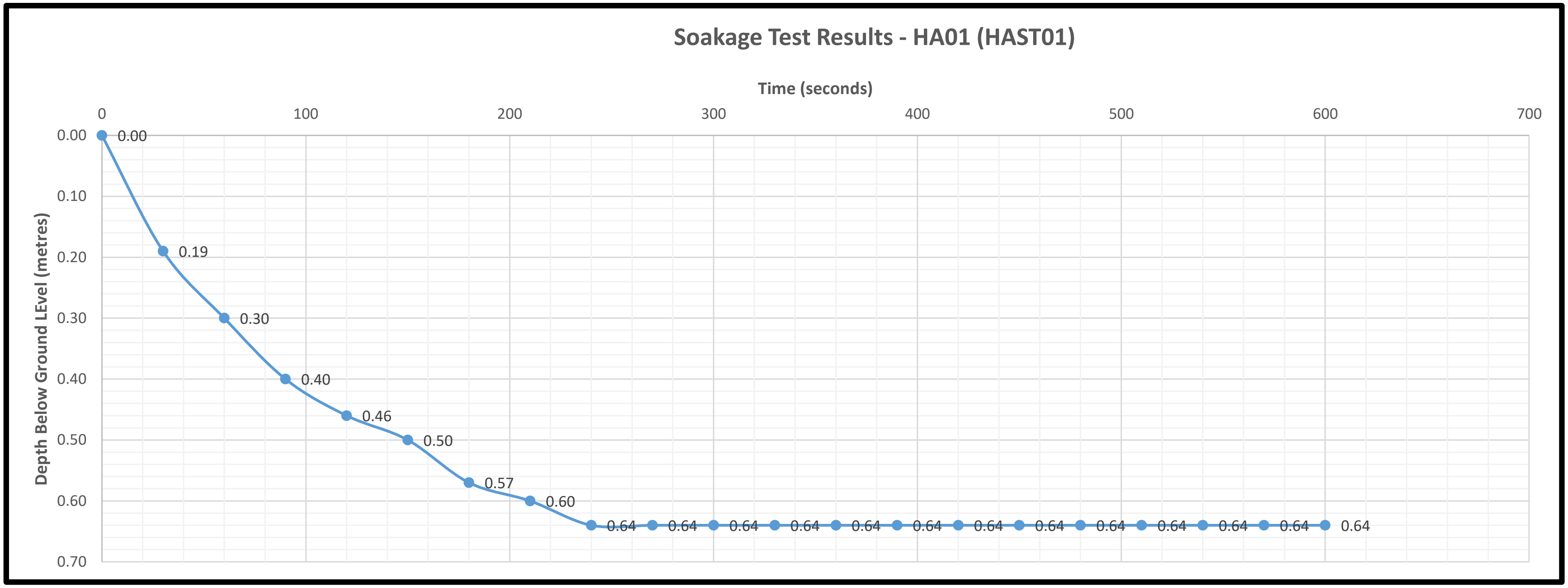
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	0.6	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time **T** (min)	Time **T** (sec)	Water Level BGL **d** (m)	Water Depth =**D**-**d** (m)	Time Steps t_0 sec	Time Steps t_1 sec	Depth Steps h_0 m	Depth Steps h_1 m	Volume Soaked $V=(h_0-h_1)*B$ m^3	Soakage Surface Area $A=(C*(h_0+h_1)/2)+B$ m^2	Soakage Rate $SR=V/A(t_1-t_0)$ $m^3/m^2/sec$	Soakage Rate $SR*60*60*1000$ $litres/m^2/hour$
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.5	30	0.19	1.81	0	30	2.00	1.81	0.001492257	0.606327382	8.2038E-05	295
1	60	0.30	1.70	30	60	1.81	1.70	0.000863938	0.559203492	5.14981E-05	185
1.5	90	0.40	1.60	60	90	1.70	1.60	0.000785398	0.526216769	4.97512E-05	179
2	120	0.46	1.54	90	120	1.60	1.54	0.000471239	0.501084028	3.1348E-05	113
2.5	150	0.50	1.50	120	150	1.54	1.50	0.000314159	0.485376065	2.1575E-05	78
3	180	0.57	1.43	150	180	1.50	1.43	0.000549779	0.468097305	3.91499E-05	141
3.5	210	0.60	1.40	180	210	1.43	1.40	0.000235619	0.452389342	1.73611E-05	63
4	240	0.64	1.36	210	240	1.40	1.36	0.000314159	0.441393768	2.37248E-05	85
4.5	270	0.64	1.36	240	270	1.36	1.36	0	0.435110583	~~0~~	~~0~~
5	300	0.64	1.36	270	300	1.36	1.36	0	0.435110583	~~0~~	~~0~~
5.5	330	0.64	1.36	300	330	1.36	1.36	0	0.435110583	~~0~~	~~0~~
6	360	0.64	1.36	330	360	1.36	1.36	0	0.435110583	~~0~~	~~0~~
6.5	390	0.64	1.36	360	390	1.36	1.36	0	0.435110583	~~0~~	~~0~~
7	420	0.64	1.36	390	420	1.36	1.36	0	0.435110583	~~0~~	~~0~~
7.5	450	0.64	1.36	420	450	1.36	1.36	0	0.435110583	~~0~~	~~0~~
8	480	0.64	1.36	450	480	1.36	1.36	0	0.435110583	~~0~~	~~0~~
8.5	510	0.64	1.36	480	510	1.36	1.36	0	0.435110583	~~0~~	~~0~~
9	540	0.64	1.36	510	540	1.36	1.36	0	0.435110583	~~0~~	~~0~~
9.5	570	0.64	1.36	540	570	1.36	1.36	0	0.435110583	~~0~~	~~0~~
10	600	0.64	1.36	570	600	1.36	1.36	0	0.435110583	~~0~~	~~0~~
									Considered Average	3.95558E-05	142
									Design Rate	1.97779E-05	71

Notes: The average does not include the struck out values as they are considered outliers

$litres/m^2/hour$ can have the units reduced to mm/hour however TCC recomends the use of $litres/m^2/hour$ to reduce confusion in subsequent calculations



Soakage Test Results - HA01 (HAST01)
Time (seconds)
0
100
200
300
400
500
600
700
Depth Below Ground LEvel (metres)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.00
0.19
0.30
0.40
0.46
0.50
0.57
0.60
0.64

Falling Head Soakage Test - HA01 (HAST02)

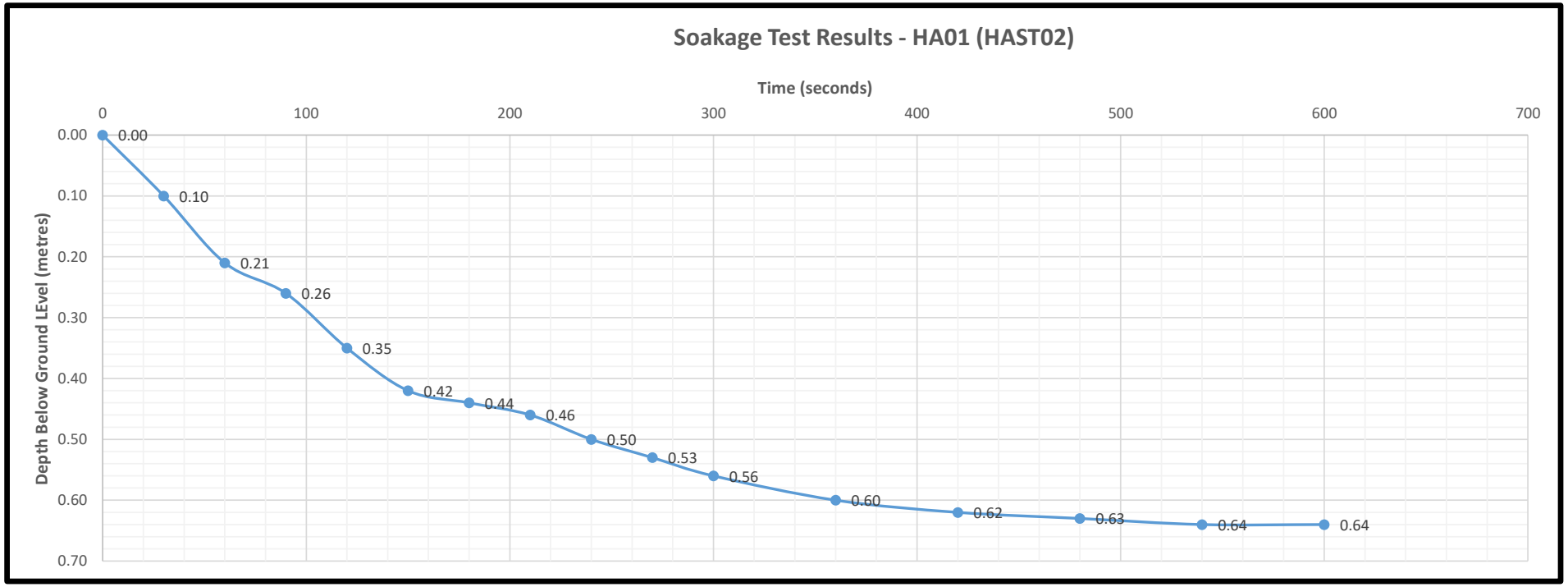
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	0.6	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time **T** (min)	Time **T** (sec)	Water Level BGL **d** (m)	Water Depth =**D**-**d** (m)	Time Steps t_0 sec	Time Steps t_1 sec	Depth Steps h_0 m	Depth Steps h_1 m	Volume Soaked $V=(h_0-h_1)*B$ m^3	Soakage Surface Area $A=(C*(h_0+h_1)/2)+B$ m^2	Soakage Rate $SR=V/A(t_1-t_0)$ $m^3/m^2/sec$	Soakage Rate $SR*60*60*1000$ litres/m^2/hour
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.5	30	0.10	1.90	0	30	2.00	1.90	0.000785398	0.620464549	4.21941E-05	152
1	60	0.21	1.79	30	60	1.90	1.79	0.000863938	0.587477826	4.90196E-05	176
1.5	90	0.26	1.74	60	90	1.79	1.74	0.000392699	0.562345085	~~2.32775E-05~~	~~84~~
2	120	0.35	1.65	90	120	1.74	1.65	0.000706858	0.540353936	4.36047E-05	157
2.5	150	0.42	1.58	120	150	1.65	1.58	0.000549779	0.515221195	3.55691E-05	128
3	180	0.44	1.56	150	180	1.58	1.56	0.00015708	0.501084028	1.04493E-05	38
3.5	210	0.46	1.54	180	210	1.56	1.54	0.00015708	0.494800843	1.0582E-05	38
4	240	0.50	1.50	210	240	1.54	1.50	0.000314159	0.485376065	2.1575E-05	78
4.5	270	0.53	1.47	240	270	1.50	1.47	0.000235619	0.474380491	1.65563E-05	60
5	300	0.56	1.44	270	300	1.47	1.44	0.000235619	0.464955713	1.68919E-05	61
6	360	0.60	1.40	300	360	1.44	1.40	0.000314159	0.453960138	1.1534E-05	42
7	420	0.62	1.38	360	420	1.40	1.38	0.00015708	0.44453536	5.88928E-06	21
8	480	0.63	1.37	420	480	1.38	1.37	7.85398E-05	0.439822972	2.97619E-06	11
9	540	0.64	1.36	480	540	1.37	1.36	7.85398E-05	0.436681379	2.9976E-06	11
10	600	0.64	1.36	540	600	1.36	1.36	0	0.435110583	~~0~~	~~0~~
									Considered Average	2.07568E-05	75
									Design Rate	1.03784E-05	37

Notes: The average does not include the struck out values as they are considered outliers

litres/m^2/hour can have the units reduced to mm/hour however TCC recomends the use of litres/m^2/hour to reduce confusion in subsequent calculations


Soakage Test Results - HA01 (HAST02)
Time (seconds)
0
100
200
300
400
500
600
700
Depth Below Ground LEvel (metres)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.00
0.10
0.21
0.26
0.35
0.42
0.44
0.46
0.50
0.53
0.56
0.60
0.62
0.63
0.64
0.64

Falling Head Soakage Test - HA01 (HAST03)

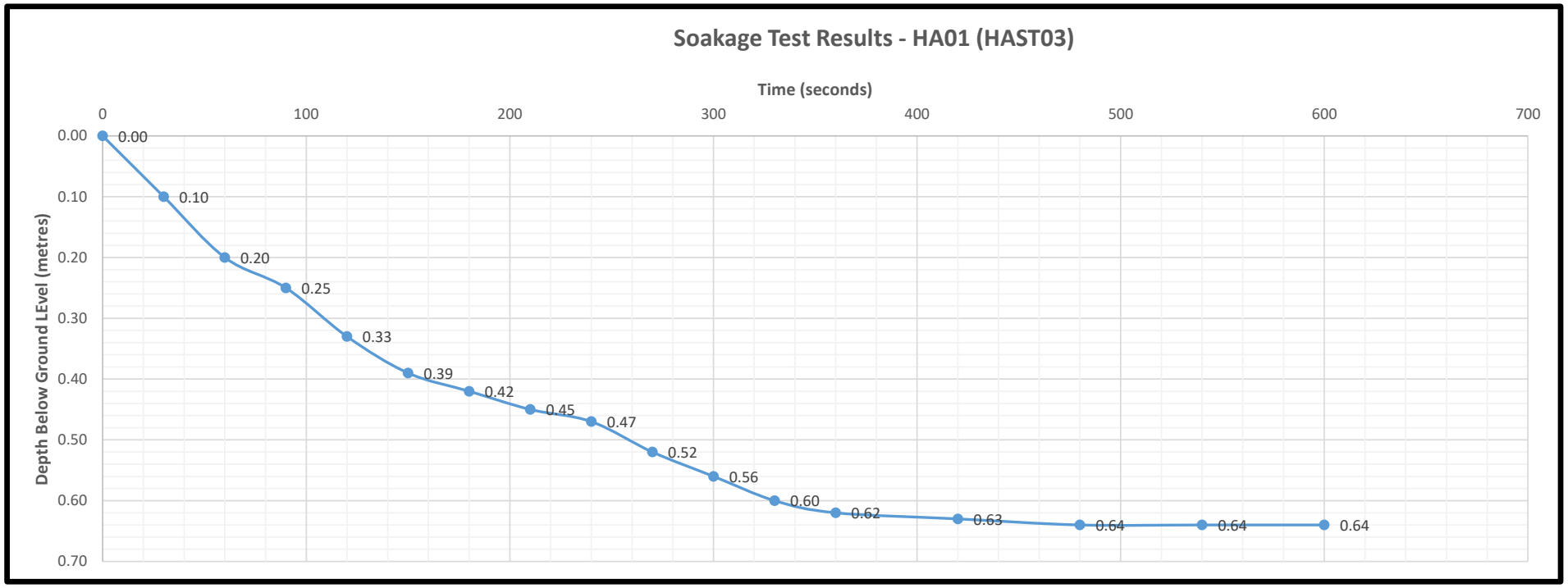
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	0.6	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time		Water Level BGL	Water Depth	Time Steps		Depth Steps		Volume Soaked	Soakage Surface Area	Soakage Rate	
T		**d**	=**D**-**d**	t_0	t_1	h_0	h_1	$V=(h_0-h_1)*B$	$A=(C*(h_0+h_1)/2)+B$	$SR=V/A(t_1-t_0)$	$SR*60*60*1000$
(min)	(sec)	(m)	(m)	sec	sec	m	m	m^3	m^2	$m^3/m^2/sec$	$litres/m^2/hour$
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.5	30	0.10	1.90	0	30	2.00	1.90	0.000785398	0.620464549	4.21941E-05	152
1	60	0.20	1.80	30	60	1.90	1.80	0.000785398	0.589048623	4.44444E-05	160
1.5	90	0.25	1.75	60	90	1.80	1.75	0.000392699	0.565486678	2.31481E-05	83
2	120	0.33	1.67	90	120	1.75	1.67	0.000628319	0.545066325	3.84246E-05	138
2.5	150	0.39	1.61	120	150	1.67	1.61	0.000471239	0.523075177	3.003E-05	108
3	180	0.42	1.58	150	180	1.61	1.58	0.000235619	0.50893801	1.54321E-05	56
3.5	210	0.45	1.55	180	210	1.58	1.55	0.000235619	0.499513232	1.57233E-05	57
4	240	0.47	1.53	210	240	1.55	1.53	0.00015708	0.49165925	1.06496E-05	38
4.5	270	0.52	1.48	240	270	1.53	1.48	0.000392699	0.480663676	2.72331E-05	98
5	300	0.56	1.44	270	300	1.48	1.44	0.000314159	0.466526509	2.24467E-05	81
5.5	330	0.60	1.40	300	330	1.44	1.40	0.000314159	0.453960138	2.30681E-05	83
6	360	0.62	1.38	330	360	1.40	1.38	0.00015708	0.44453536	1.17786E-05	42
7	420	0.63	1.37	360	420	1.38	1.37	7.85398E-05	0.439822972	2.97619E-06	11
8	480	0.64	1.36	420	480	1.37	1.36	7.85398E-05	0.436681379	2.9976E-06	11
9	540	0.64	1.36	480	540	1.36	1.36	0	0.435110583	~~0~~	~~0~~
10	600	0.64	1.36	540	600	1.36	1.36	0	0.435110583	~~0~~	~~0~~
									Considered Average	2.21819E-05	80
									Design Rate	1.10909E-05	40

Notes: The average does not include the struck out values as they are considered outliers

$litres/m^2/hour$ can have the units reduced to mm/hour however TCC recomends the use of $litres/m^2/hour$ to reduce confusion in subsequent calculations


Soakage Test Results - HA01 (HAST03)
Time (seconds)
0
100
200
300
400
500
600
700
Depth Below Ground LEvel (metres)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.00
0.10
0.20
0.25
0.33
0.39
0.42
0.45
0.47
0.52
0.56
0.60
0.62
0.63
0.64
0.64
0.64

Falling Head Soakage Test - HA03

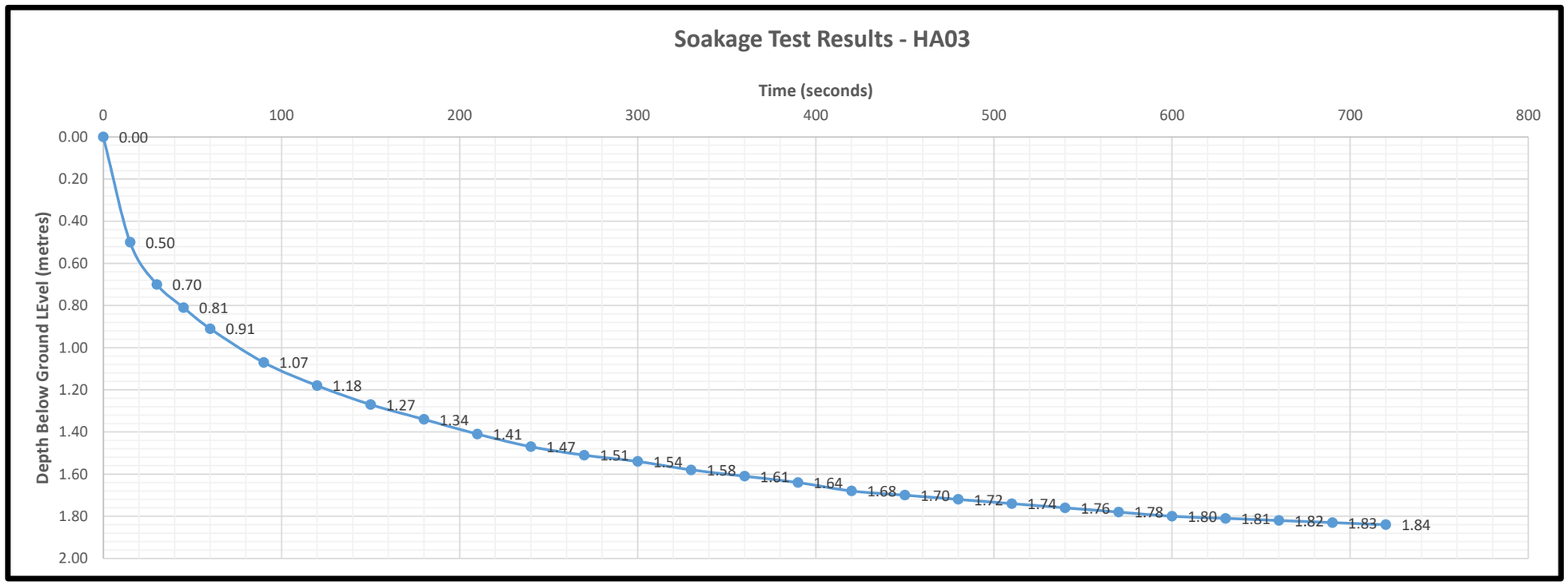
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	-	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time **T** (min)	(sec)	Water Level BGL **d** (m)	Water Depth =**D**-**d** (m)	Time Steps t_0 sec	t_1 sec	Depth Steps h_0 m	h_1 m	Volume Soaked $V=(h_0-h_1)*B$ m^3	Soakage Surface Area $A=(C*(h_0+h_1)/2)+B$ m^2	Soakage Rate SR=V/A(t_1-t_0) $m^3/m^2/sec$	SR*60*60*1000 litres/m^2/hour
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.25	15	0.50	1.50	0	15	2.00	1.50	0.003926991	0.557632696	0.000469484	1690
0.5	30	0.70	1.30	15	30	1.50	1.30	0.001570796	0.447676953	0.000233918	842
0.75	45	0.81	1.19	30	45	1.30	1.19	0.000863938	0.398982267	0.000144357	520
1	60	0.91	1.09	45	60	1.19	1.09	0.000785398	0.365995544	0.000143062	515
1.5	90	1.07	0.93	60	90	1.09	0.93	0.001256637	0.32515484	0.000128824	464
2	120	1.18	0.82	90	120	0.93	0.82	0.000863938	0.282743339	0.000101852	367
2.5	150	1.27	0.73	120	150	0.82	0.73	0.000706858	0.251327412	9.375E-05	338
3	180	1.34	0.66	150	180	0.73	0.66	0.000549779	0.226194671	8.10185E-05	292
3.5	210	1.41	0.59	180	210	0.66	0.59	0.000549779	0.204203522	8.97436E-05	323
4	240	1.47	0.53	210	240	0.59	0.53	0.000471239	0.18378317	8.54701E-05	308
4.5	270	1.51	0.49	240	270	0.53	0.49	0.000314159	0.168075207	6.23053E-05	224
5	300	1.54	0.46	270	300	0.49	0.46	0.000235619	0.157079633	0.00005	180
5.5	330	1.58	0.42	300	330	0.46	0.42	0.000314159	0.146084058	7.16846E-05	258
6	360	1.61	0.39	330	360	0.42	0.39	0.000235619	0.135088484	5.81395E-05	209
6.5	390	1.64	0.36	360	390	0.39	0.36	0.000235619	0.125663706	6.25E-05	225
7	420	1.68	0.32	390	420	0.36	0.32	0.000314159	0.114668132	9.13242E-05	329
7.5	450	1.70	0.30	420	450	0.32	0.30	0.00015708	0.105243354	4.97512E-05	179
8	480	1.72	0.28	450	480	0.30	0.28	0.00015708	0.098960169	5.29101E-05	190
8.5	510	1.74	0.26	480	510	0.28	0.26	0.00015708	0.092676983	5.64972E-05	203
9	540	1.76	0.24	510	540	0.26	0.24	0.00015708	0.086393798	6.06061E-05	218
9.5	570	1.78	0.22	540	570	0.24	0.22	0.00015708	0.080110613	6.53595E-05	235
10	600	1.80	0.20	570	600	0.22	0.20	0.00015708	0.073827427	7.0922E-05	255
10.5	630	1.81	0.19	600	630	0.20	0.19	7.85398E-05	0.069115038	3.78788E-05	136
11	660	1.82	0.18	630	660	0.19	0.18	7.85398E-05	0.065973446	3.96825E-05	143
11.5	690	1.83	0.17	660	690	0.18	0.17	7.85398E-05	0.062831853	4.16667E-05	150
12	720	1.84	0.16	690	720	0.17	0.16	7.85398E-05	0.05969026	4.38596E-05	158
									Considered Average	9.56372E-05	344
									Design Rate	4.78186E-05	172

Notes: The average does not include the struck out values as they are considered outliers

litres/m^2/hour can have the units reduced to mm/hour however TCC recomends the use of litres/m^2/hour to reduce confusion in subsequent calculations


Soakage Test Results - HA03
Time (seconds)
0
100
200
300
400
500
600
700
800
Depth Below Ground LEvel (metres)
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.00
0.00
0.50
0.70
0.81
0.91
1.07
1.18
1.27
1.34
1.41
1.47
1.51
1.54
1.58
1.61
1.64
1.68
1.70
1.72
1.74
1.76
1.78
1.80
1.81
1.82
1.83
1.84

Falling Head Soakage Test - HA06

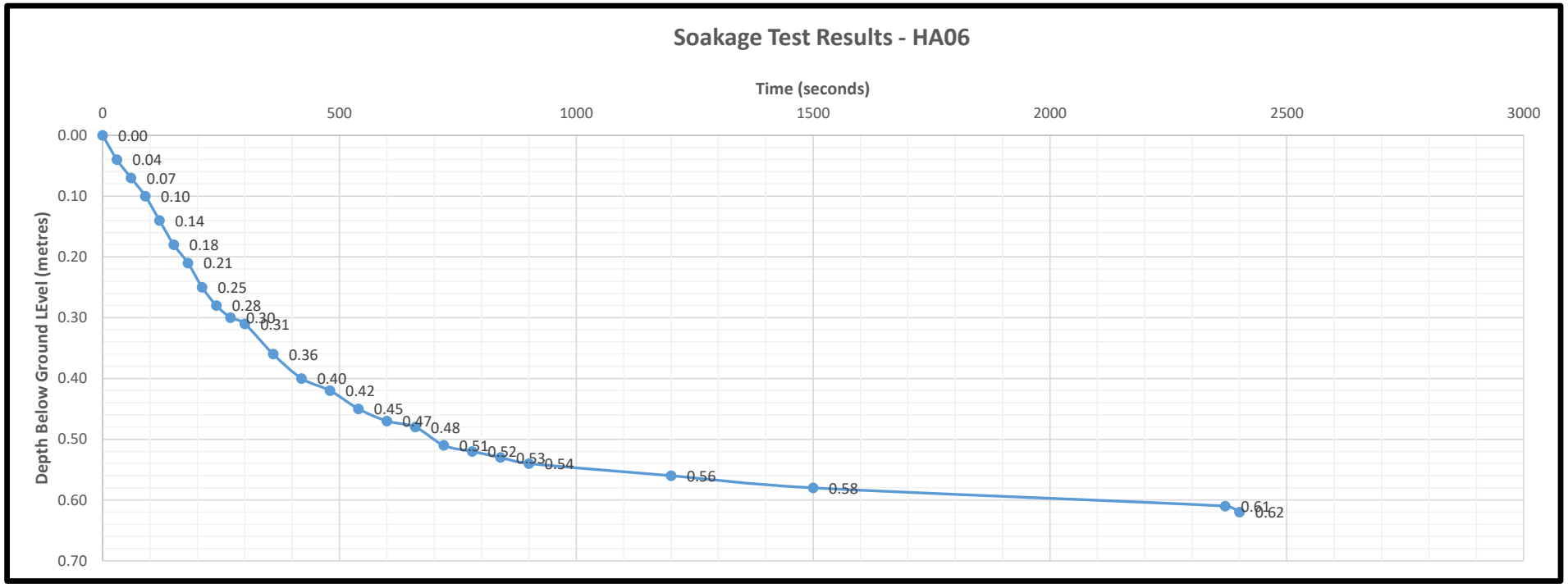
Test Hole Diameter	0.1	m
Test Hole Depth **D**	2.0	m
Groundwater Level	0.6	m

Base Area **B**	0.00785398	m^2
Circumference **C**	0.31415927	m2

Time **T** (min)	Time **T** (sec)	Water Level BGL **d** (m)	Water Depth =**D**-**d** (m)	Time Steps t_0 sec	Time Steps t_1 sec	Depth Steps h_0 m	Depth Steps h_1 m	Volume Soaked $V=(h_0-h_1)*B$ m^3	Soakage Surface Area $A=(C*(h_0+h_1)/2)+B$ m^2	Soakage Rate $SR=V/A(t_1-t_0)$ $m^3/m^2/sec$	Soakage Rate $SR*60*60*1000$ litres/m^2/hour
0	0	0.00	2.00	-	-	-	-	-	-	-	-
0.5	30	0.04	1.96	0	30	2.00	1.96	0.000314159	0.629889327	1.66251E-05	60
1	60	0.07	1.93	30	60	1.96	1.93	0.000235619	0.618893753	1.26904E-05	46
1.5	90	0.10	1.90	60	90	1.93	1.90	0.000235619	0.609468975	1.28866E-05	46
2	120	0.14	1.86	90	120	1.90	1.86	0.000314159	0.598473401	1.74978E-05	63
2.5	150	0.18	1.82	120	150	1.86	1.82	0.000314159	0.58590703	1.78731E-05	64
3	180	0.21	1.79	150	180	1.82	1.79	0.000235619	0.574911456	1.36612E-05	49
3.5	210	0.25	1.75	180	210	1.79	1.75	0.000314159	0.563915881	1.85701E-05	67
4	240	0.28	1.72	210	240	1.75	1.72	0.000235619	0.552920307	1.42045E-05	51
4.5	270	0.30	1.70	240	270	1.72	1.70	0.00015708	0.545066325	9.60615E-06	35
5	300	0.31	1.69	270	300	1.70	1.69	7.85398E-05	0.540353936	~~4.84496E-06~~	~~17~~
6	360	0.36	1.64	300	360	1.69	1.64	0.000392699	0.530929158	1.23274E-05	44
7	420	0.40	1.60	360	420	1.64	1.60	0.000314159	0.516791992	1.01317E-05	36
8	480	0.42	1.58	420	480	1.60	1.58	0.00015708	0.507367214	5.15996E-06	19
9	540	0.45	1.55	480	540	1.58	1.55	0.000235619	0.499513232	7.86164E-06	28
10	600	0.47	1.53	540	600	1.55	1.53	0.00015708	0.49165925	5.32481E-06	19
11	660	0.48	1.52	600	660	1.53	1.52	7.85398E-05	0.486946861	2.68817E-06	10
12	720	0.51	1.49	660	720	1.52	1.49	0.000235619	0.480663676	~~8.16993E-06~~	~~29~~
13	780	0.52	1.48	720	780	1.49	1.48	7.85398E-05	0.474380491	2.75938E-06	10
14	840	0.53	1.47	780	840	1.48	1.47	7.85398E-05	0.471238898	2.77778E-06	10
15	900	0.54	1.46	840	900	1.47	1.46	7.85398E-05	0.468097305	2.79642E-06	10
20	1200	0.56	1.44	900	1200	1.46	1.44	0.00015708	0.463384916	1.12994E-06	4
25	1500	0.58	1.42	1200	1500	1.44	1.42	0.00015708	0.457101731	1.14548E-06	~~4~~
39.5	2370	0.61	1.39	1500	2370	1.42	1.39	0.000235619	0.449247749	6.02845E-07	2
40	2400	0.62	1.38	2370	2400	1.39	1.38	7.85398E-05	0.442964564	5.91017E-06	21
									Considered Average	8.82867E-06	32
									Design Rate	4.41433E-06	16

Notes: The average does not include the struck out values as they are considered outliers

litres/m^2/hour can have the units reduced to mm/hour however TCC recomends the use of litres/m^2/hour to reduce confusion in subsequent calculations


Soakage Test Results - HA06
Time (seconds)
0
500
1000
1500
2000
2500
3000
Depth Below Ground LEvel (metres)
0.00
0.10
0.20
0.30
0.40
0.50
0.60
0.70
0.00
0.04
0.07
0.10
0.14
0.18
0.21
0.25
0.28
0.30
0.31
0.36
0.40
0.42
0.45
0.47
0.48
0.51
0.52
0.53
0.54
0.56
0.58
0.61
0.62

APPENDIX 4:

Liquefaction Analysis

ENGEO
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Mount Maunganui
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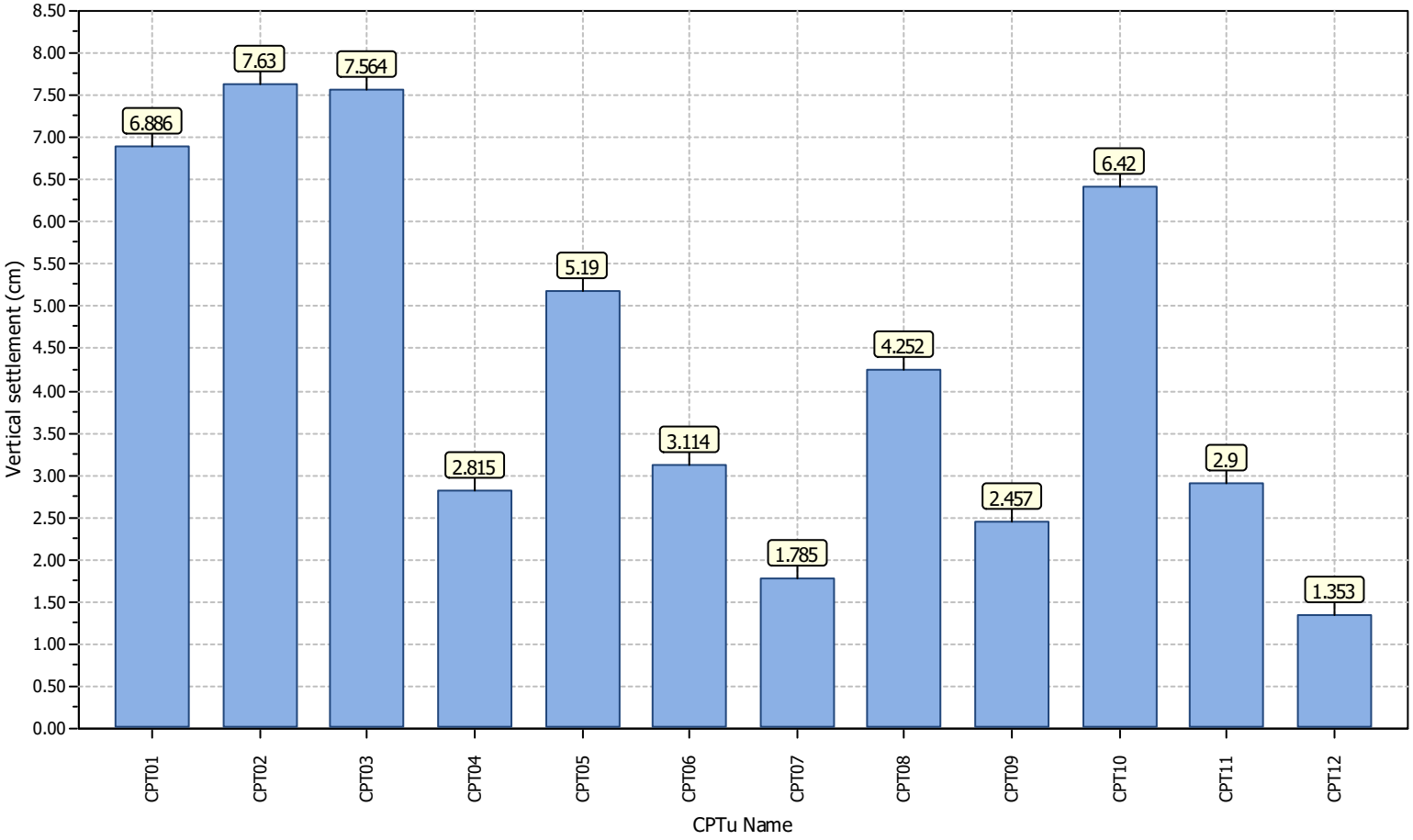
Project title : ULS Liquefaction Analysis

Location : Julian's Berry Farm

Overall vertical settlements report



ENGEO
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Mount Maunganui
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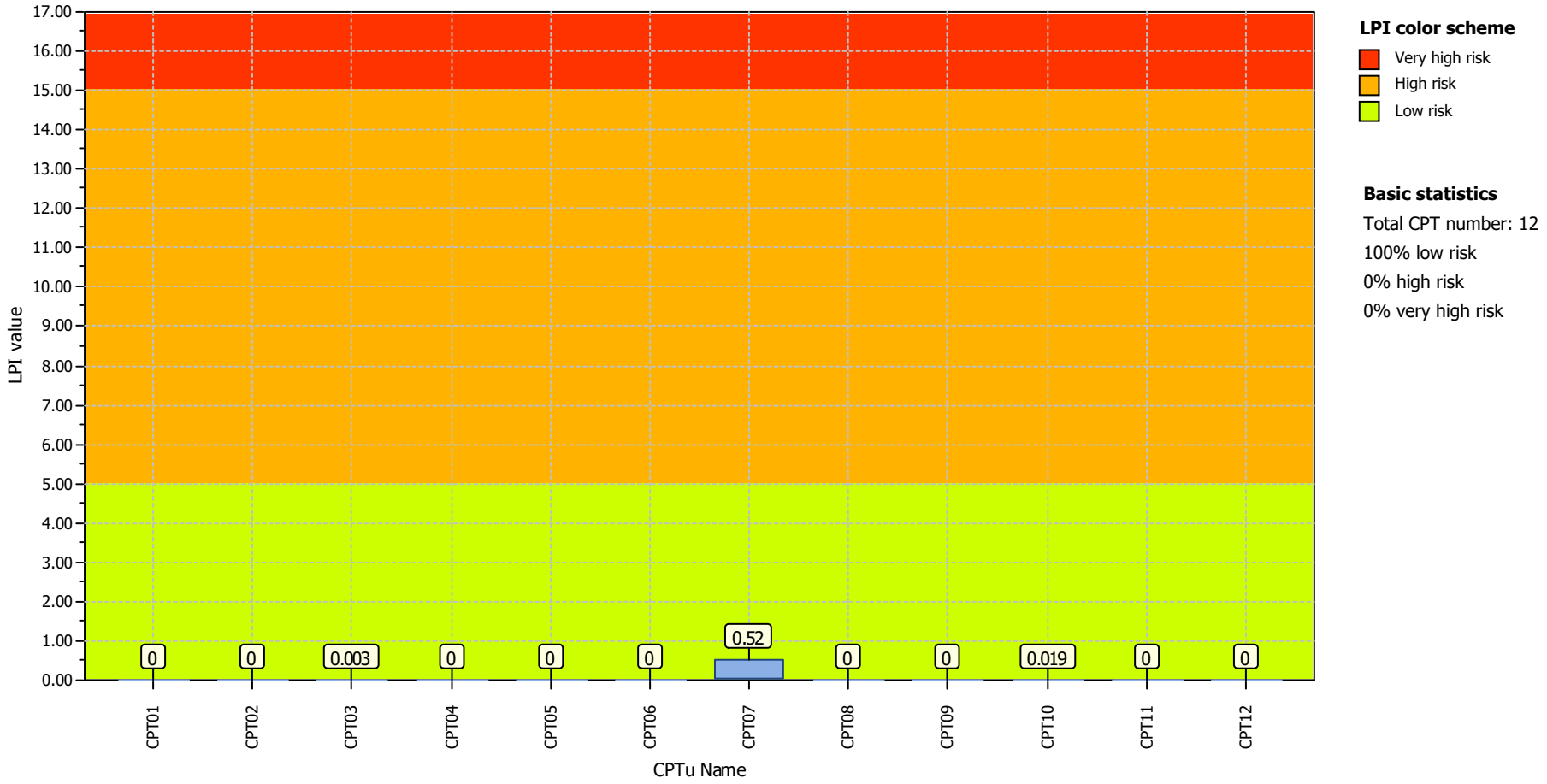
Project title : SLS Liquefaction Analysis

Location : Julian's Berry Farm

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 12

100% low risk

0% high risk

0% very high risk

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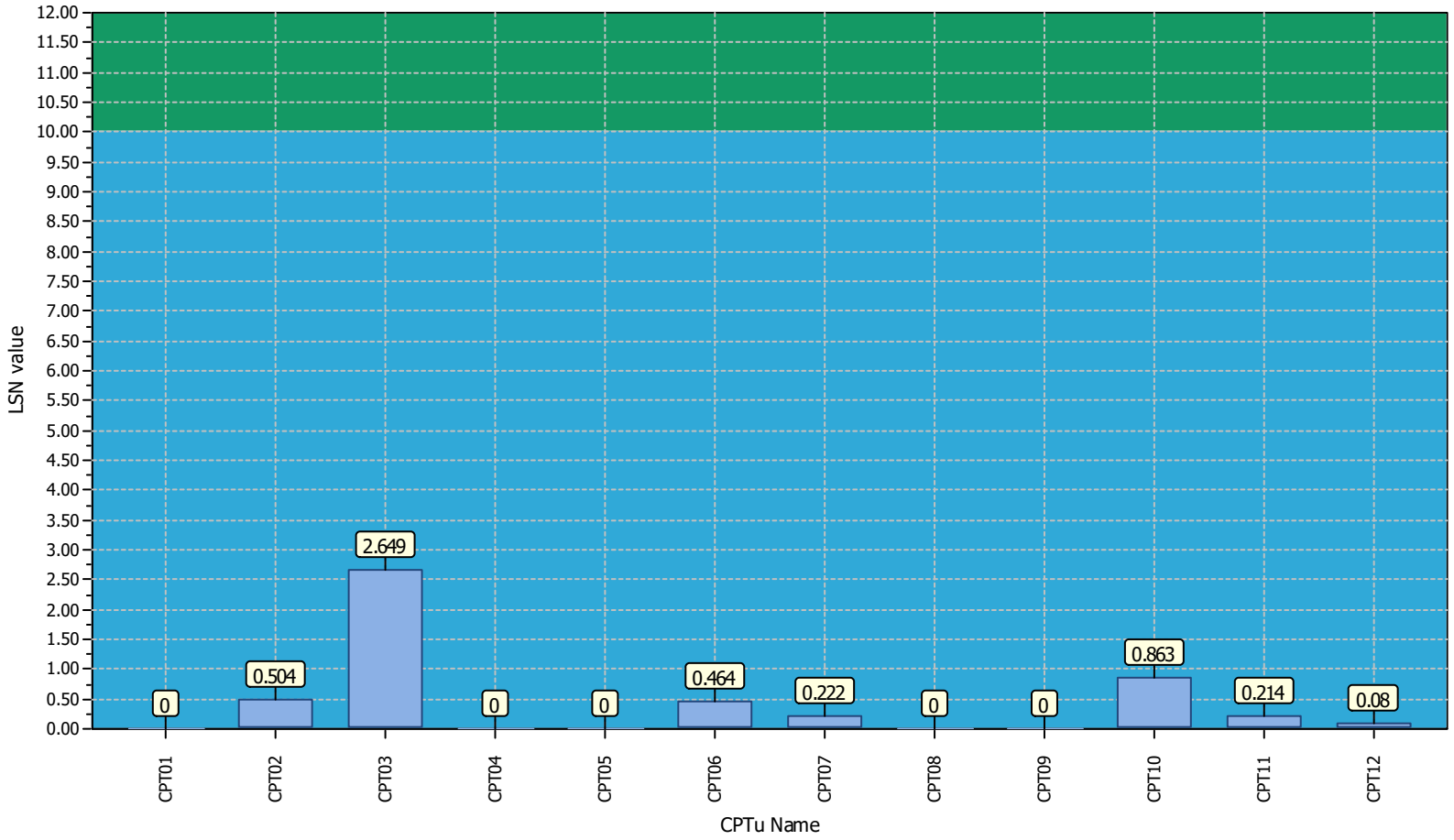
Project title : SLS Liquefaction Analysis

Location : Julian's Berry Farm

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 12

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

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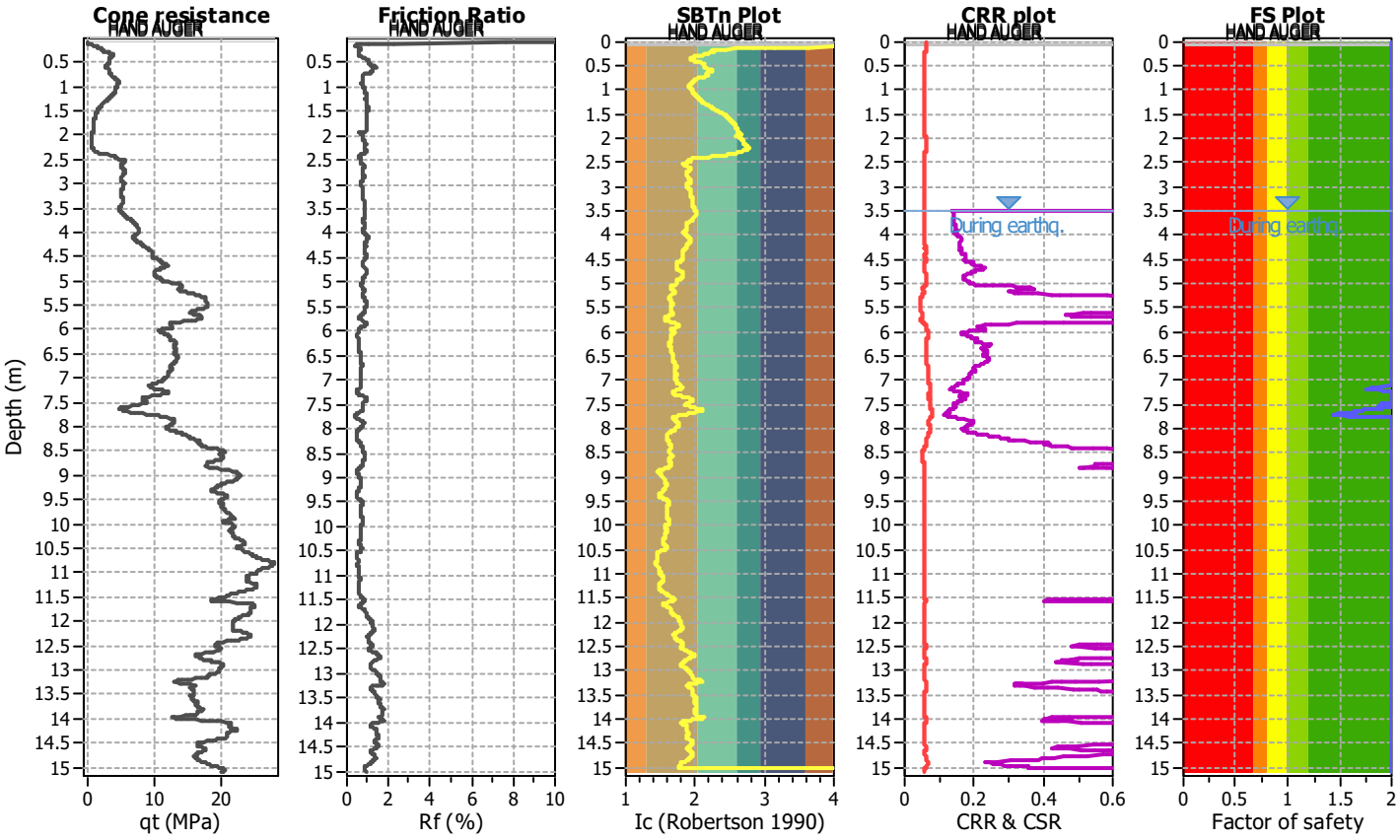
LIQUEFACTION ANALYSIS REPORT

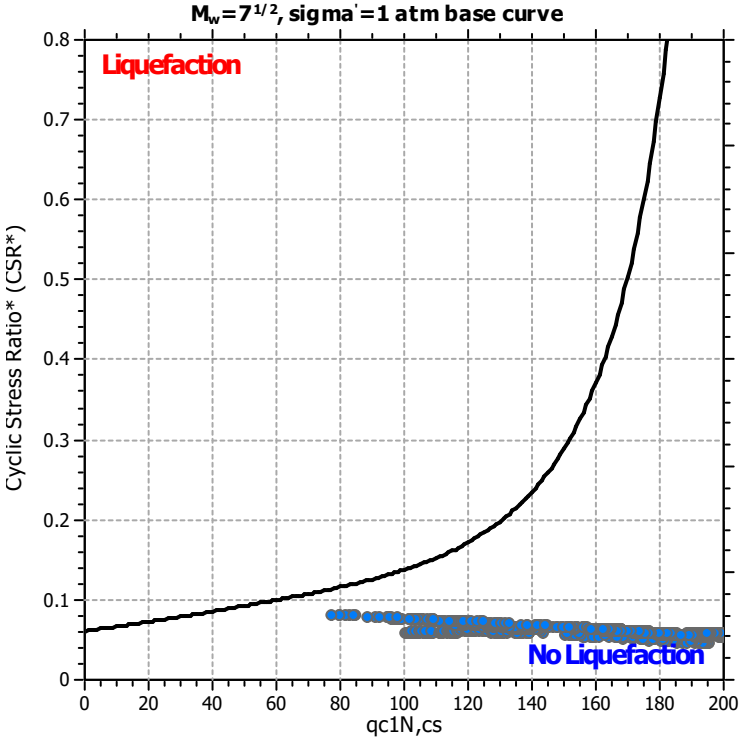
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

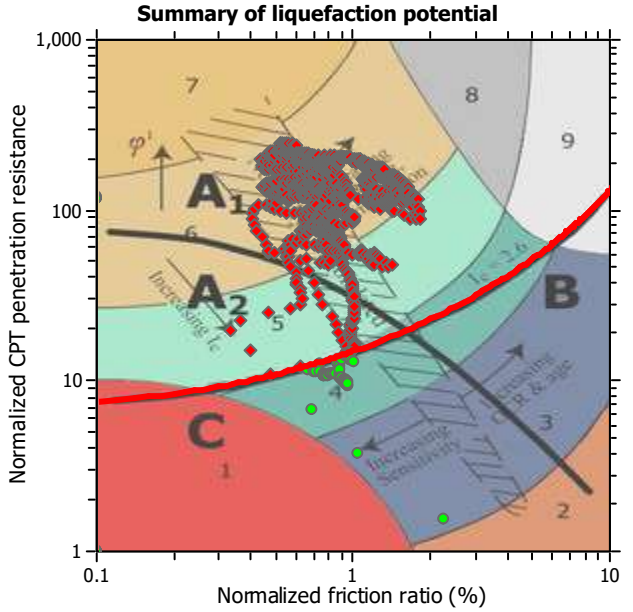
CPT file : CPT01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.50 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

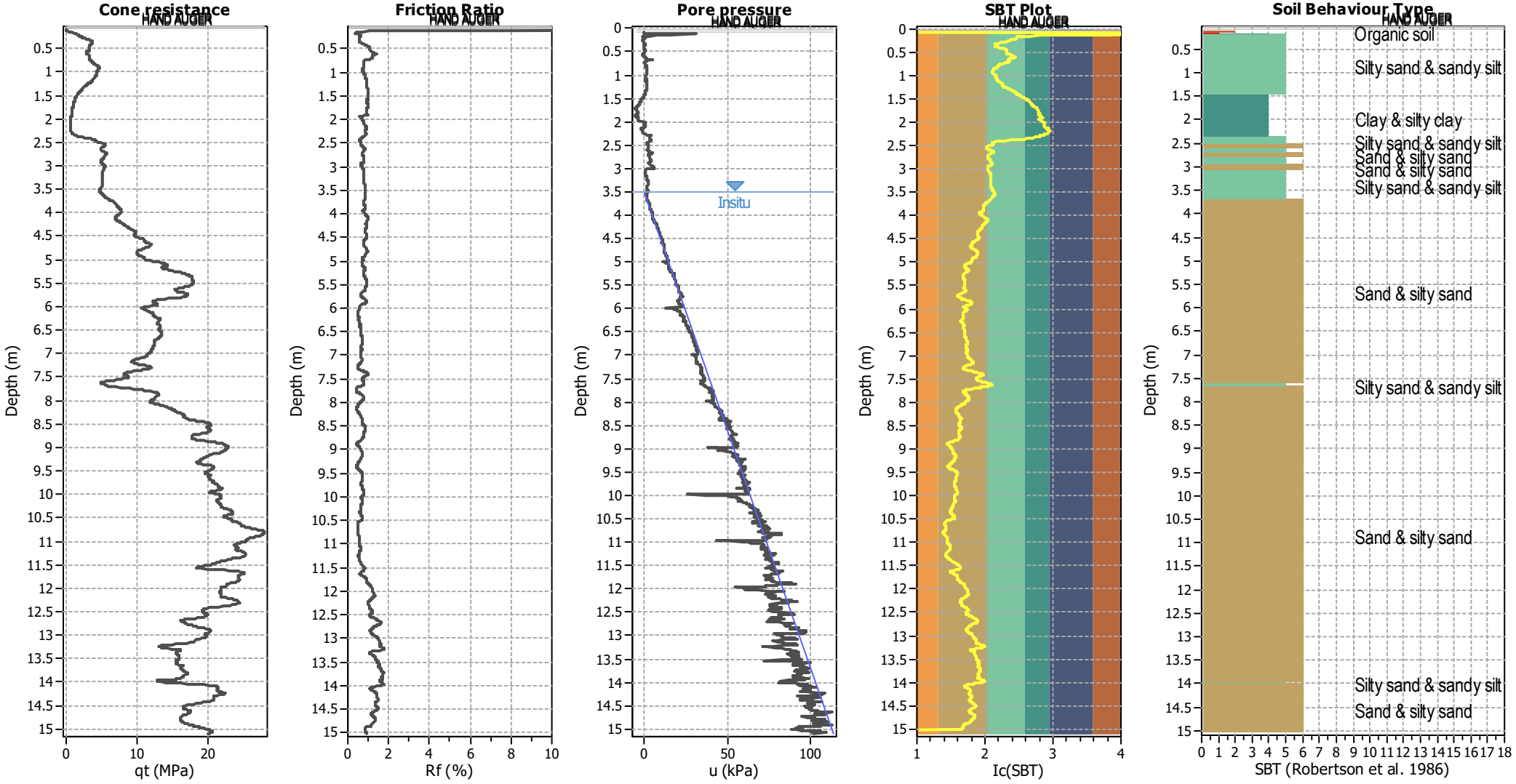






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



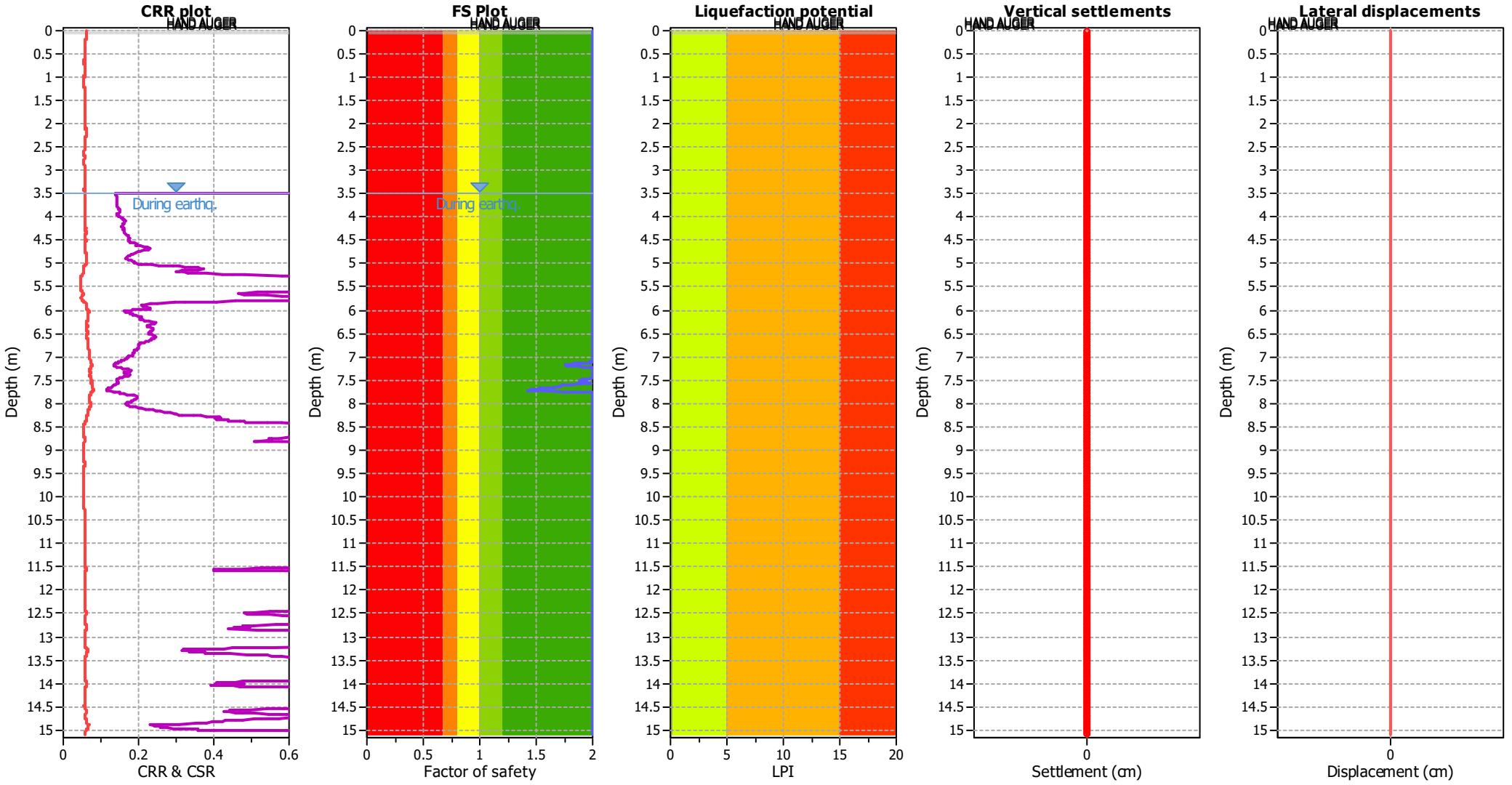
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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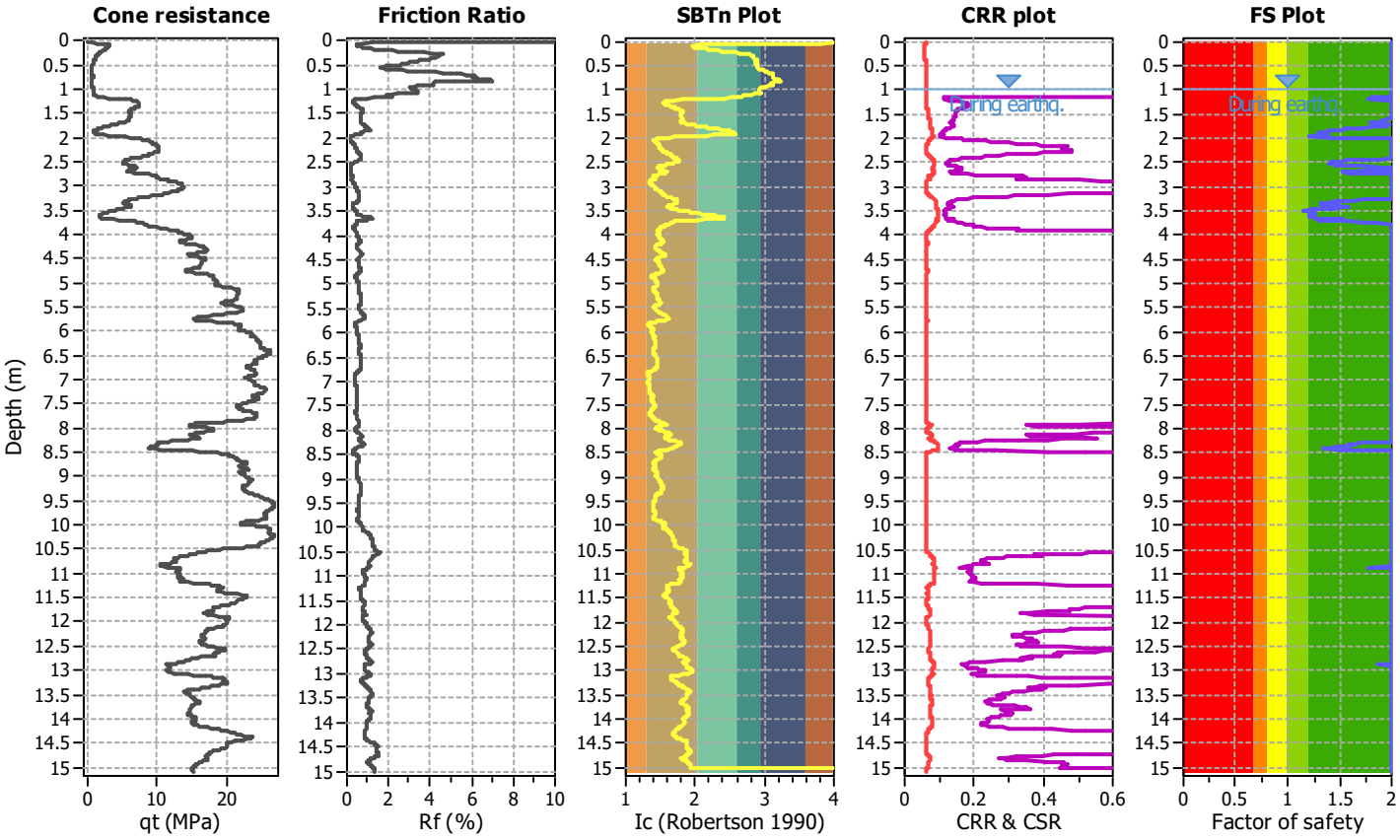
LIQUEFACTION ANALYSIS REPORT

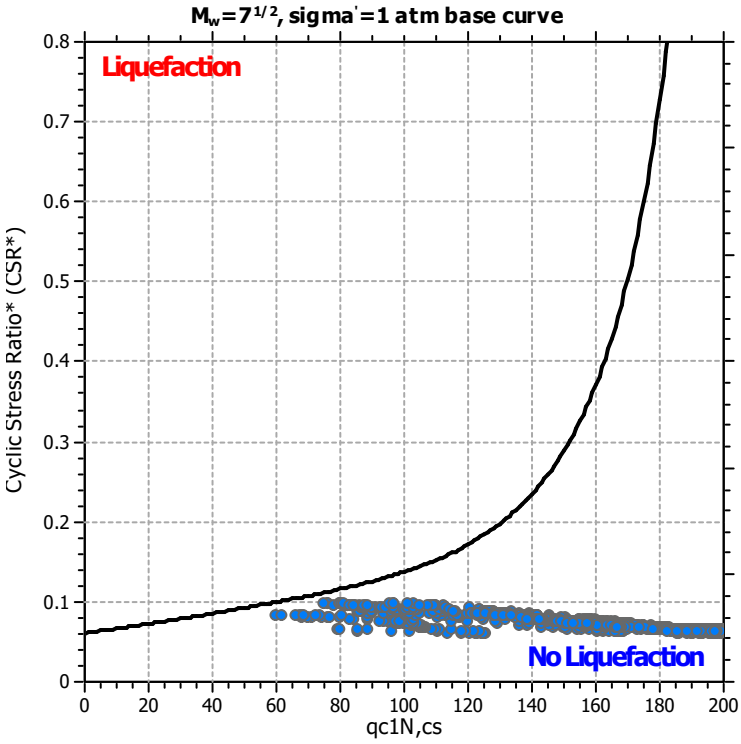
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

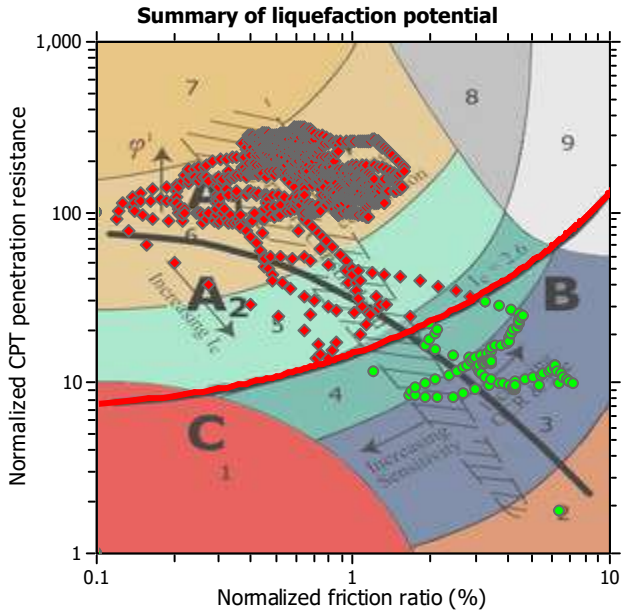
CPT file : CPT02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

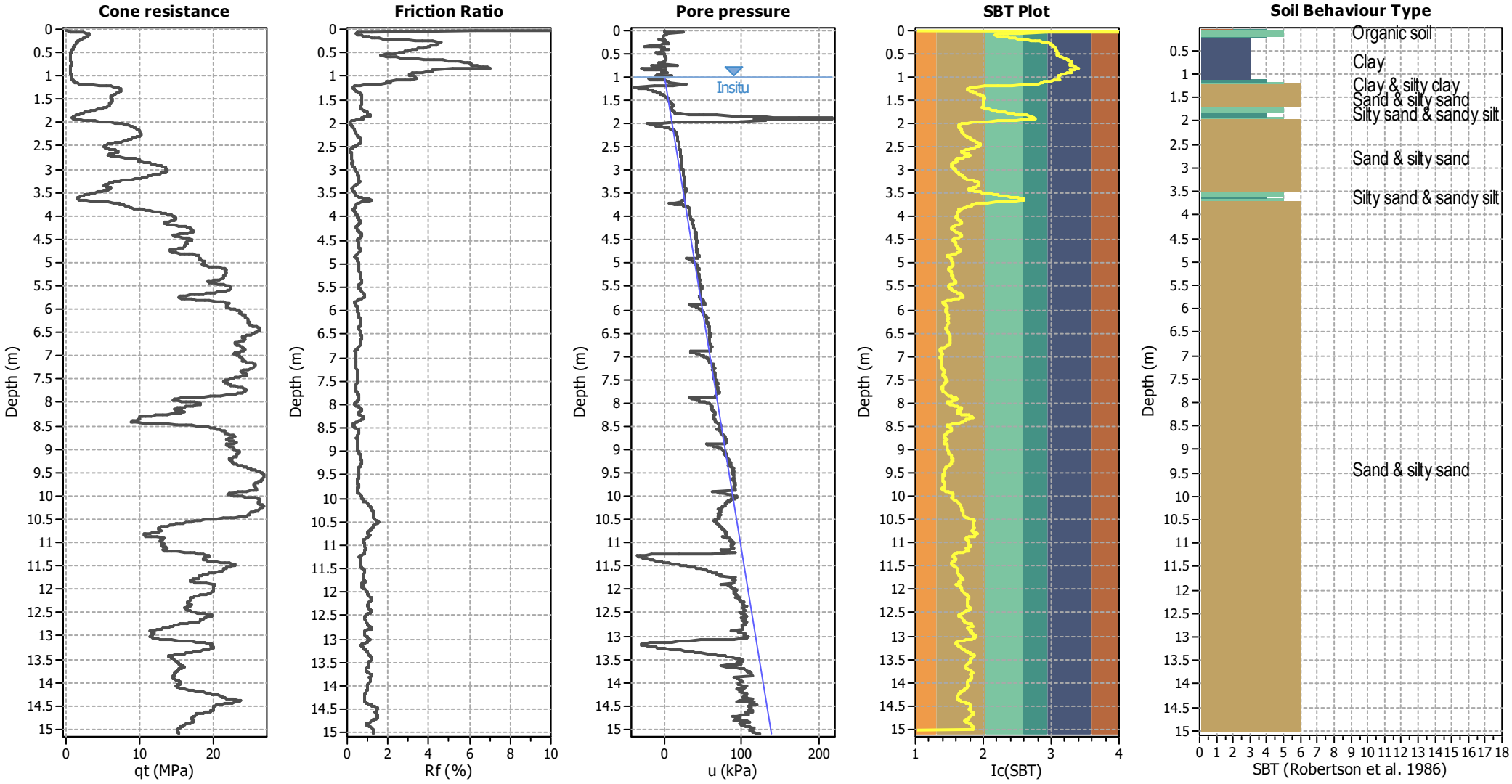






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



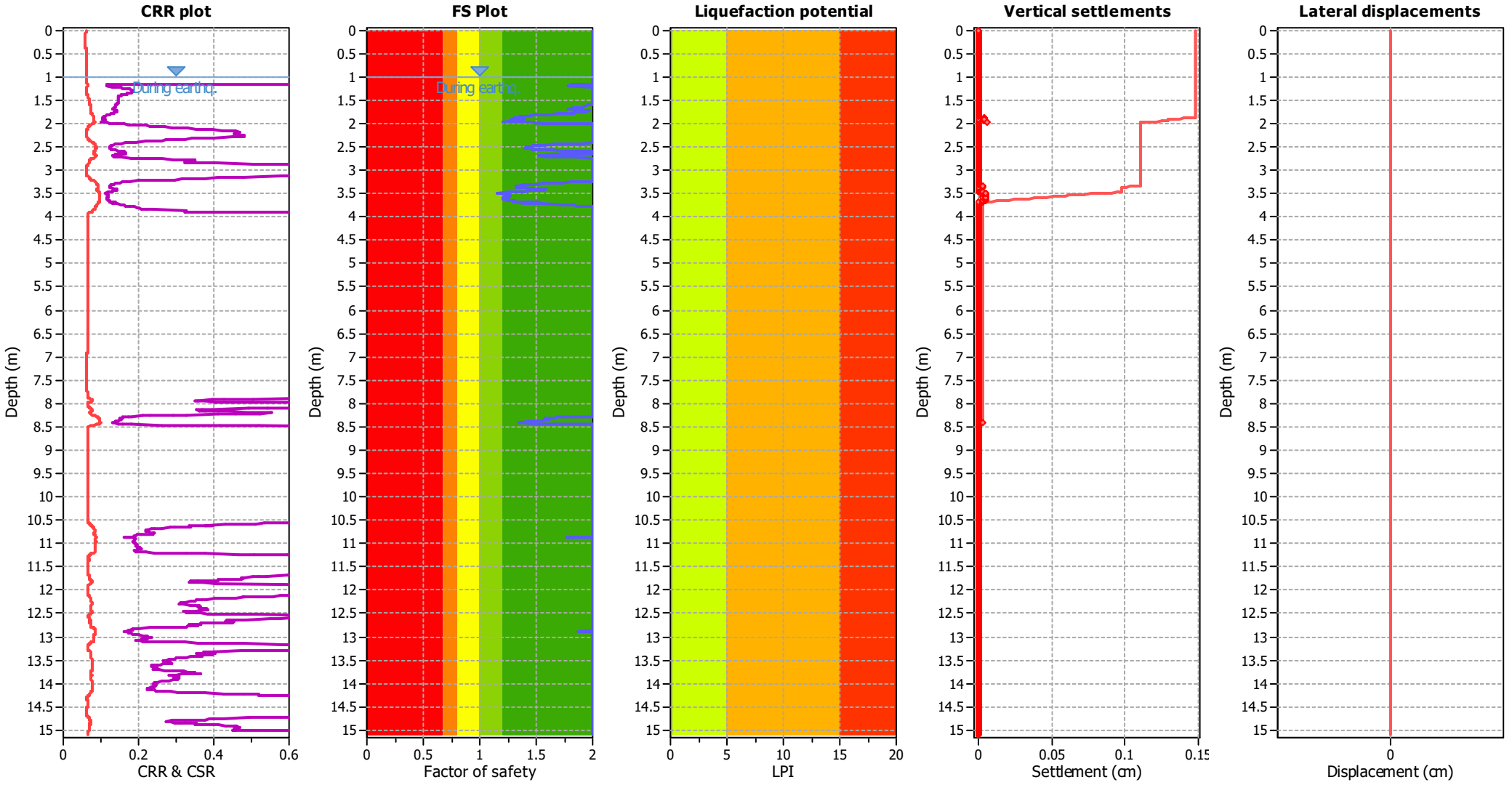
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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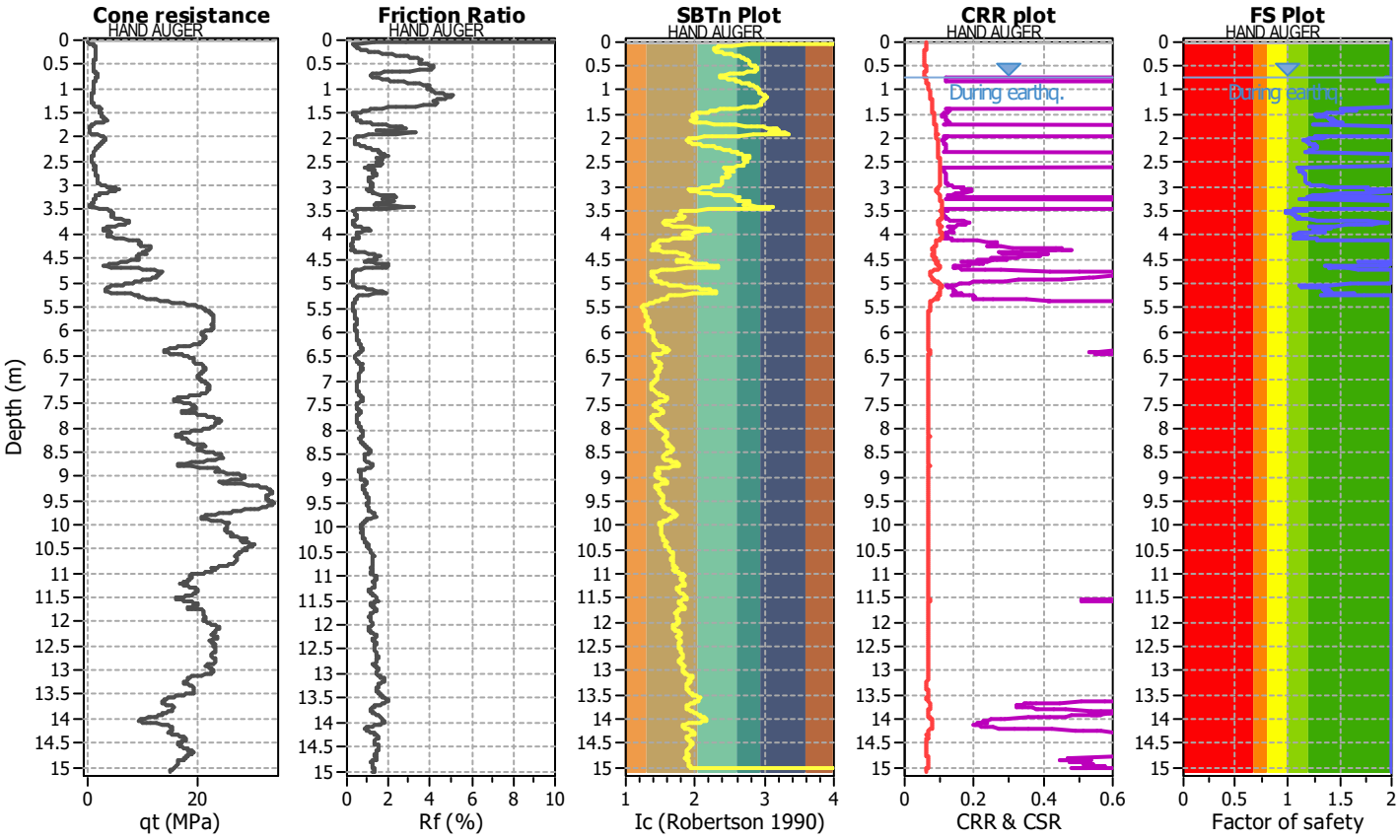
LIQUEFACTION ANALYSIS REPORT

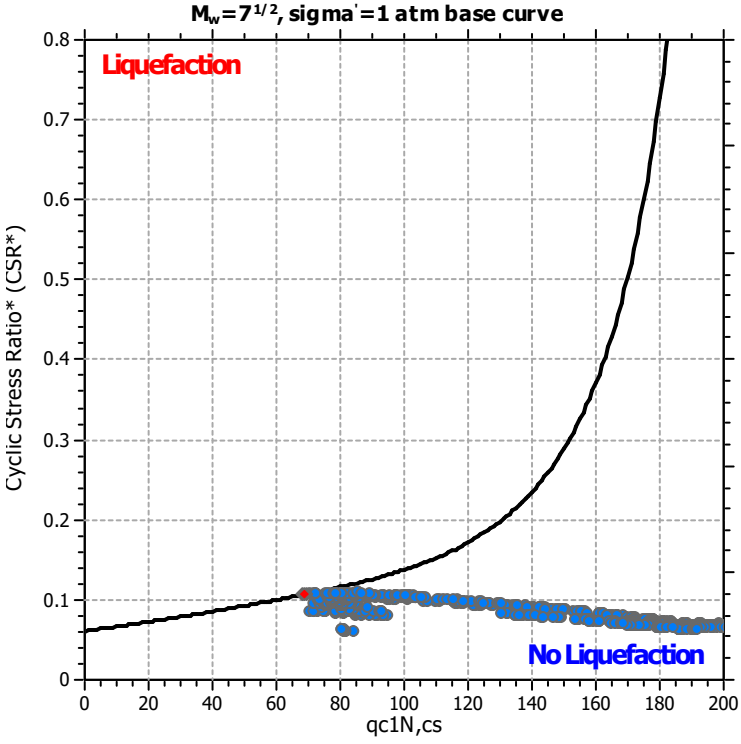
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

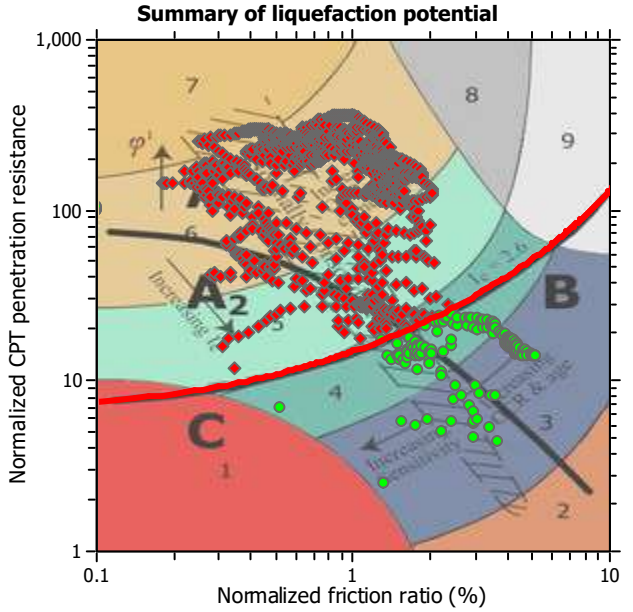
CPT file : CPT03

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.73 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.73 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

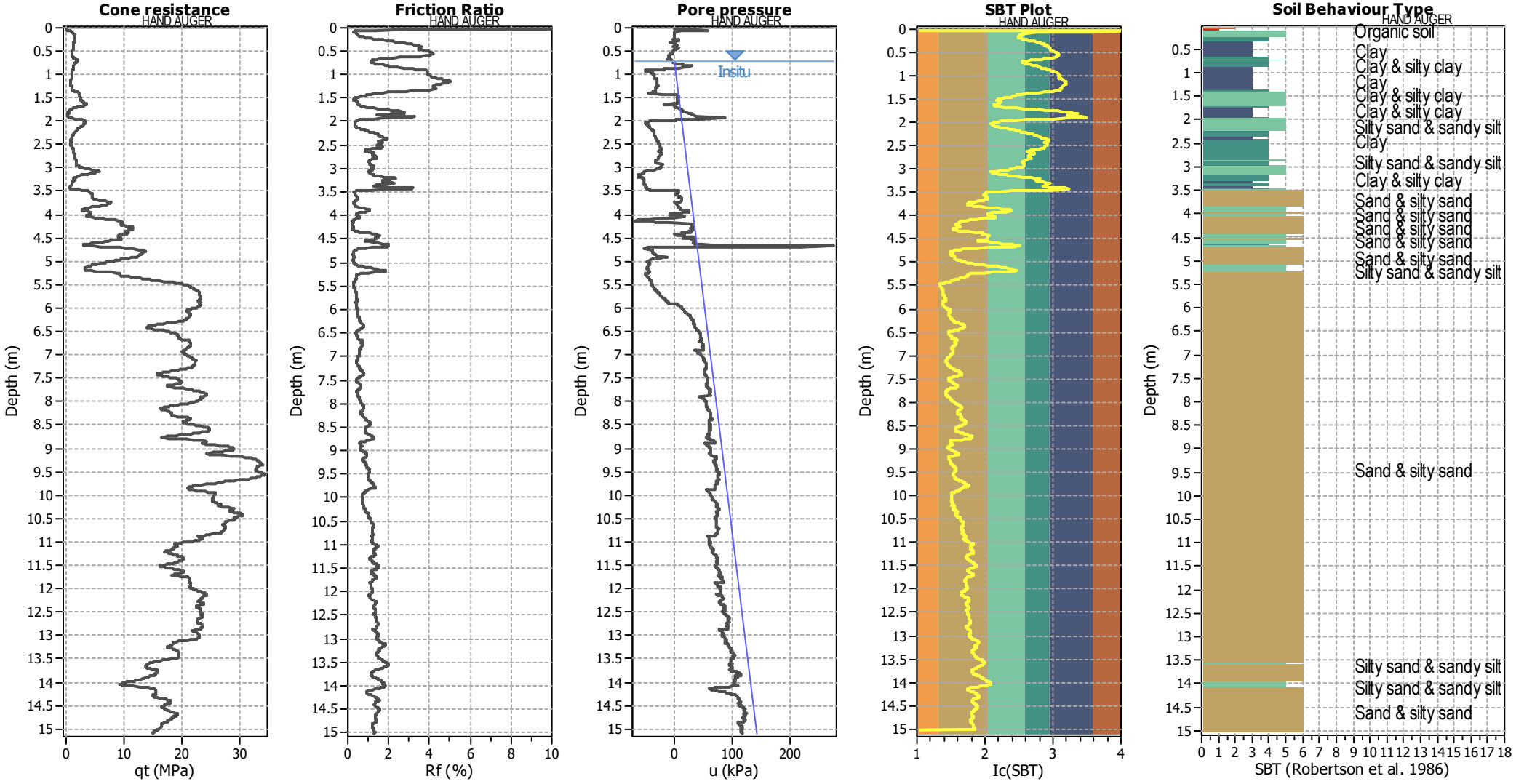






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



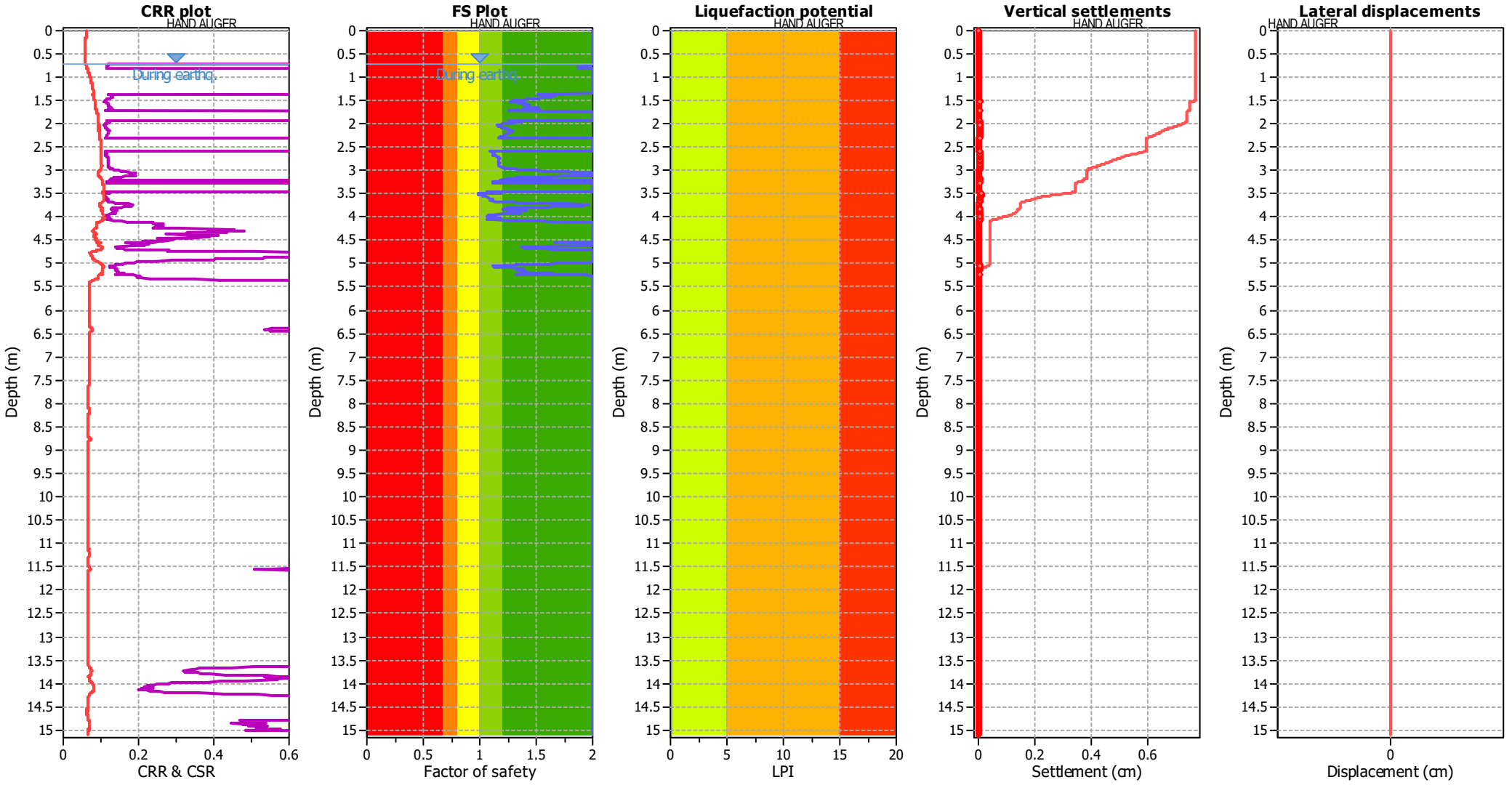
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.73 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.73 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.73 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.73 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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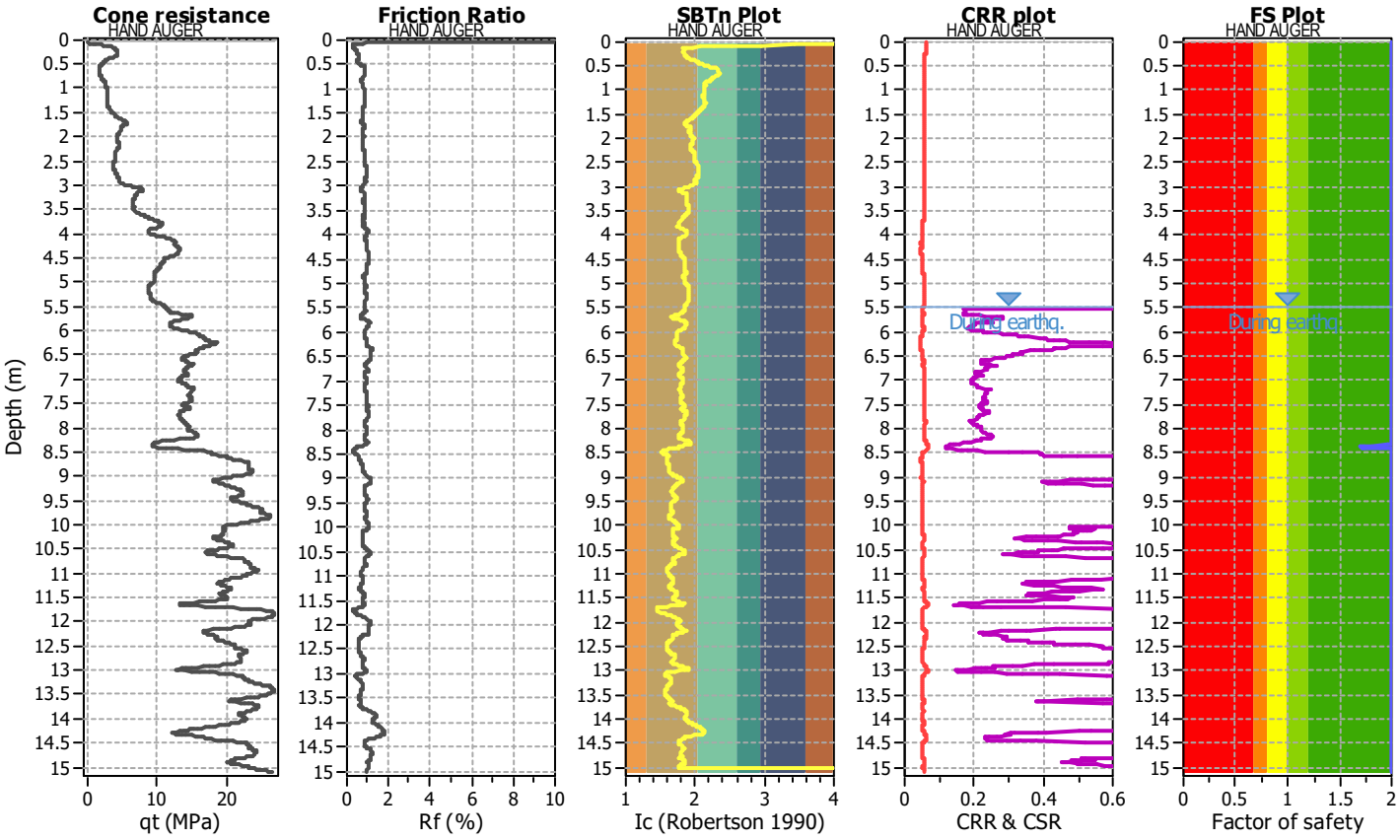
LIQUEFACTION ANALYSIS REPORT

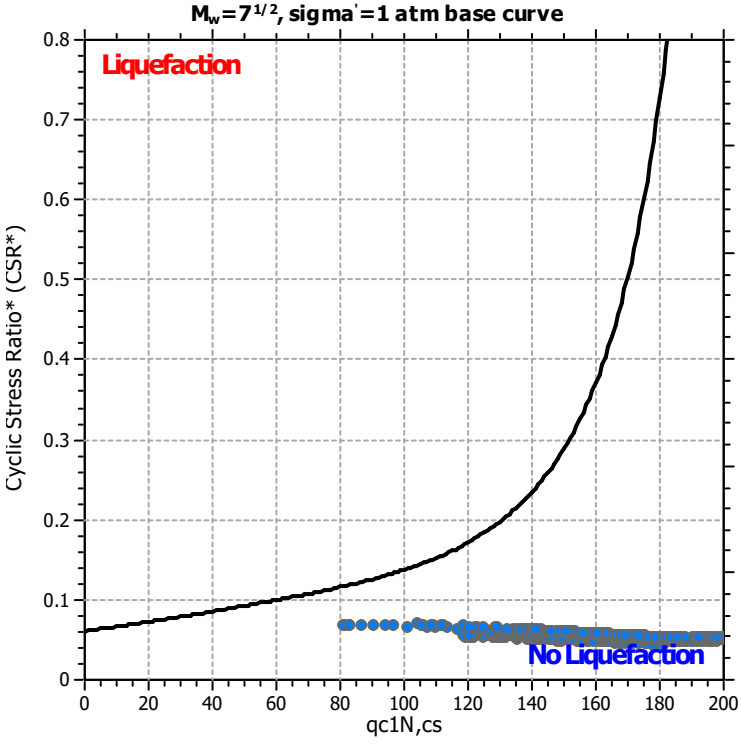
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

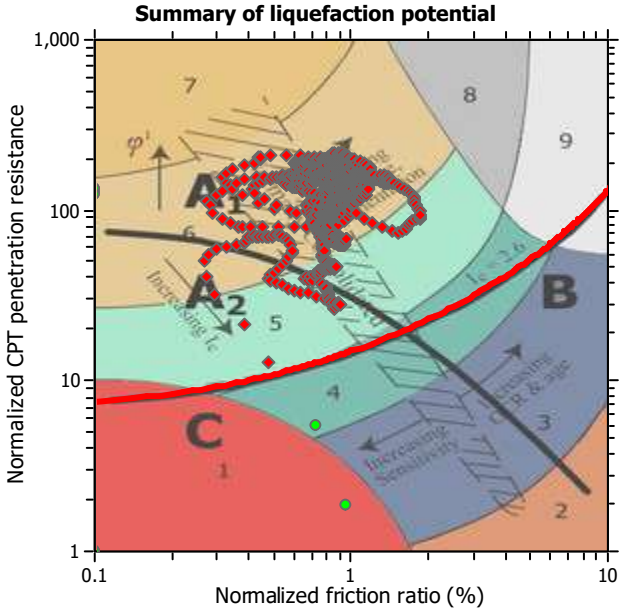
CPT file : CPT04

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

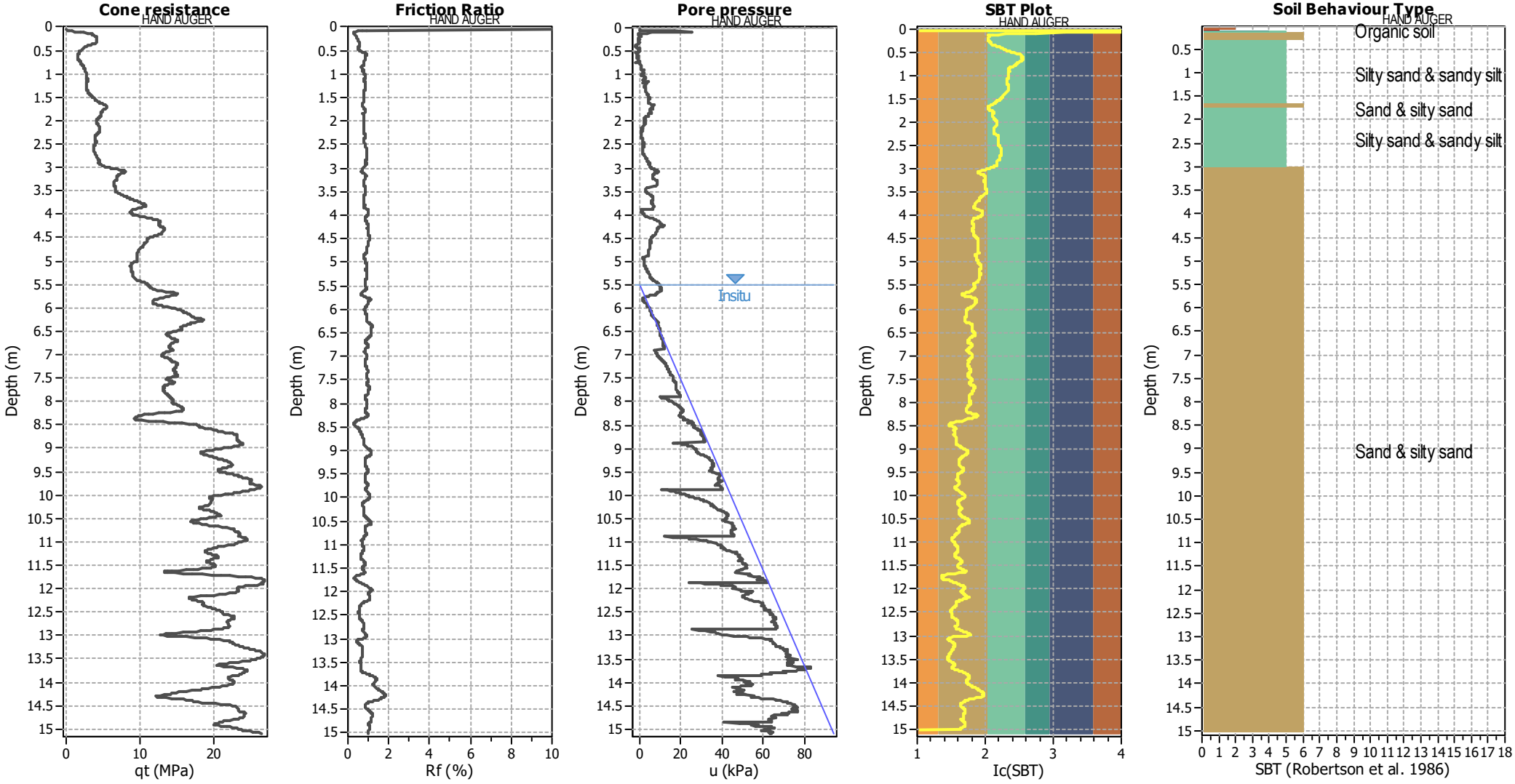






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



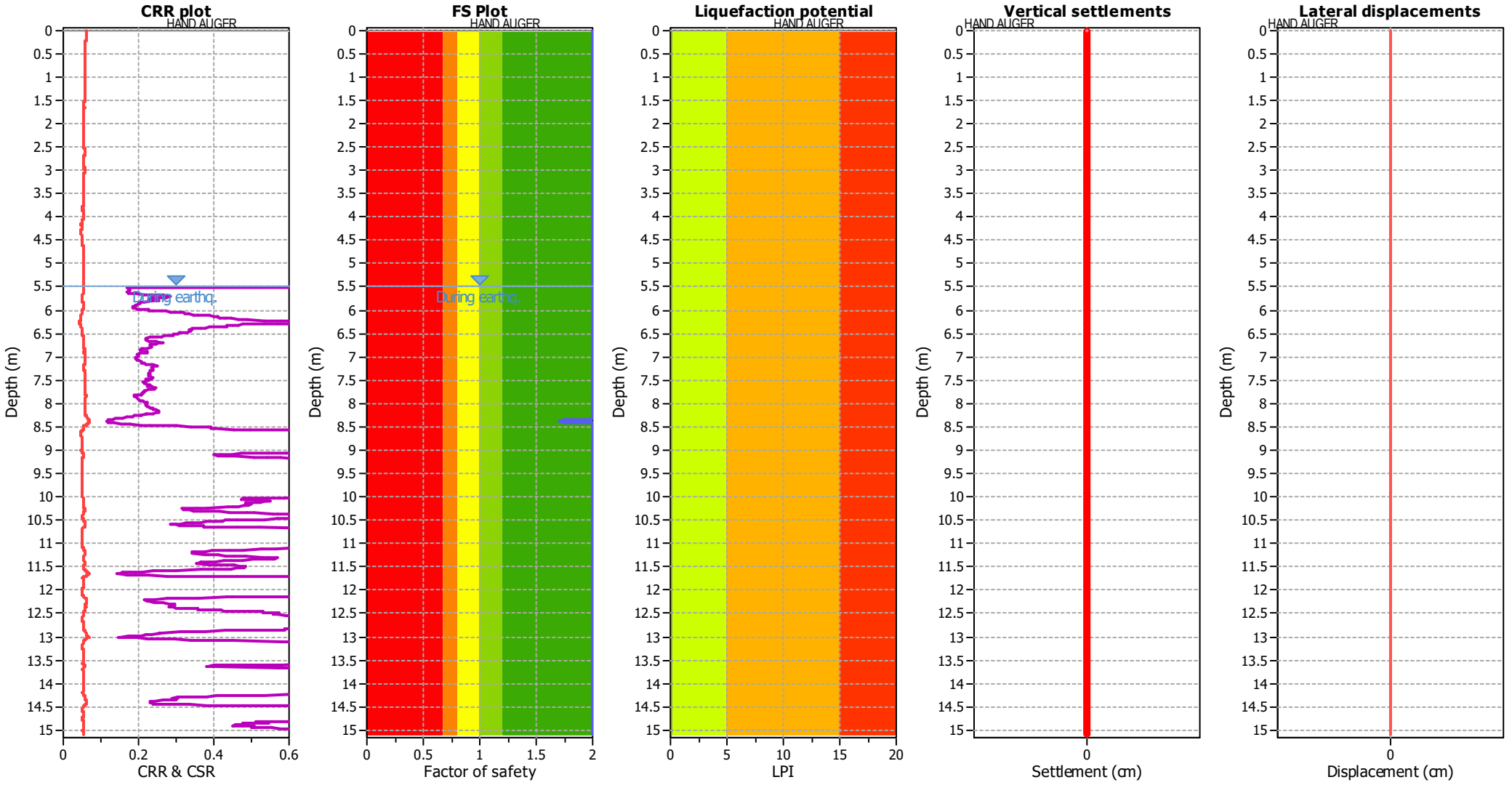
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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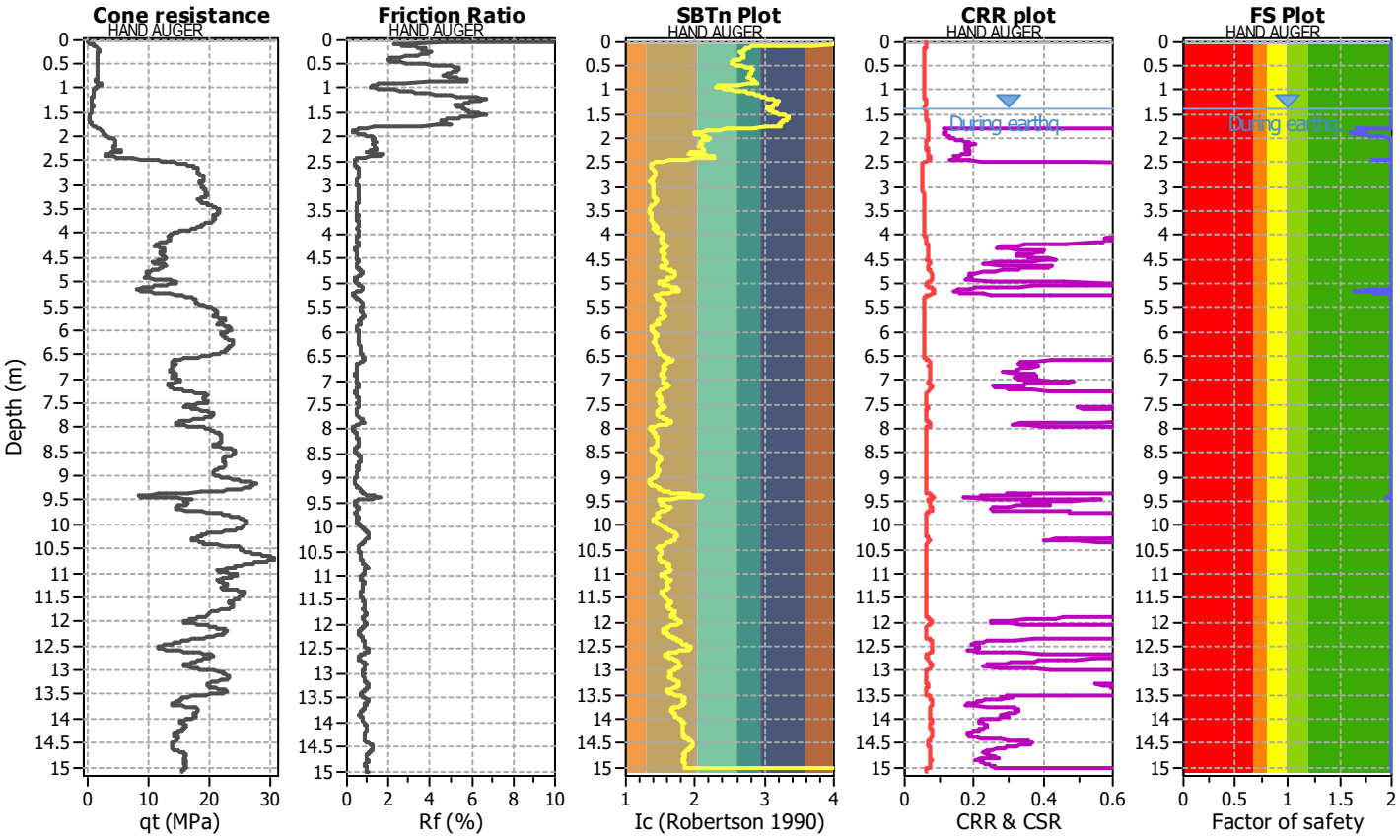
LIQUEFACTION ANALYSIS REPORT

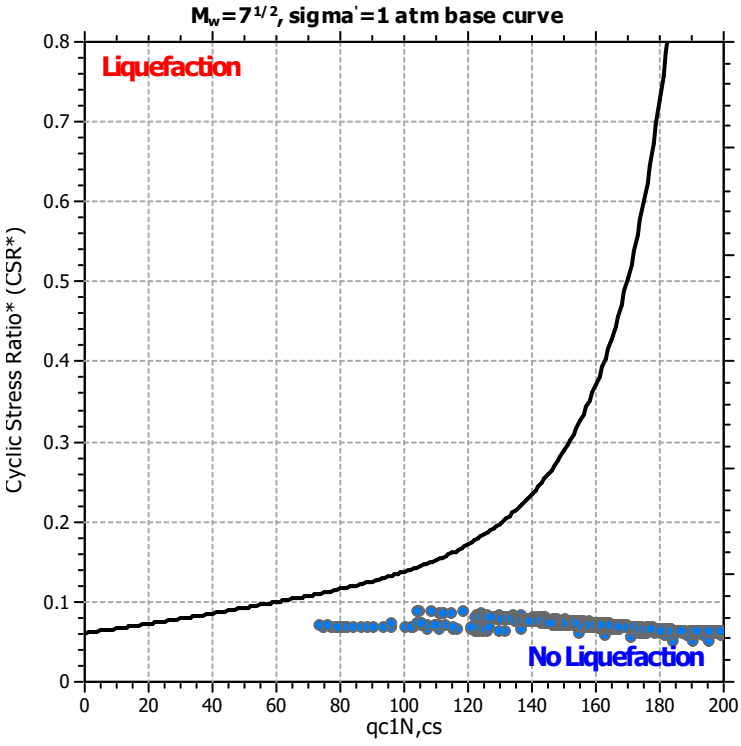
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

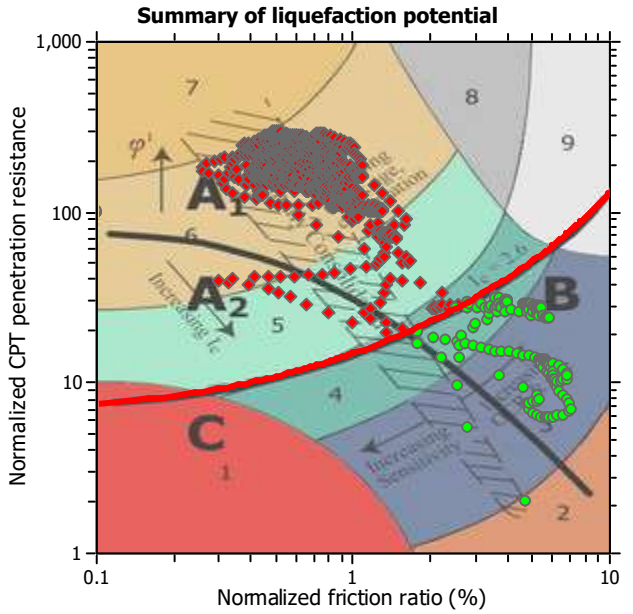
CPT file : CPT05

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

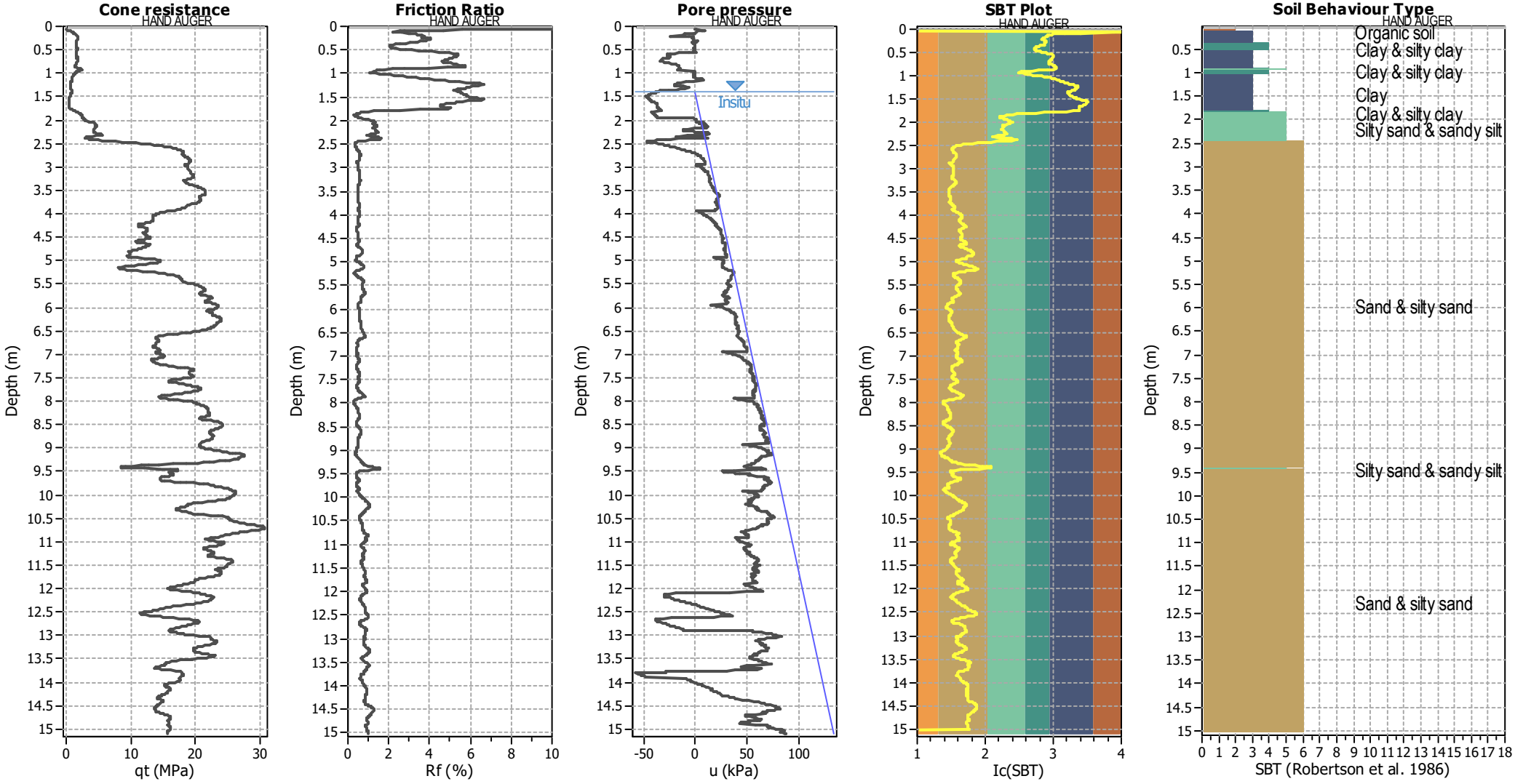






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



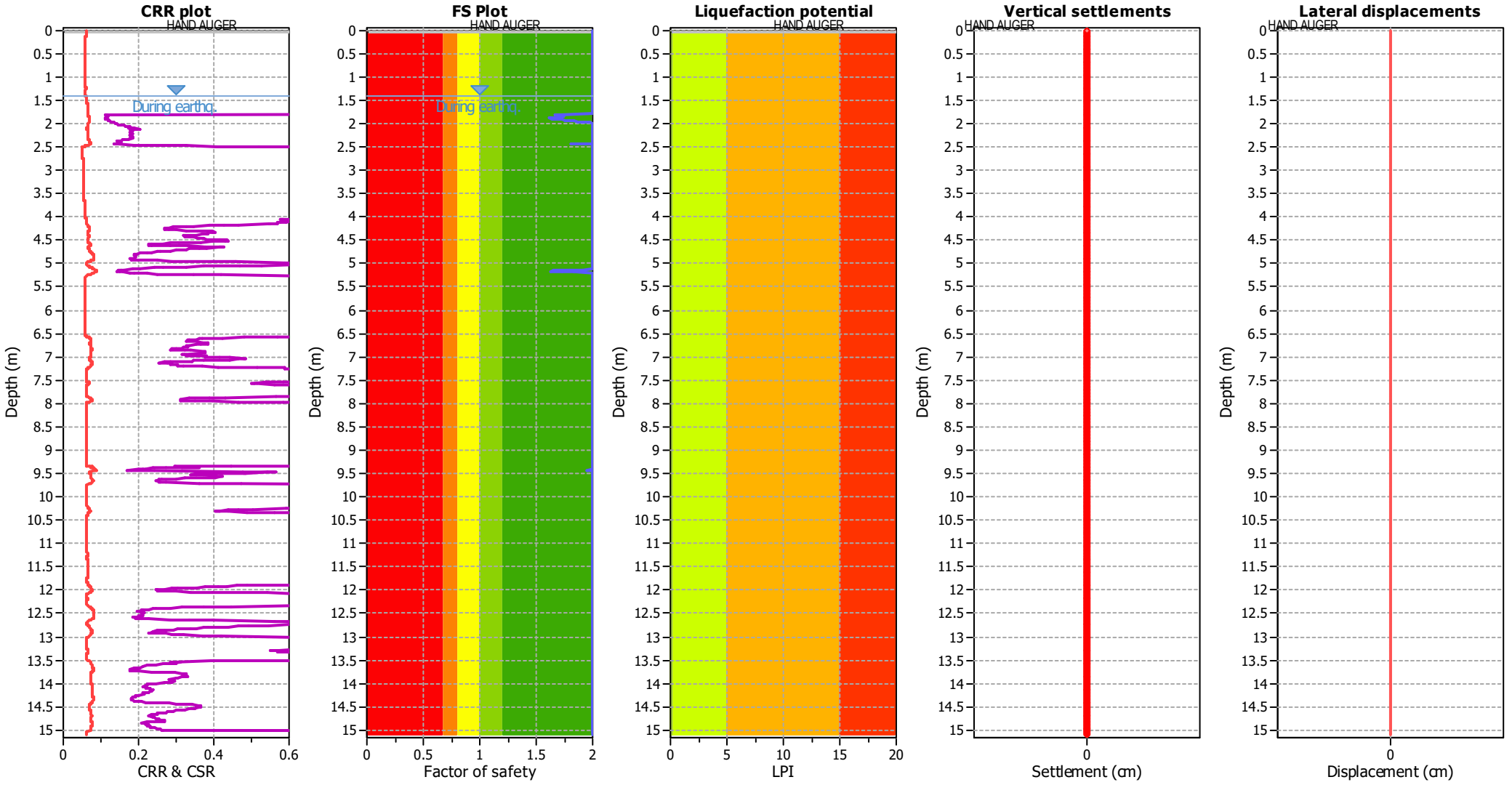
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.40 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.40 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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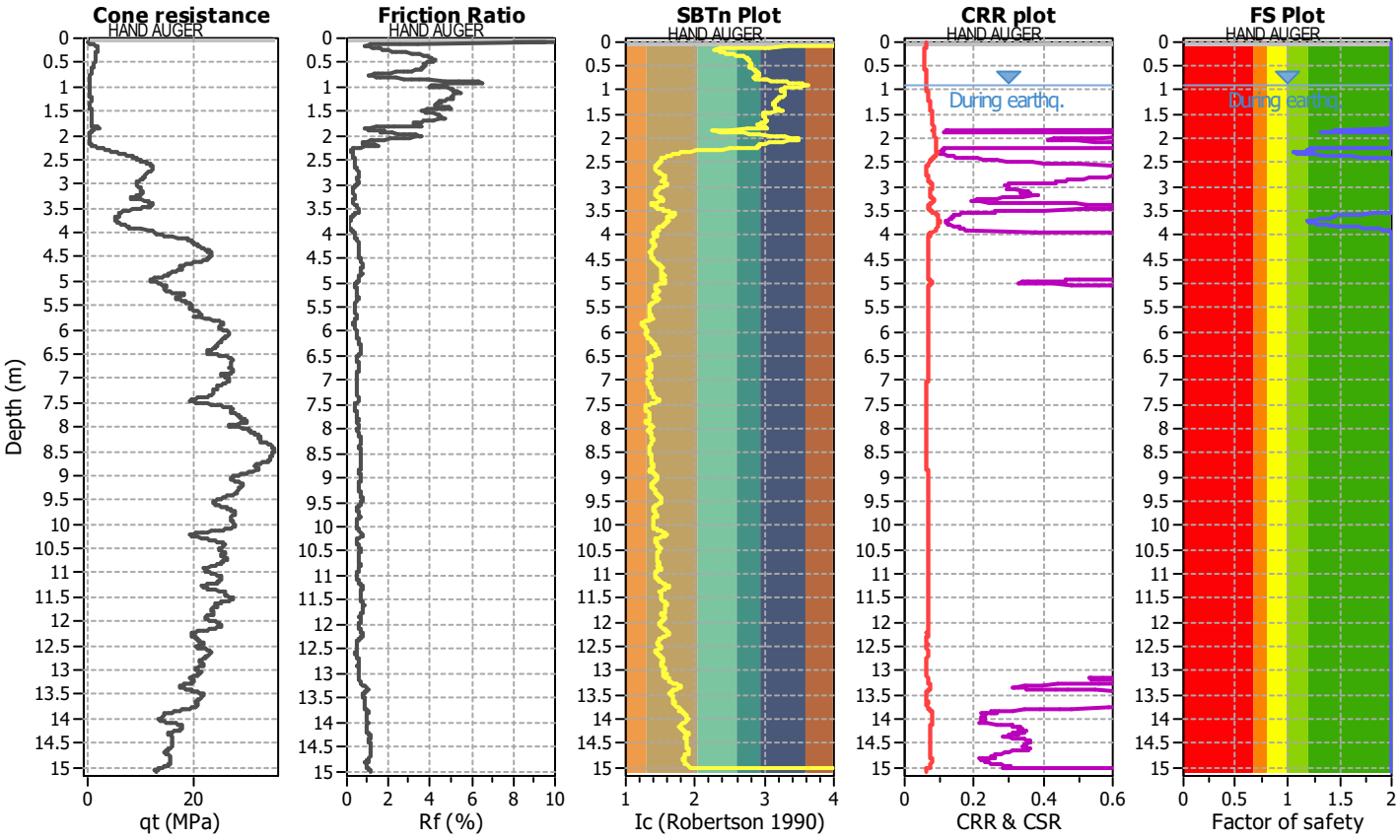
LIQUEFACTION ANALYSIS REPORT

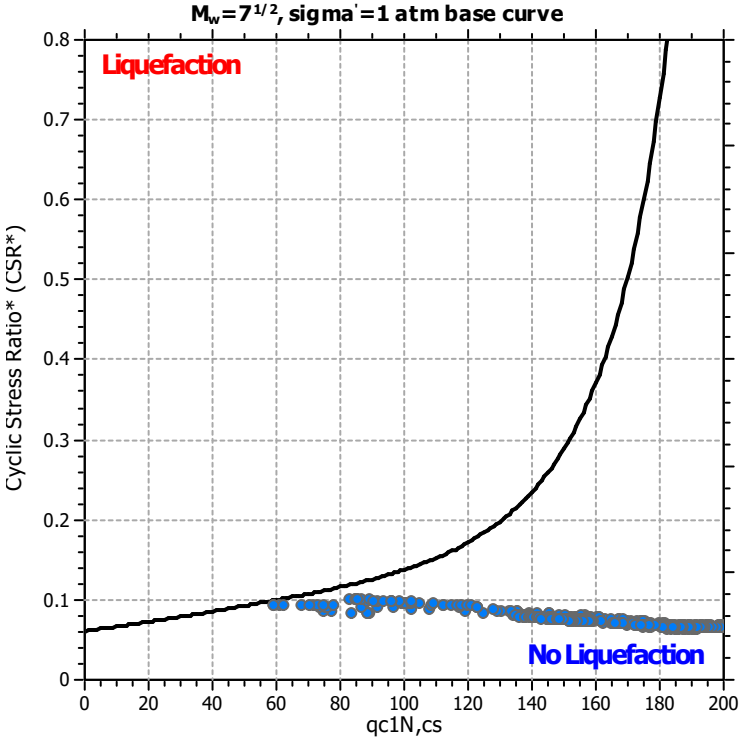
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

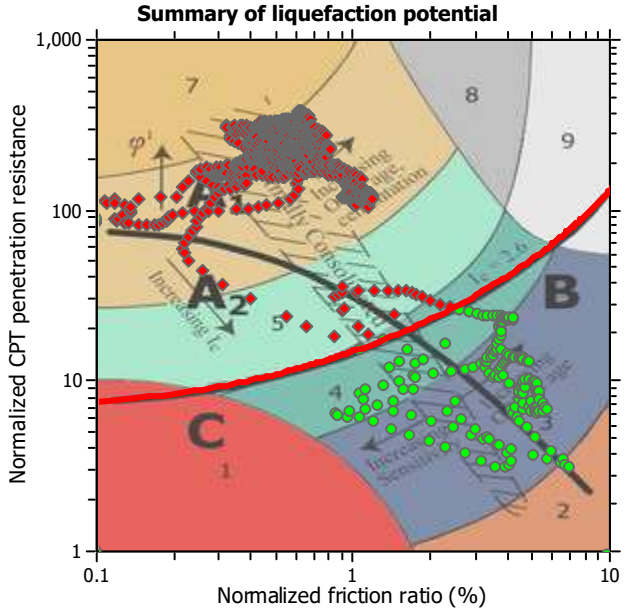
CPT file : CPT06

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.90 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

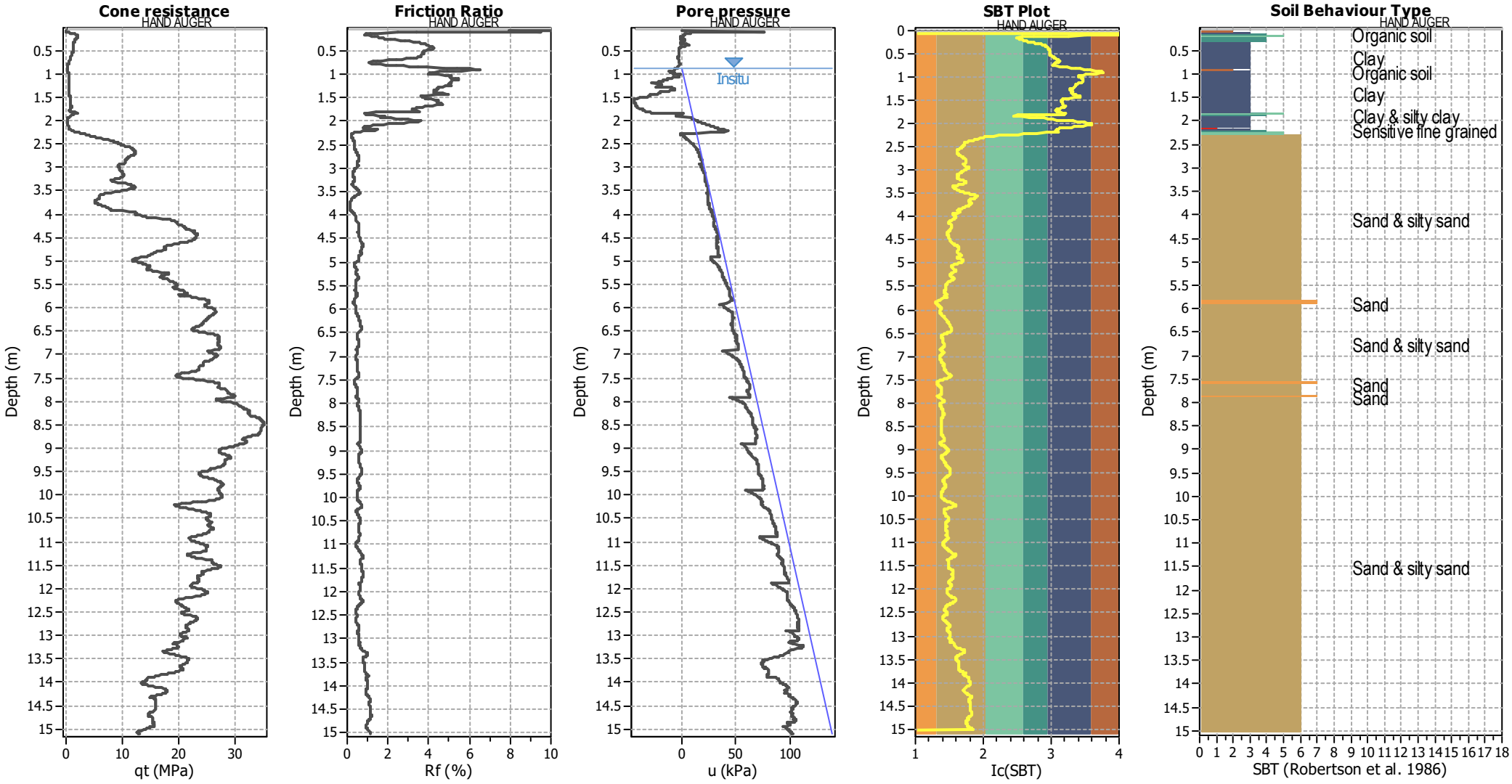






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



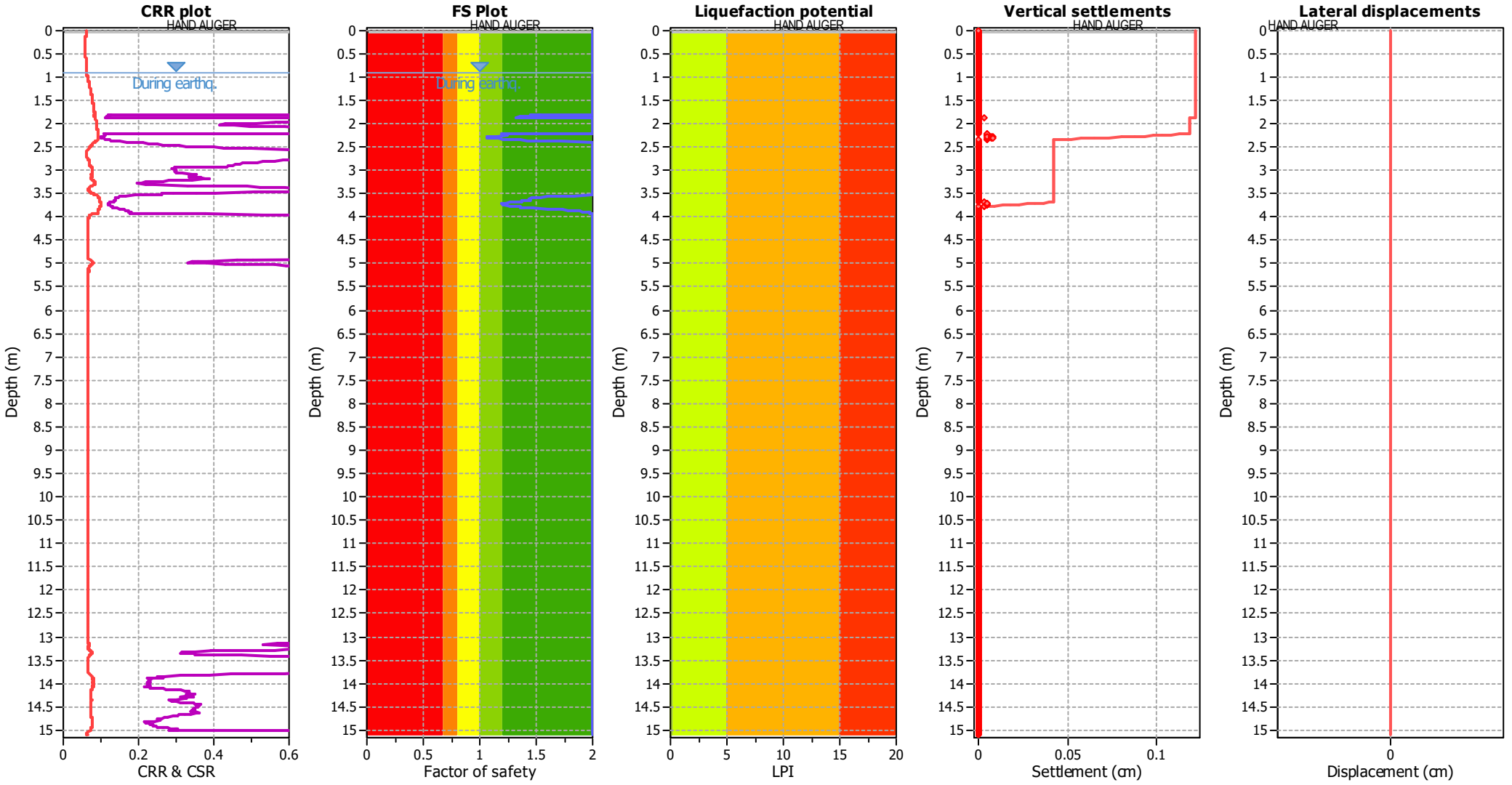
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.90 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.90 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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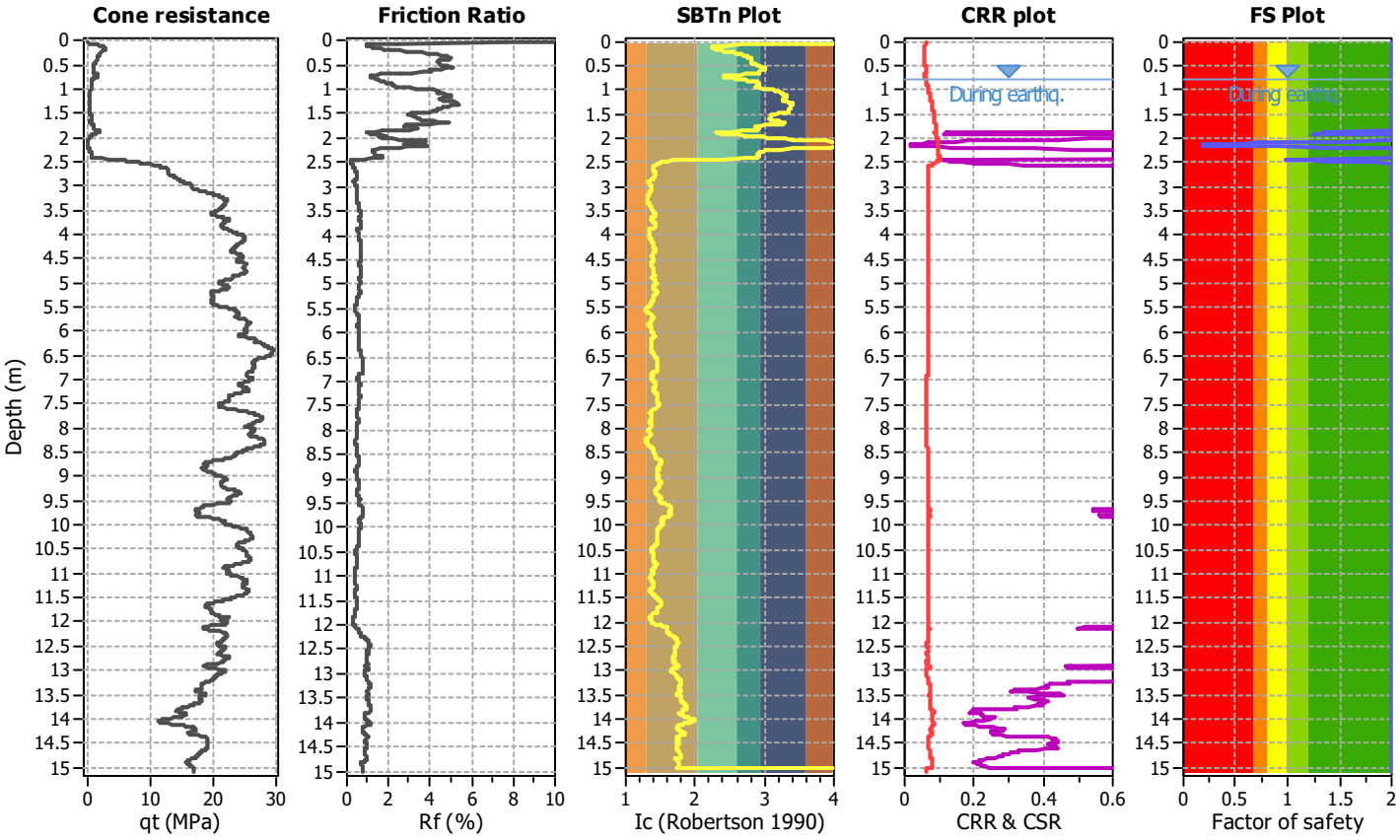
LIQUEFACTION ANALYSIS REPORT

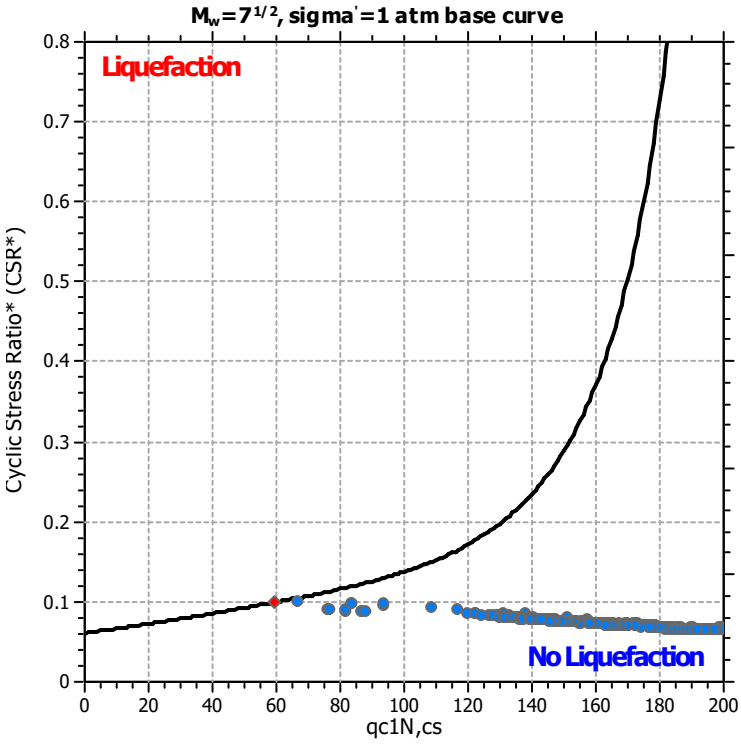
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

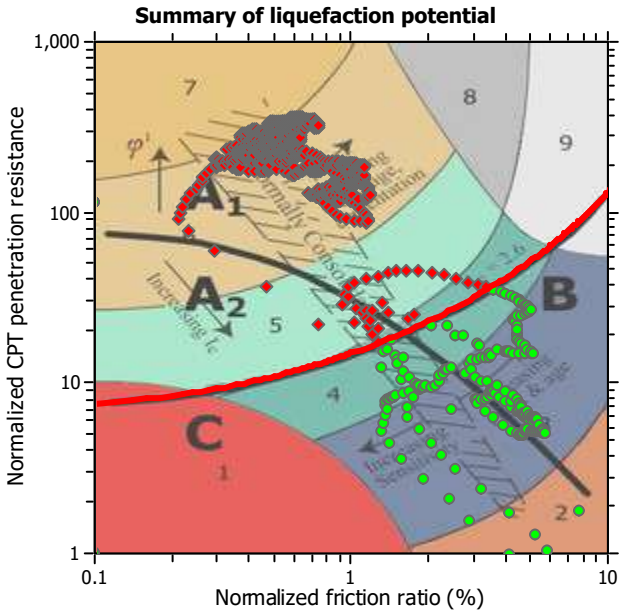
CPT file : CPT07

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.78 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.78 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

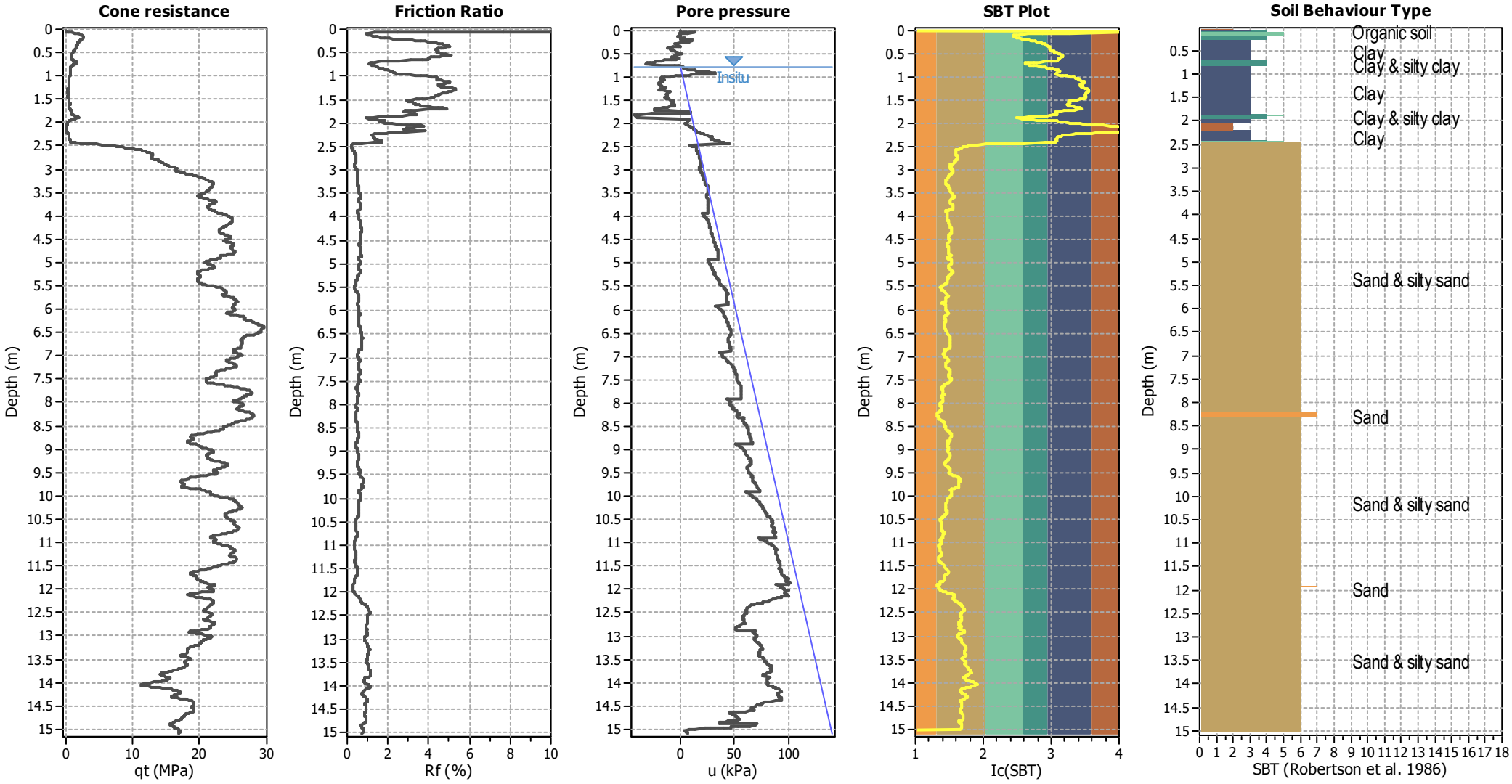






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



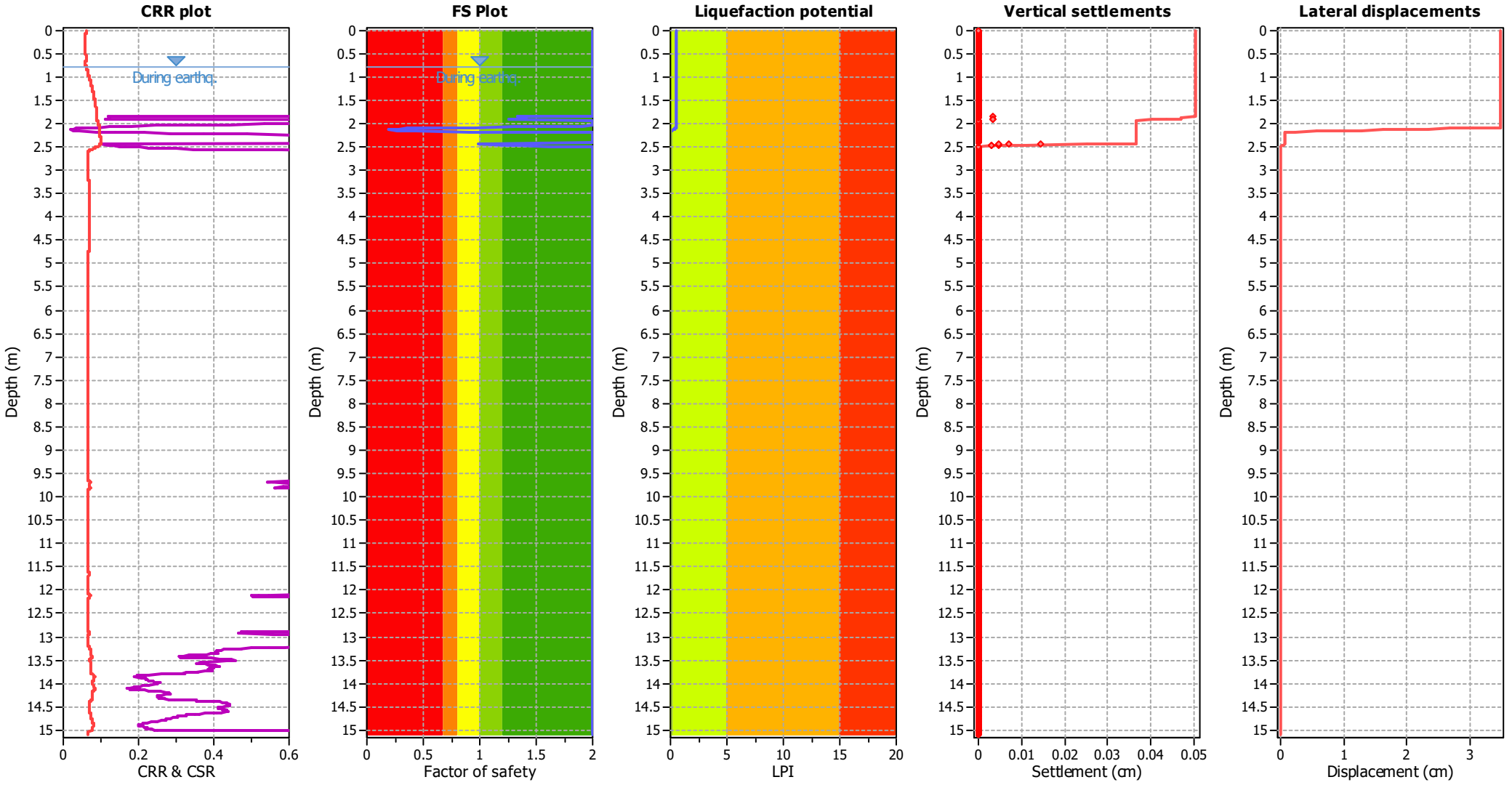
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.78 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.78 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.78 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.78 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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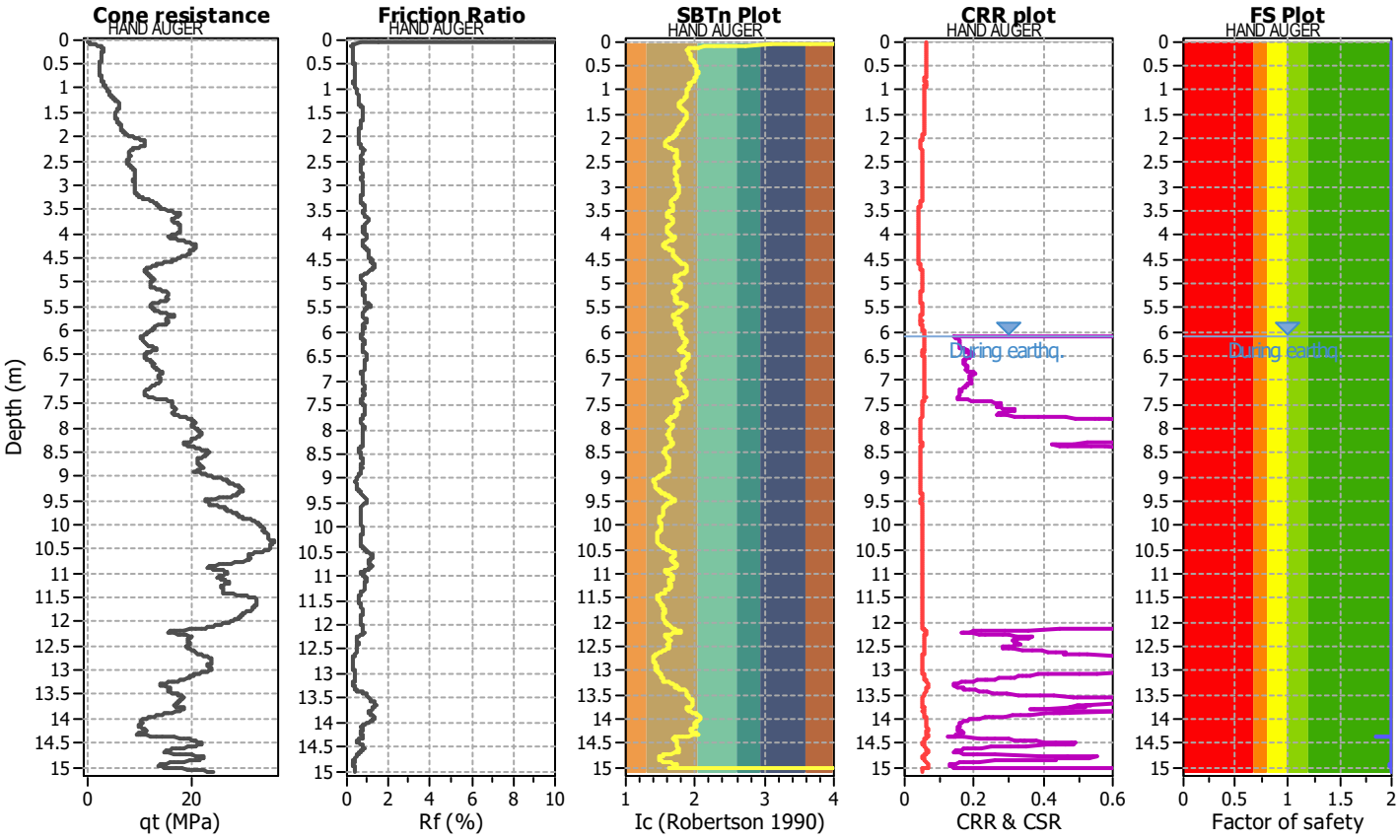
LIQUEFACTION ANALYSIS REPORT

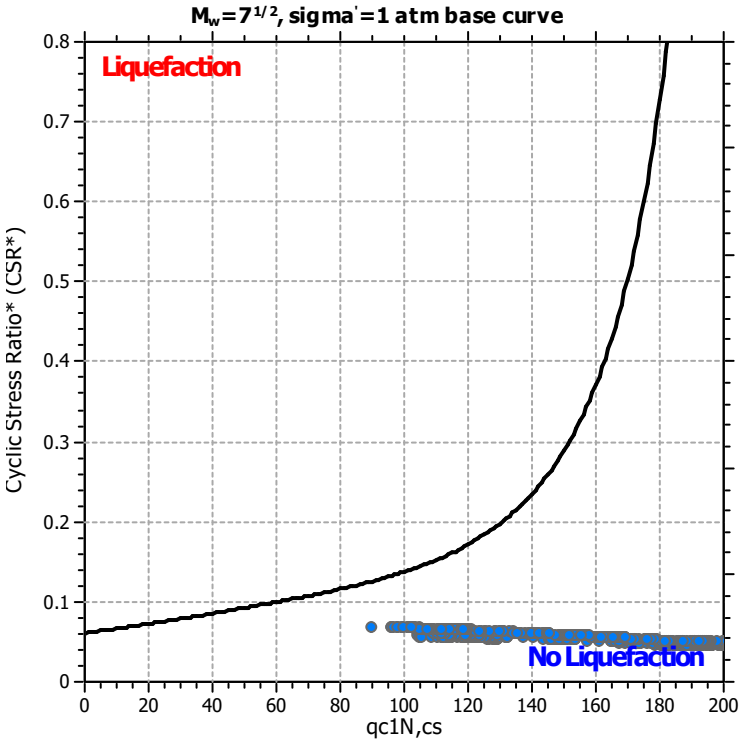
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

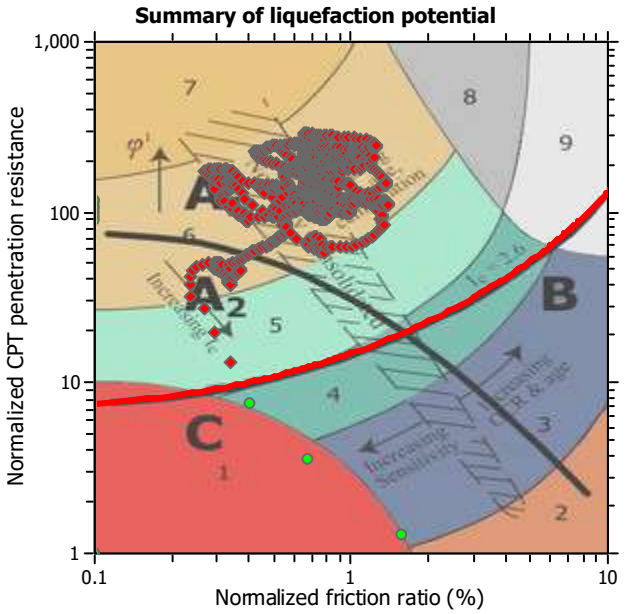
CPT file : CPT08

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	6.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	6.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

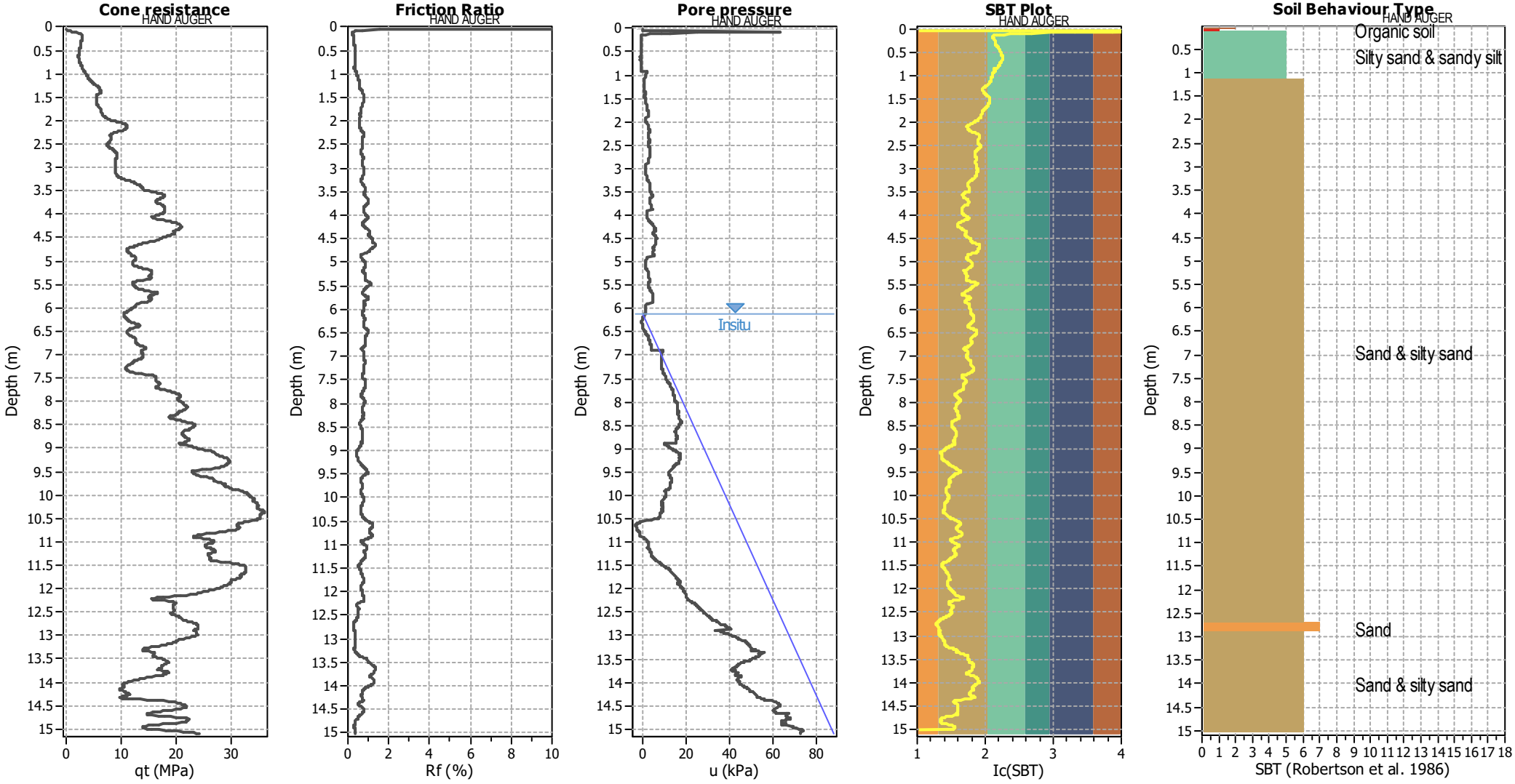






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



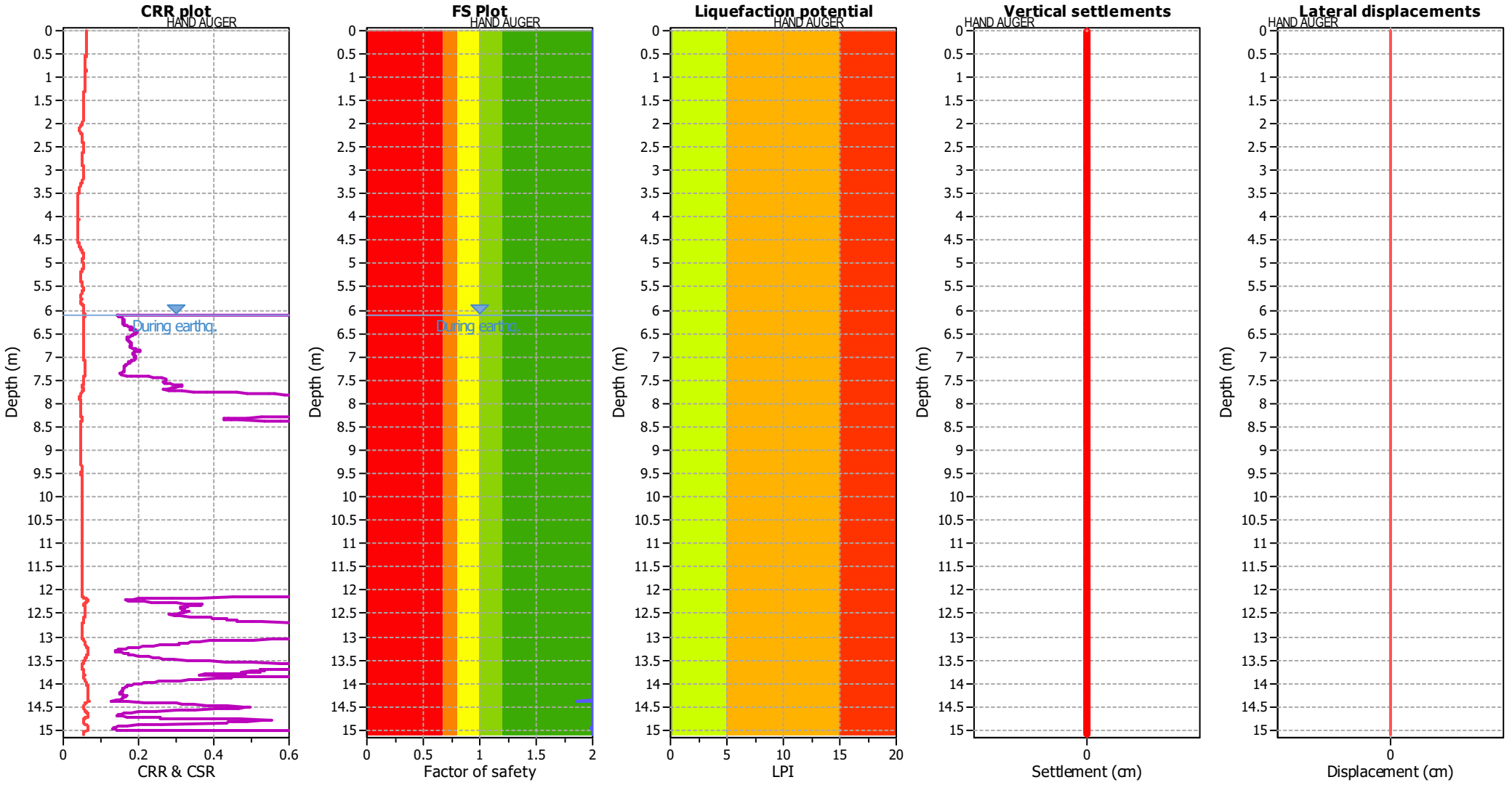
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	6.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	6.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	6.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	6.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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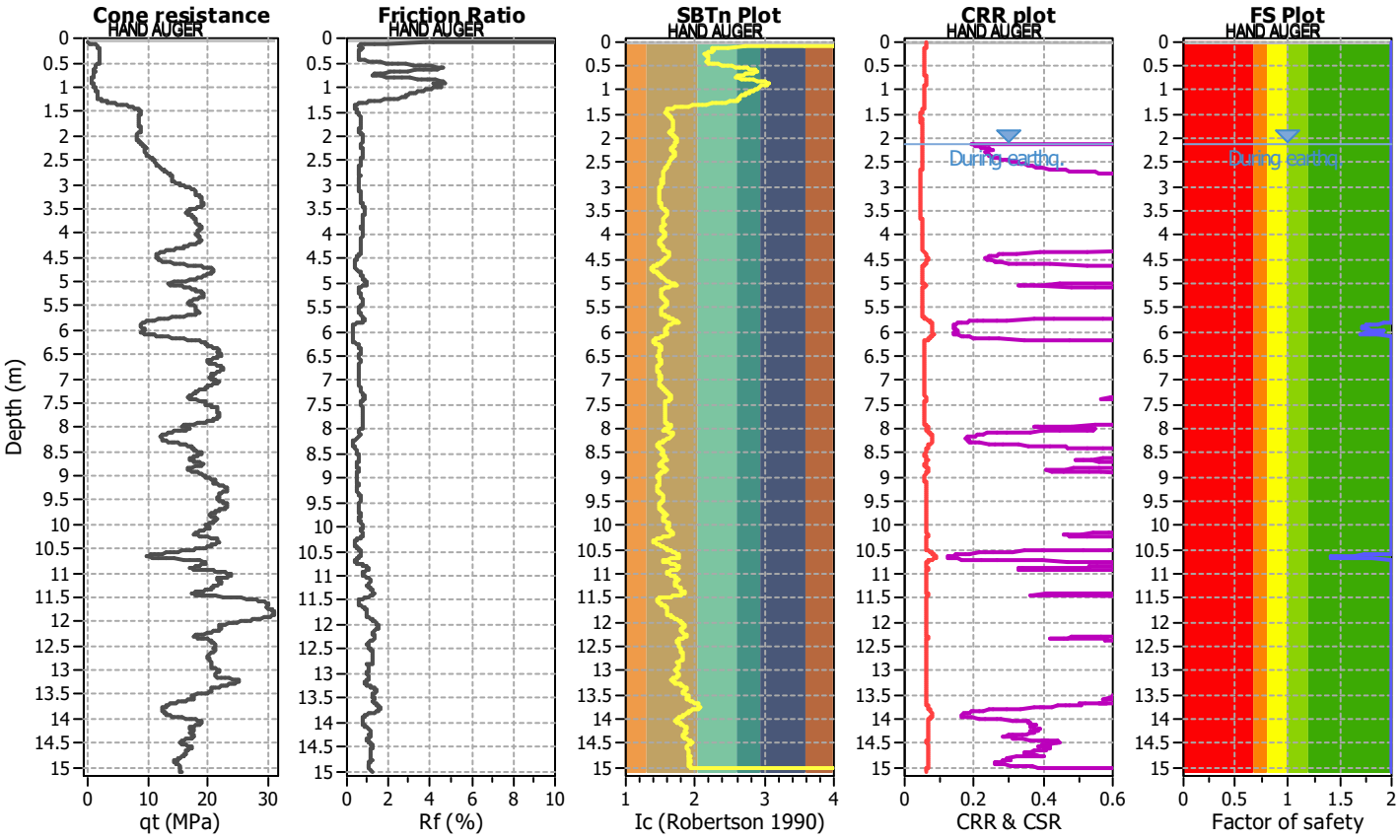
LIQUEFACTION ANALYSIS REPORT

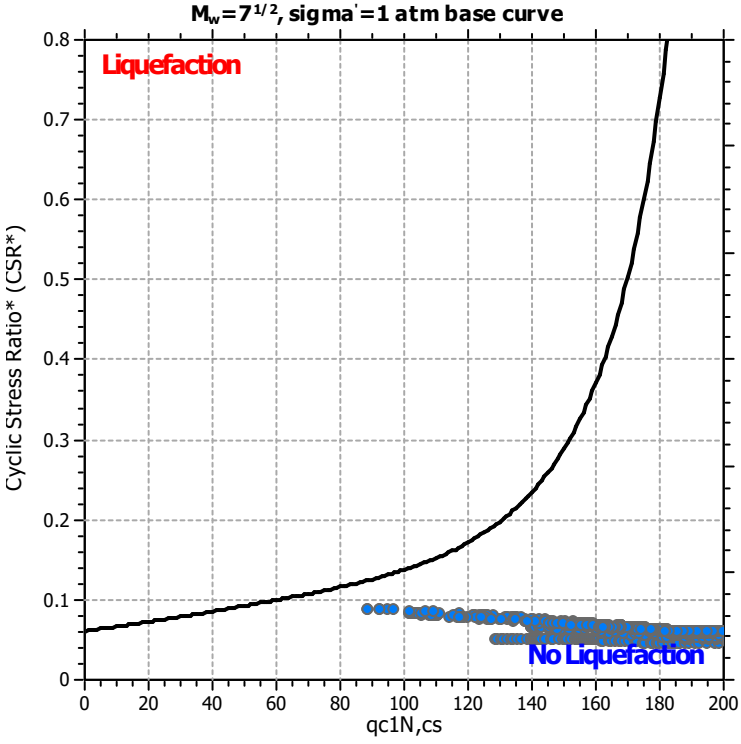
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

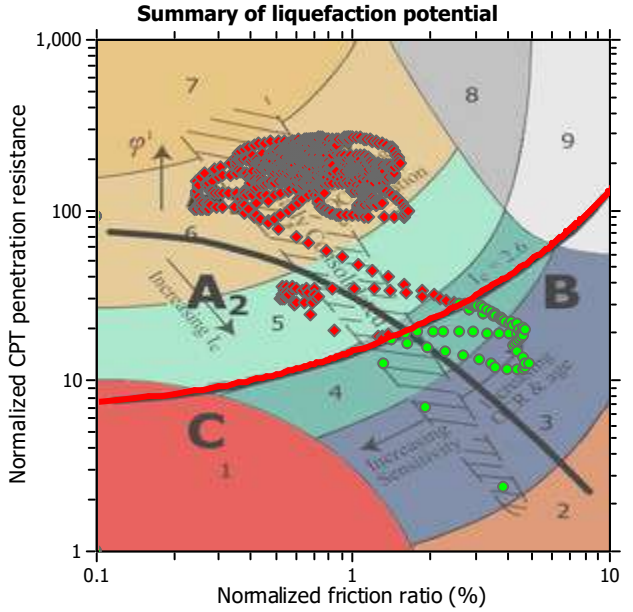
CPT file : CPT09

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

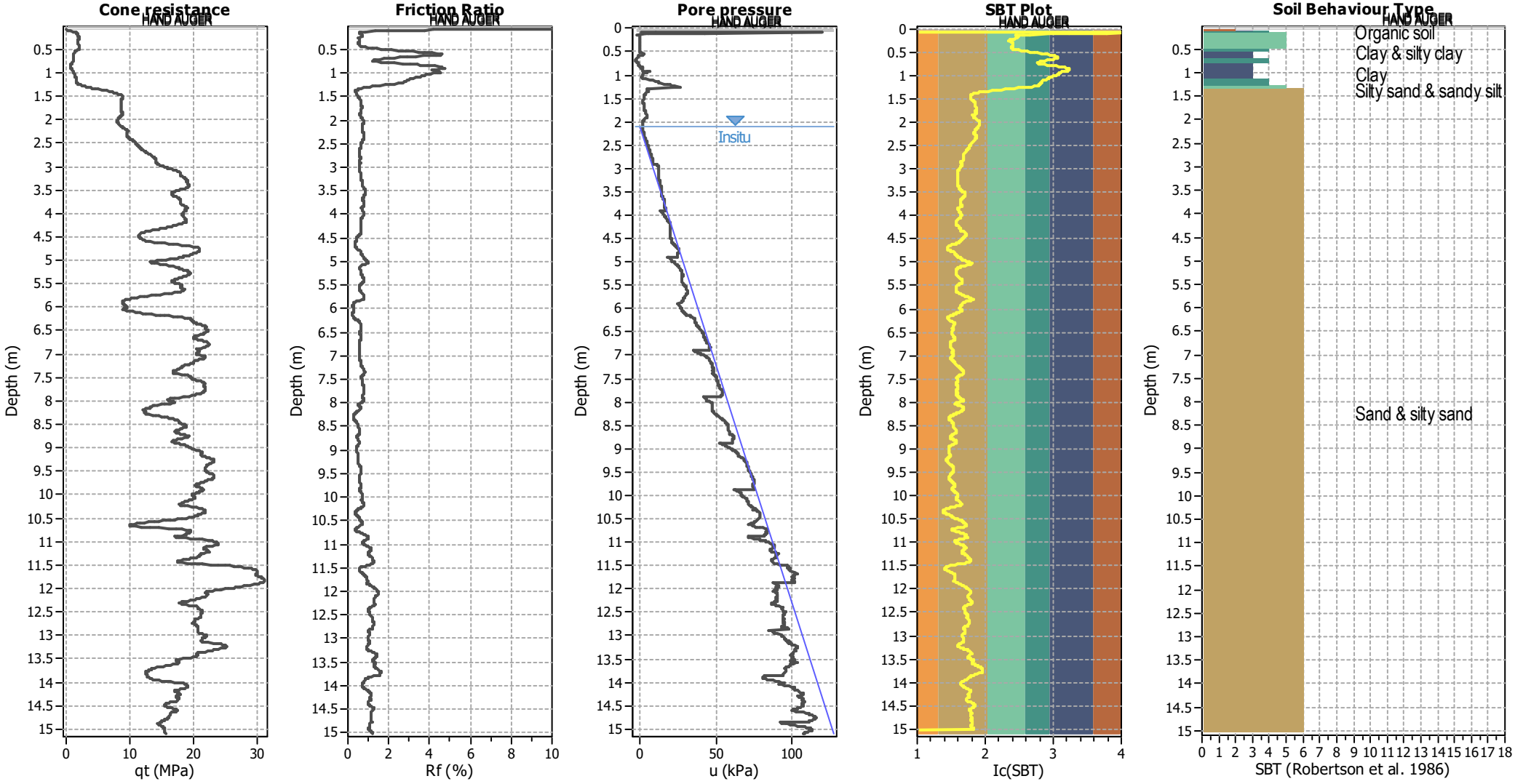






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



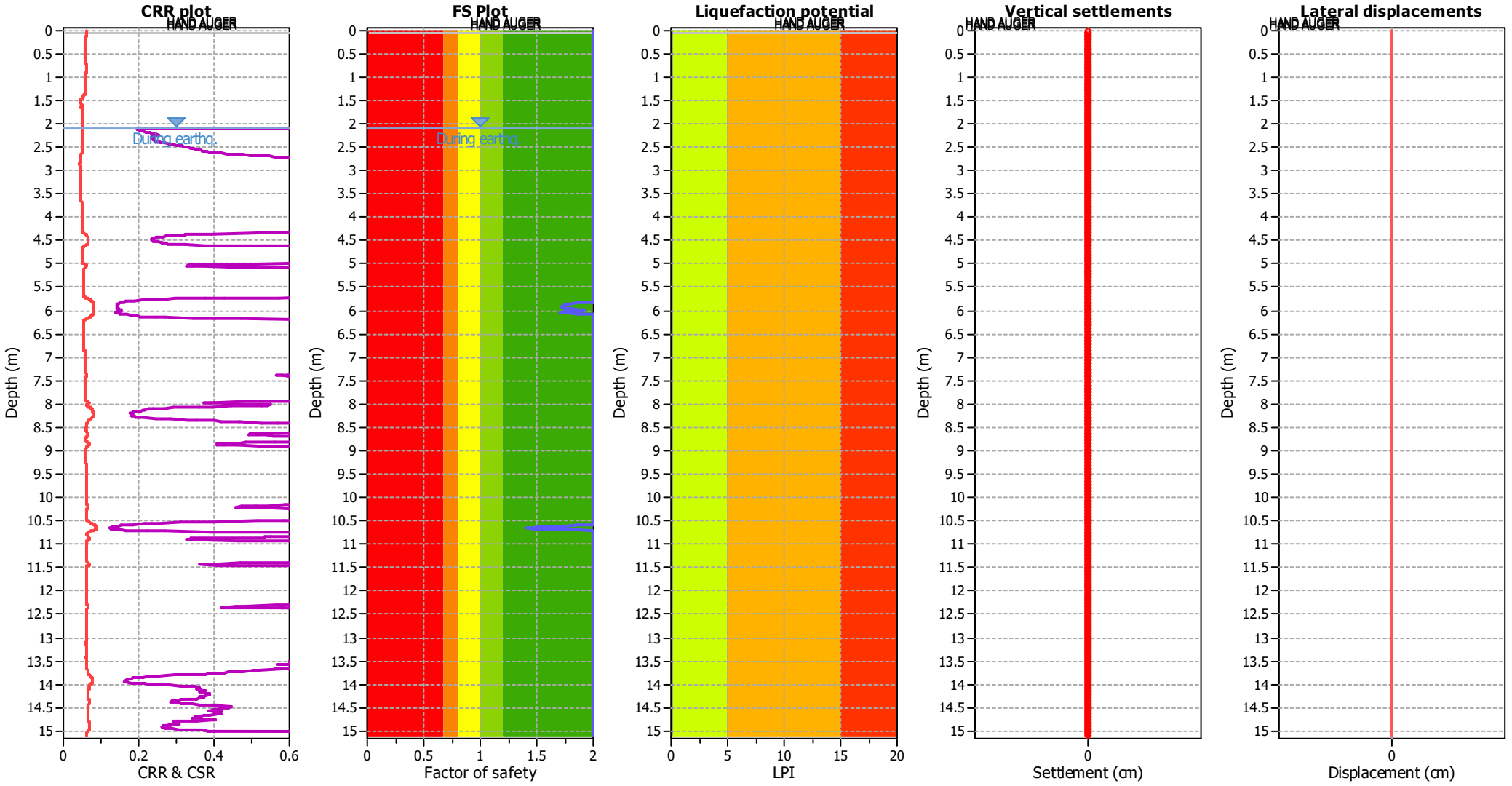
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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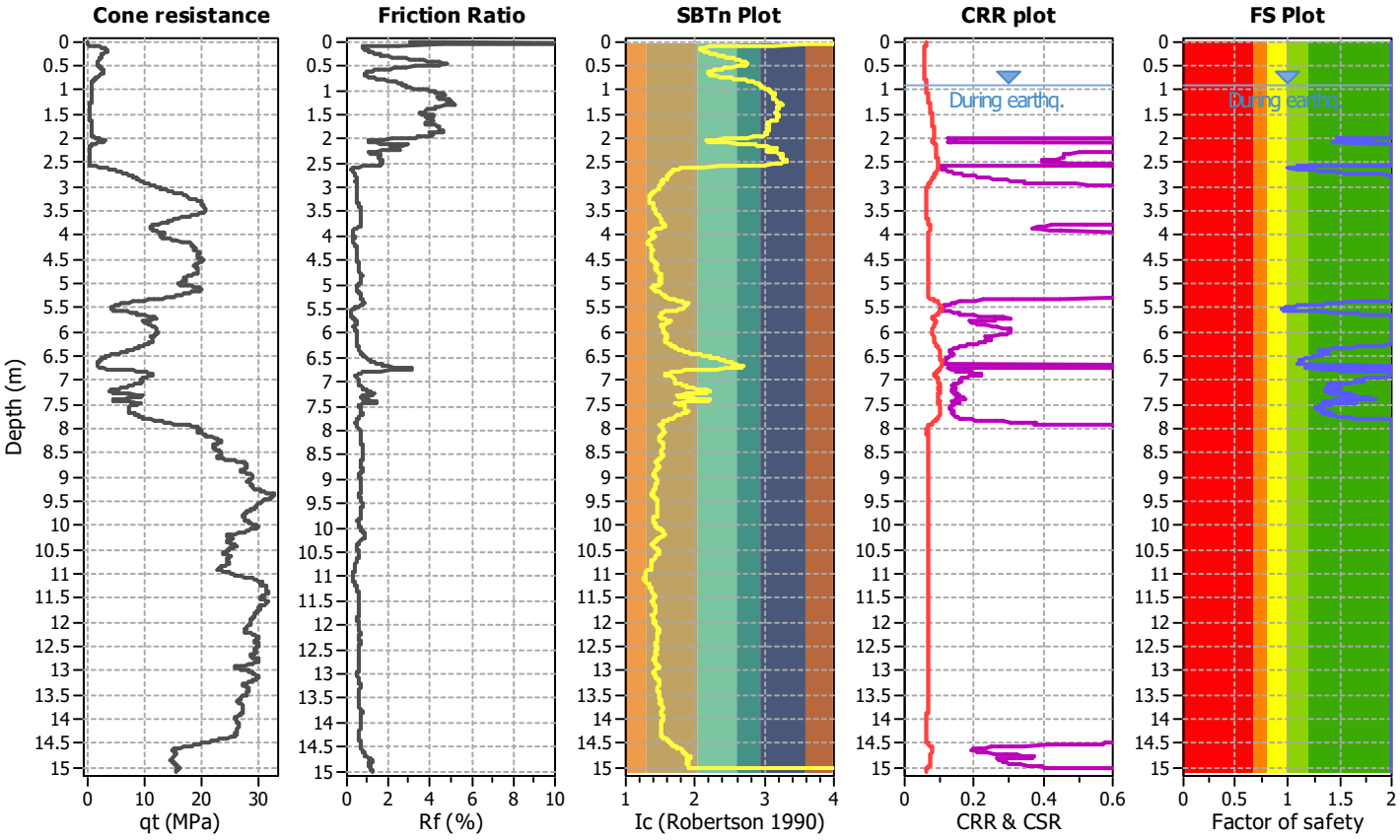
LIQUEFACTION ANALYSIS REPORT

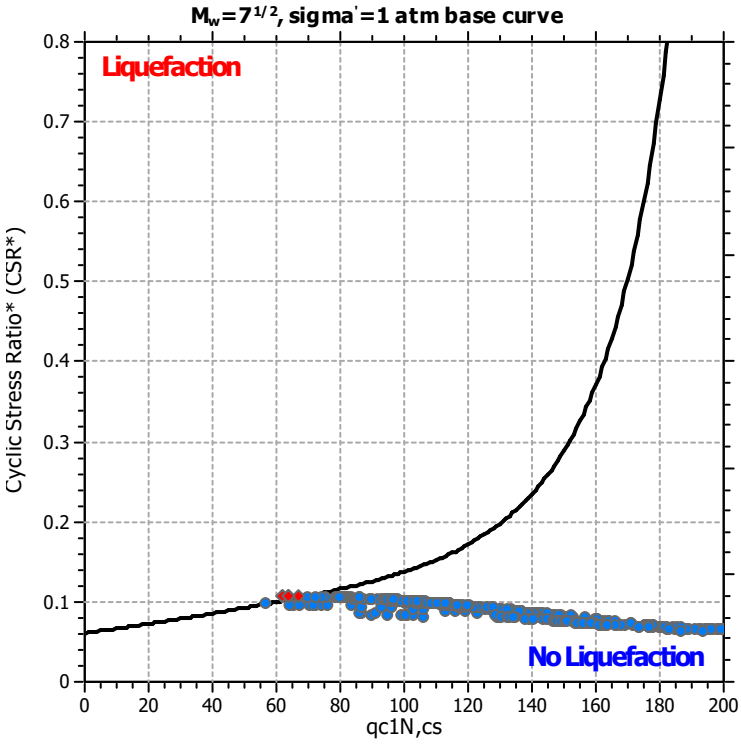
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

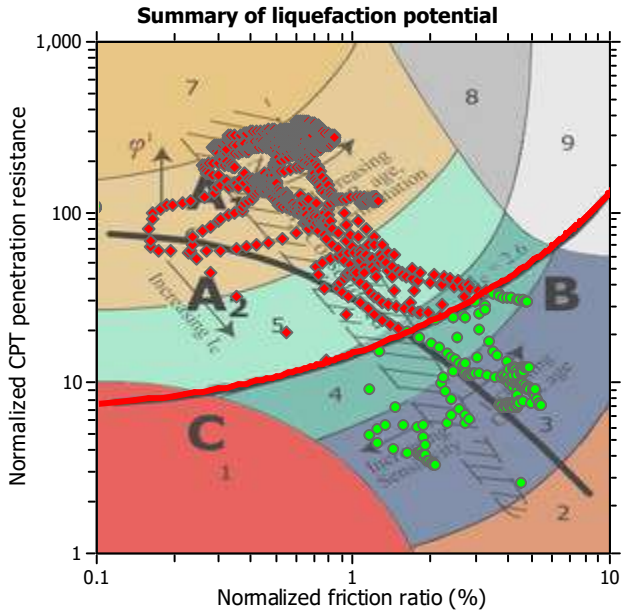
CPT file : CPT10

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.92 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.92 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

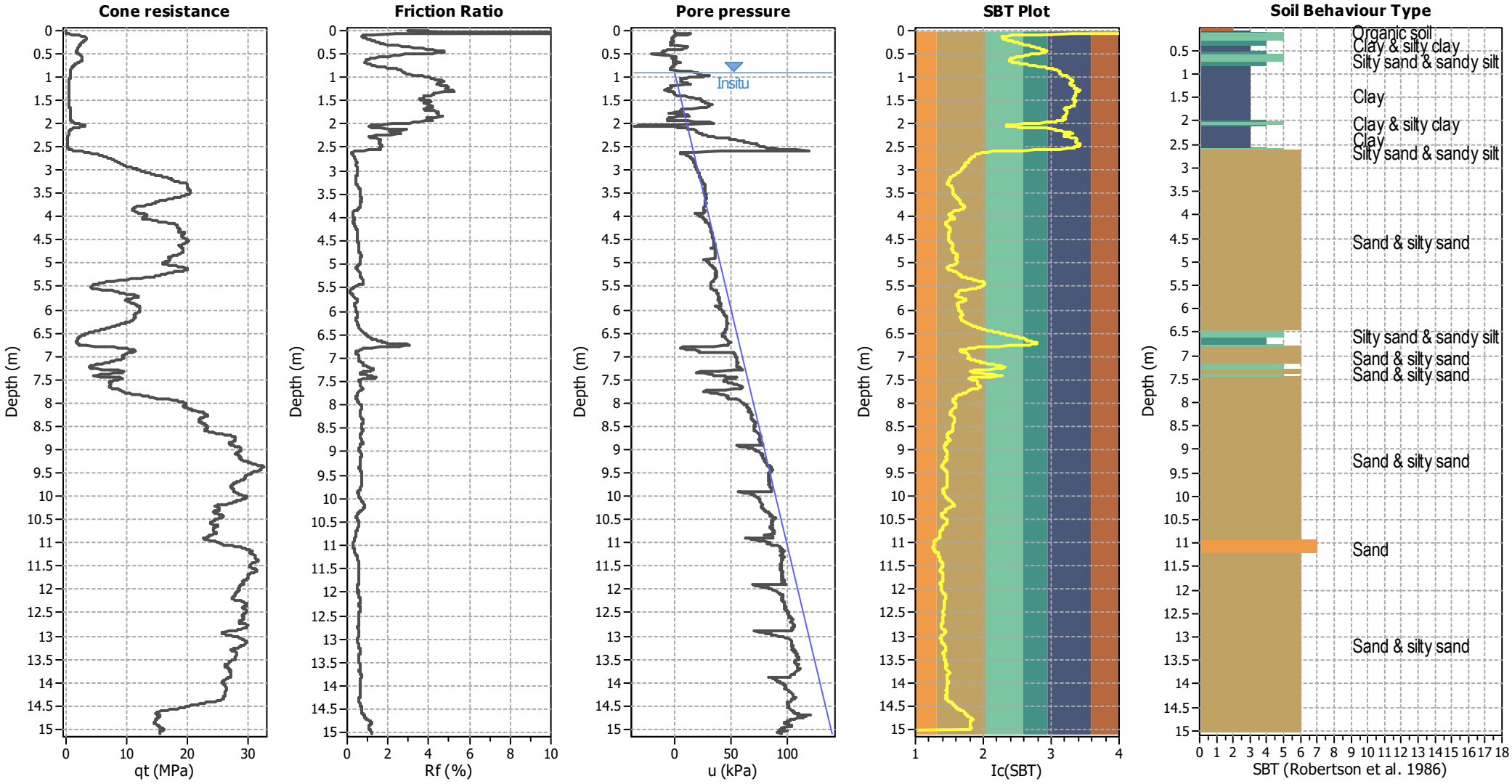






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



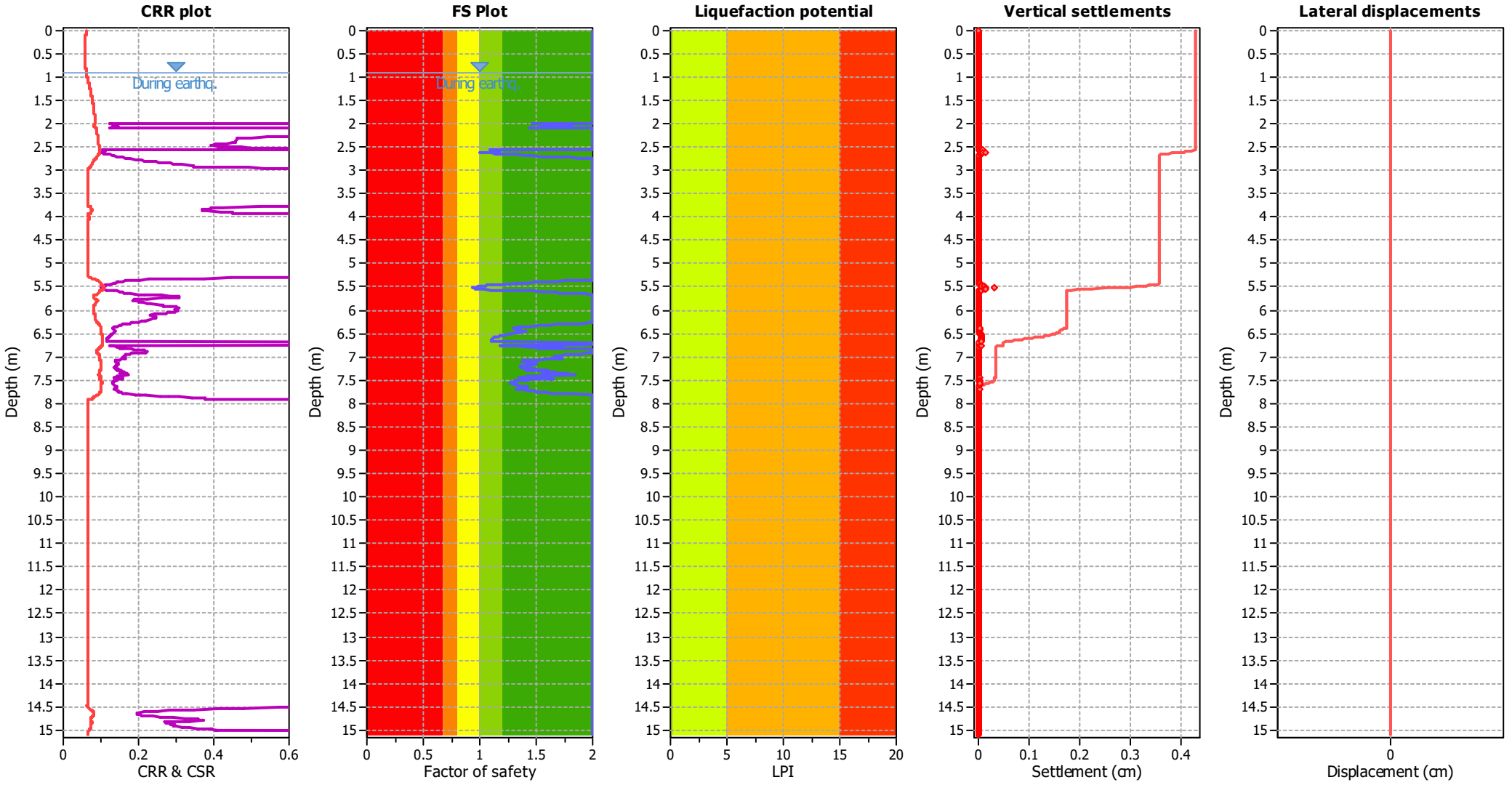
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.92 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.92 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.92 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.92 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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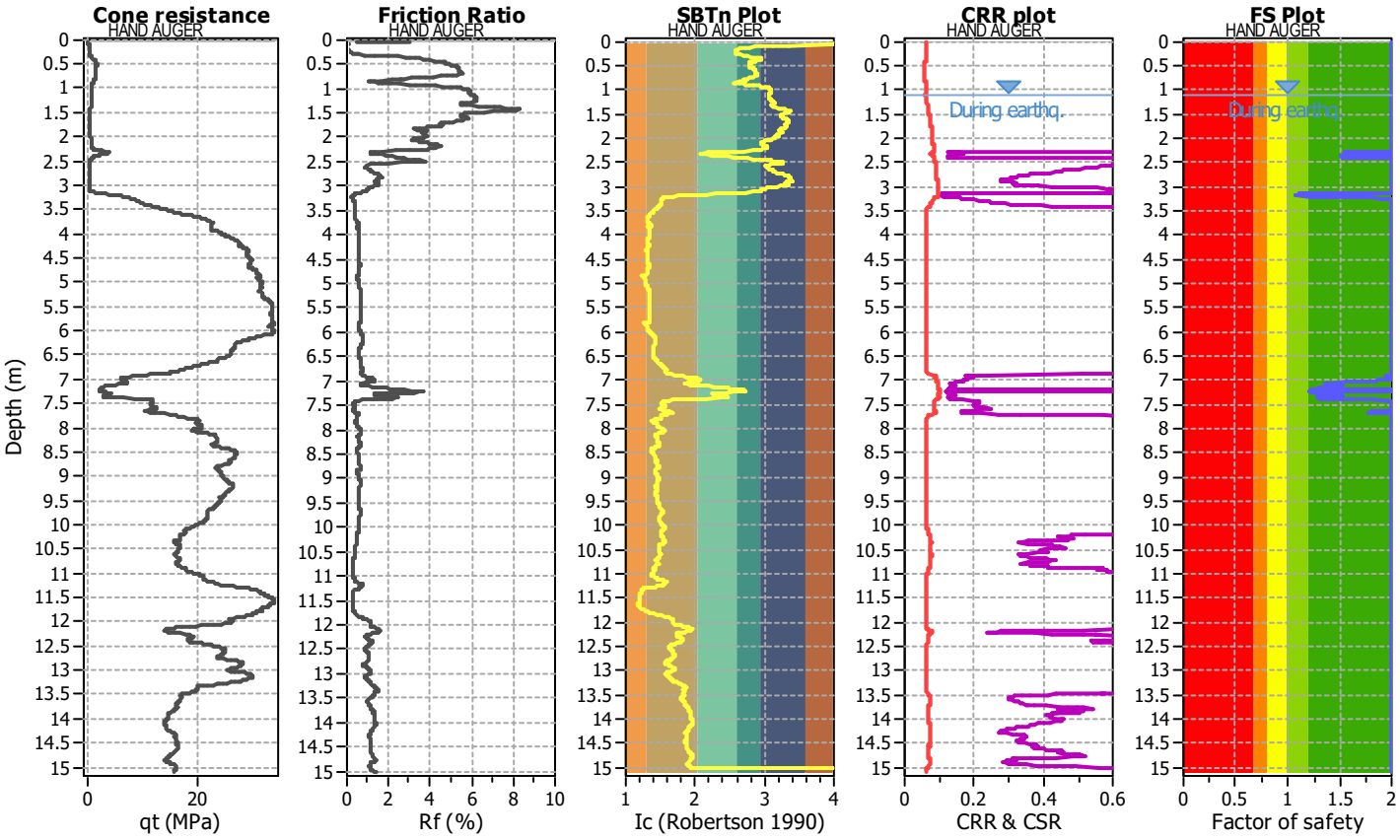
LIQUEFACTION ANALYSIS REPORT

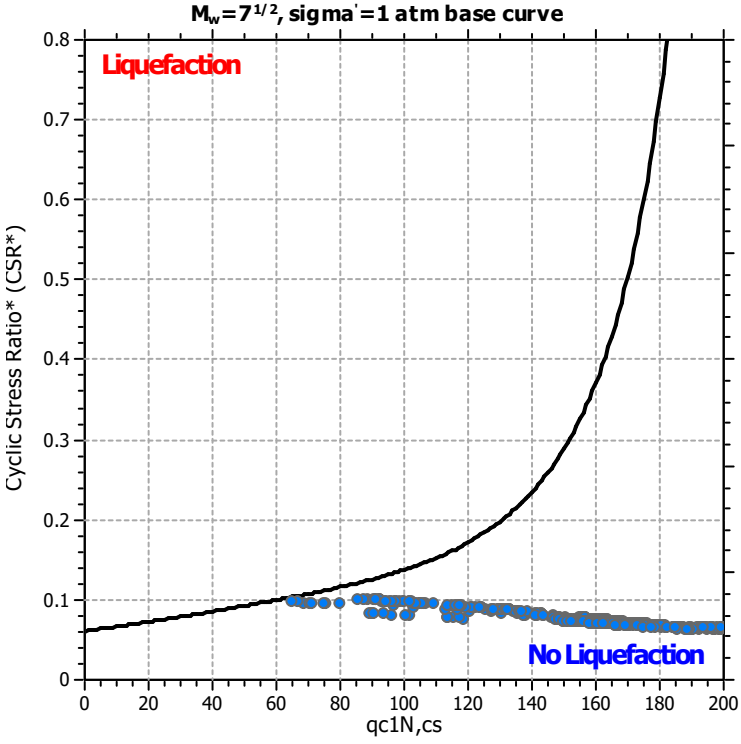
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

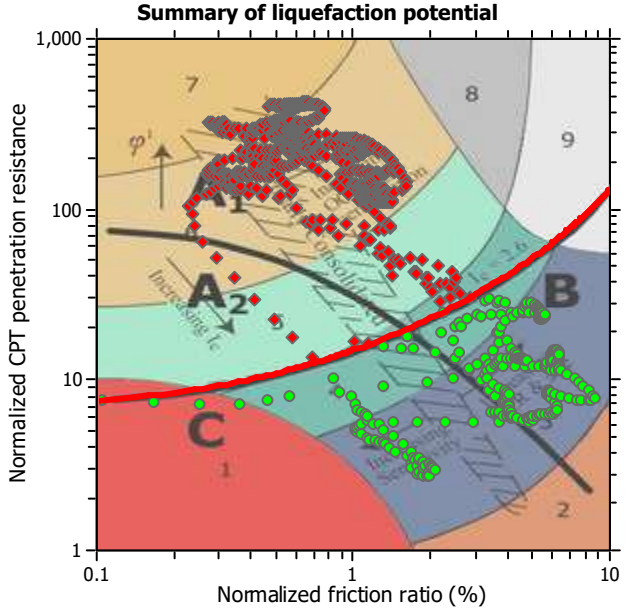
CPT file : CPT11

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

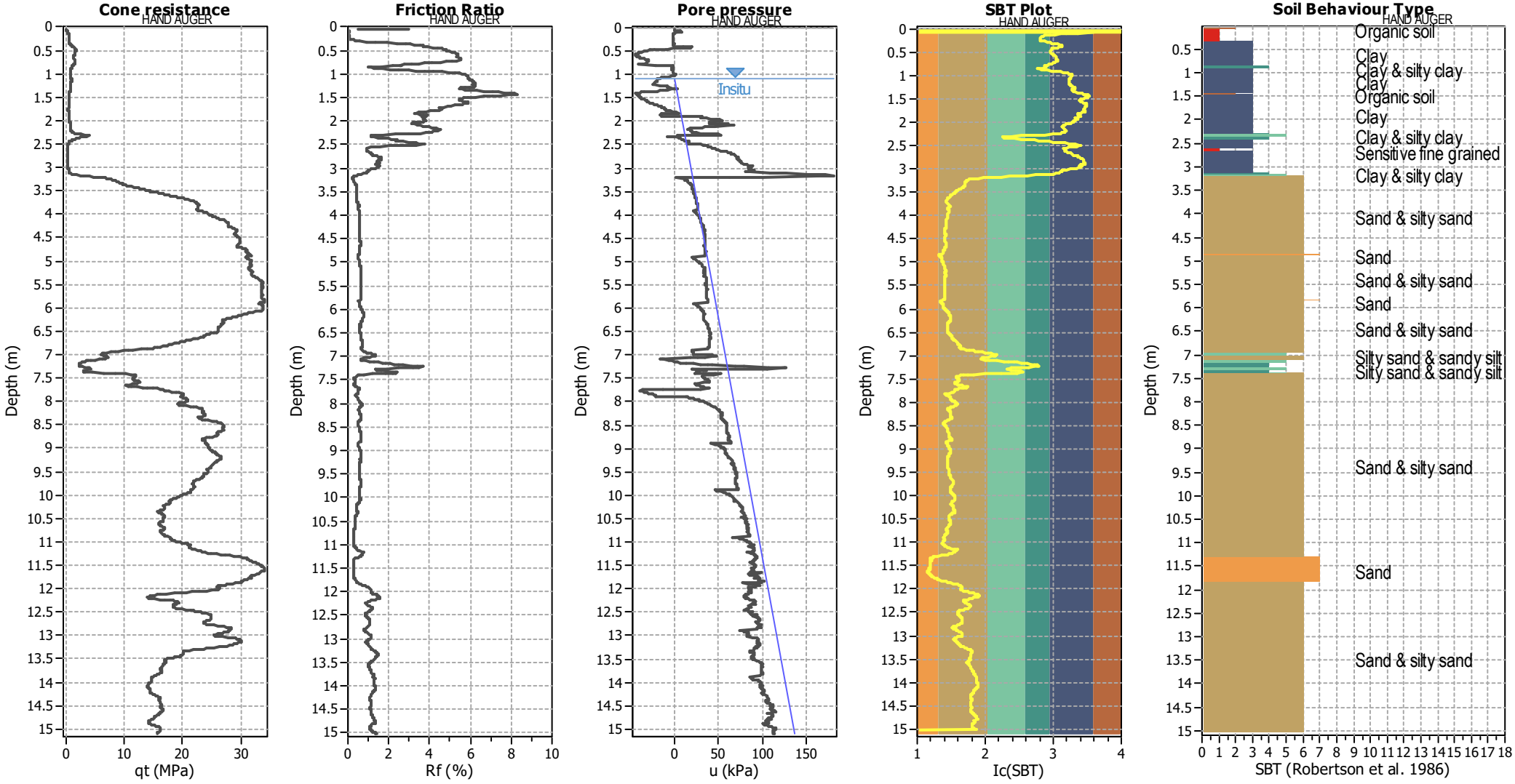






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



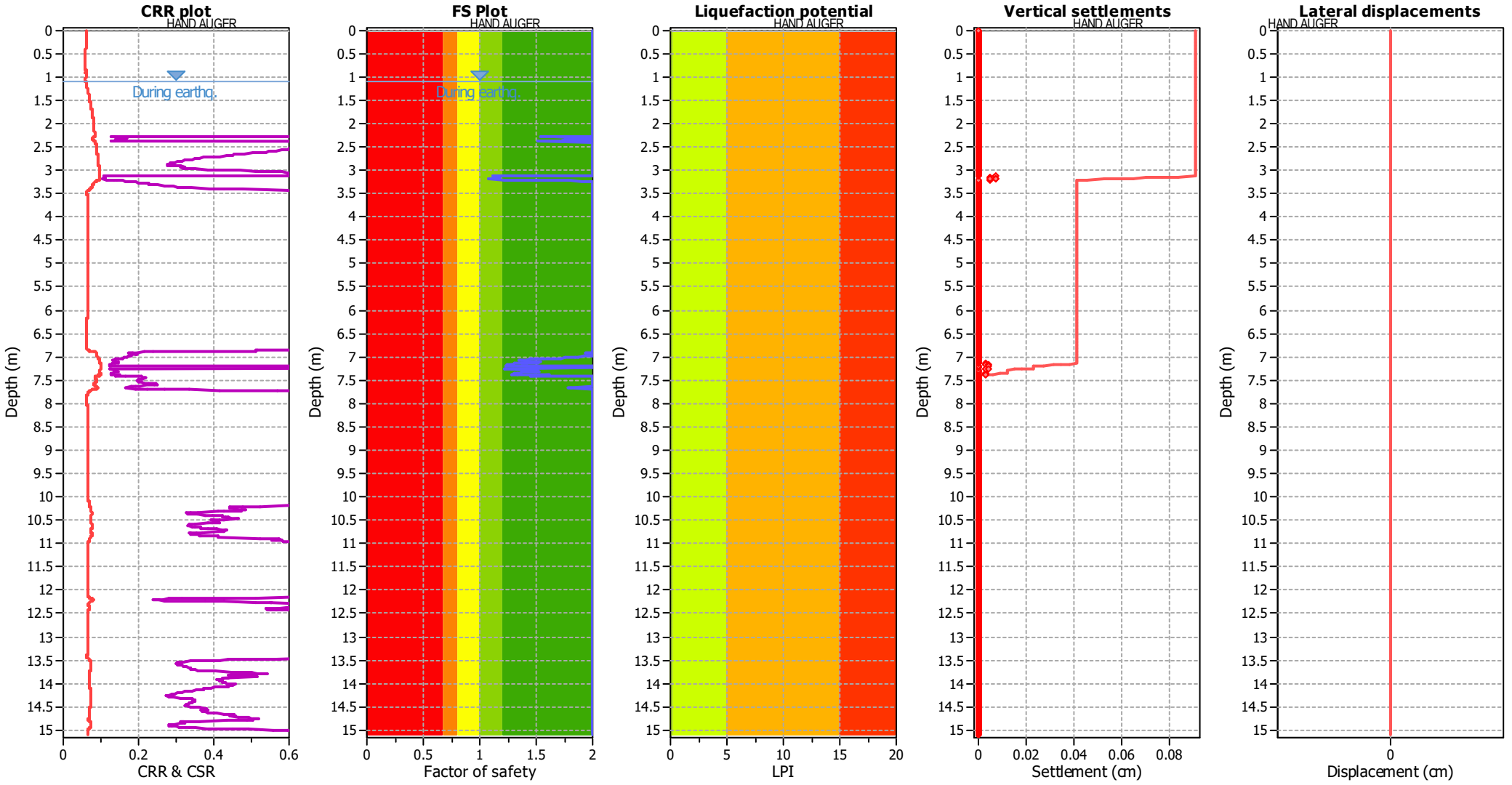
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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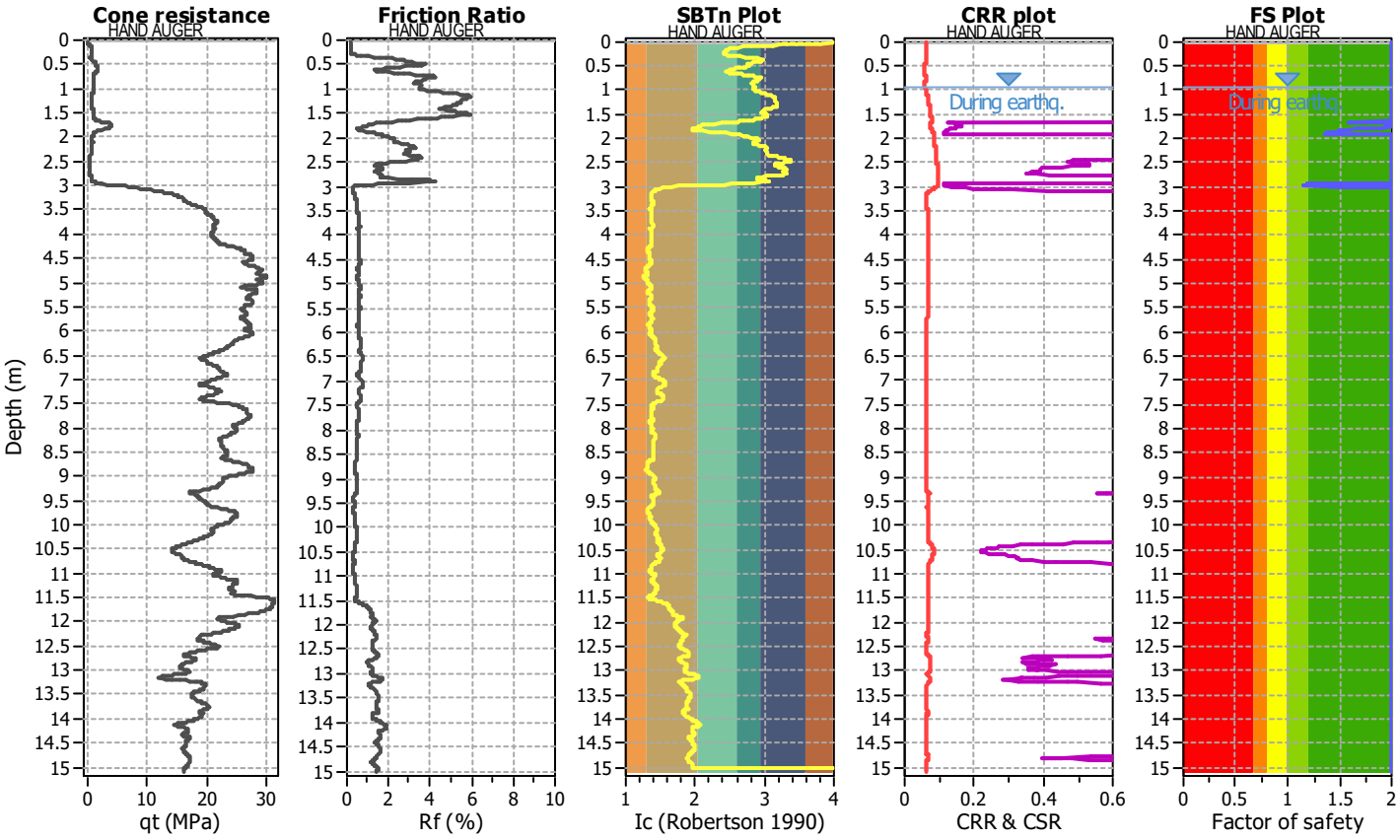
LIQUEFACTION ANALYSIS REPORT

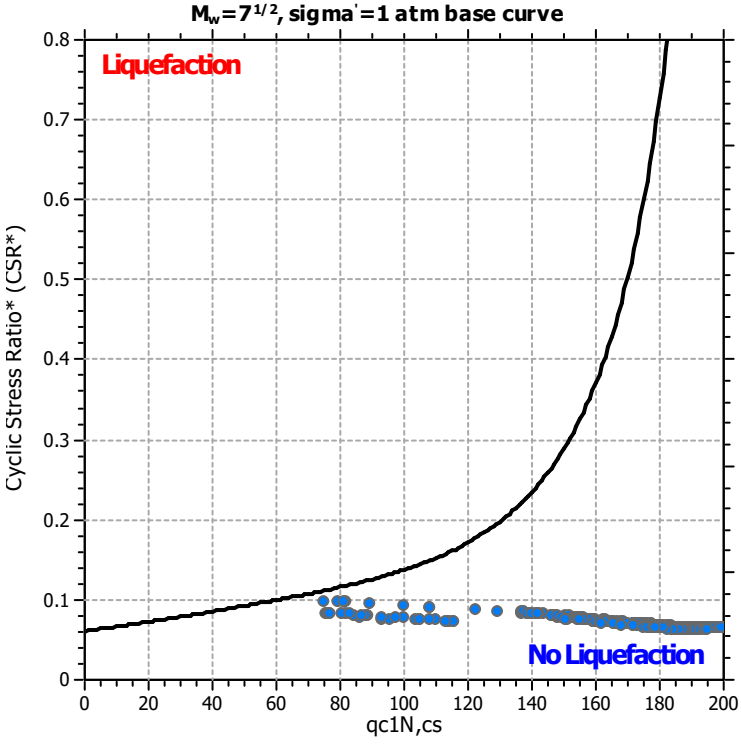
Project title : SLS Liquefaction Analysis **Location : Julian's Berry Farm**

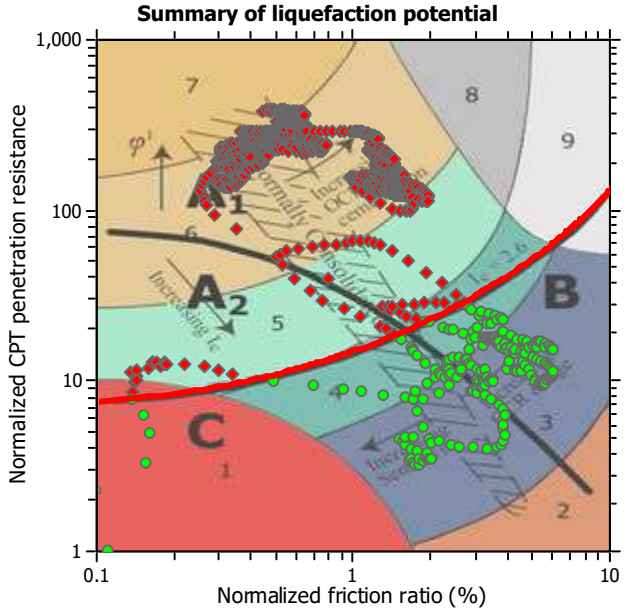
CPT file : CPT12

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.96 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.96 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.11	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

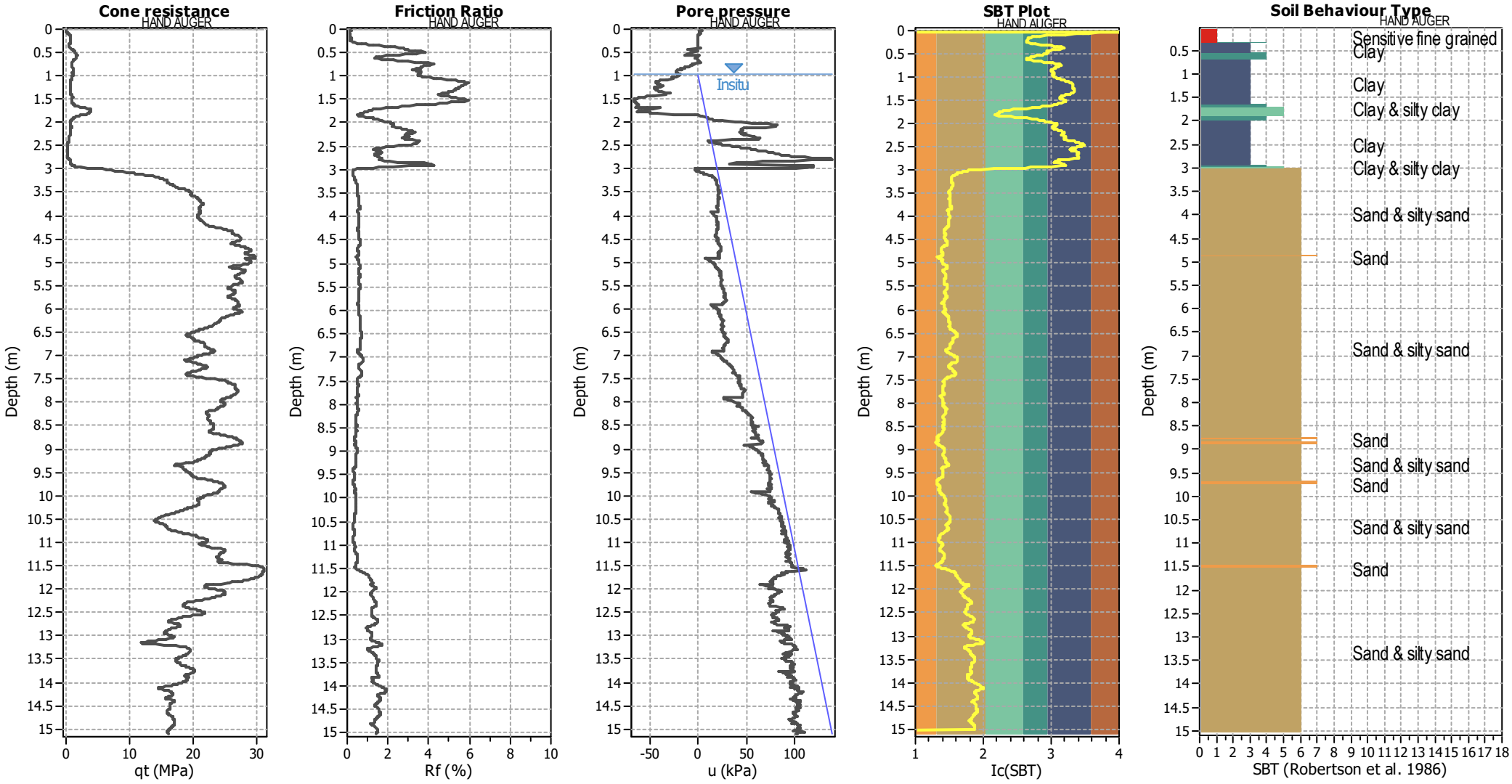






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



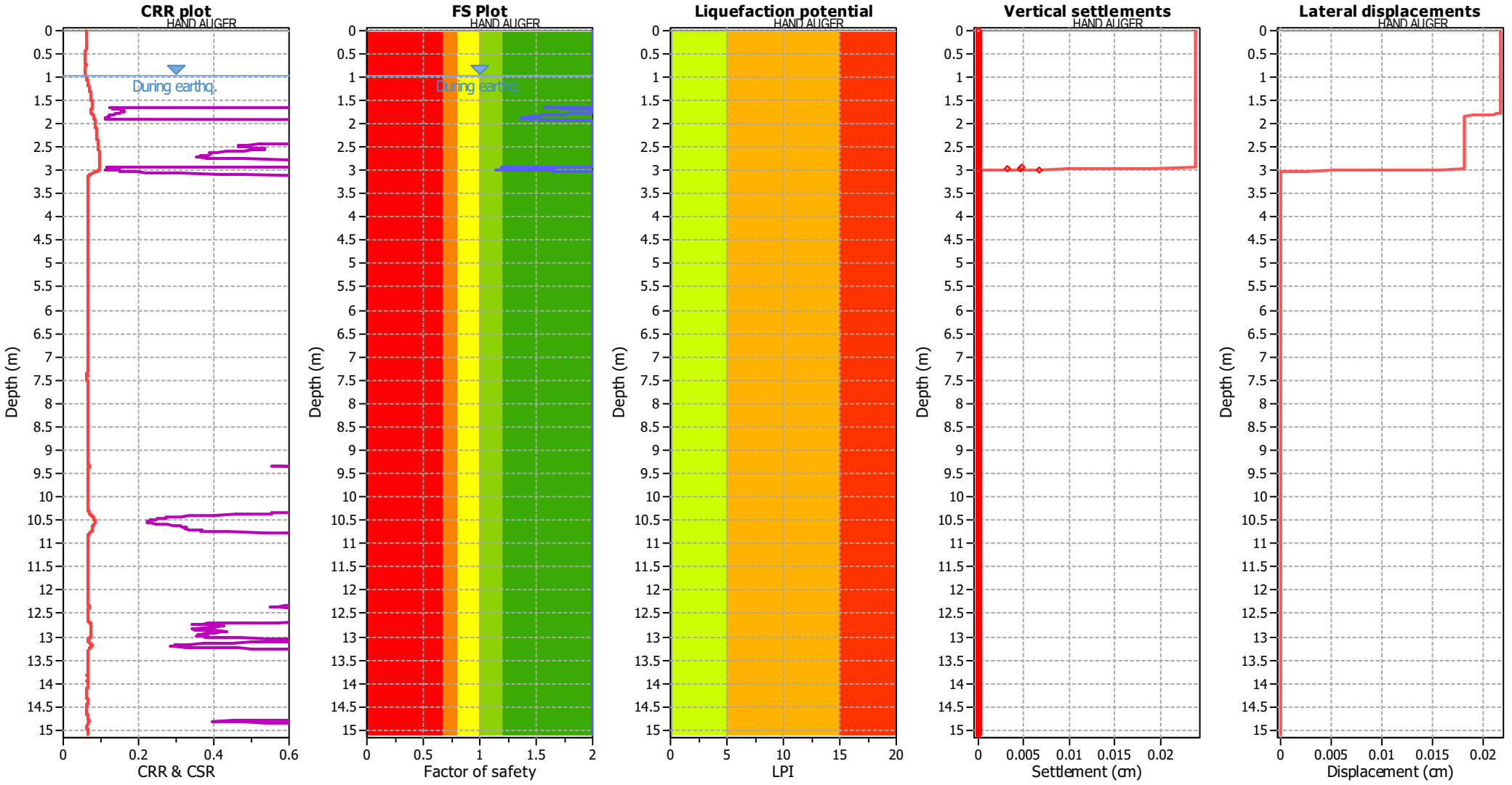
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.96 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.96 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.96 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.11	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.96 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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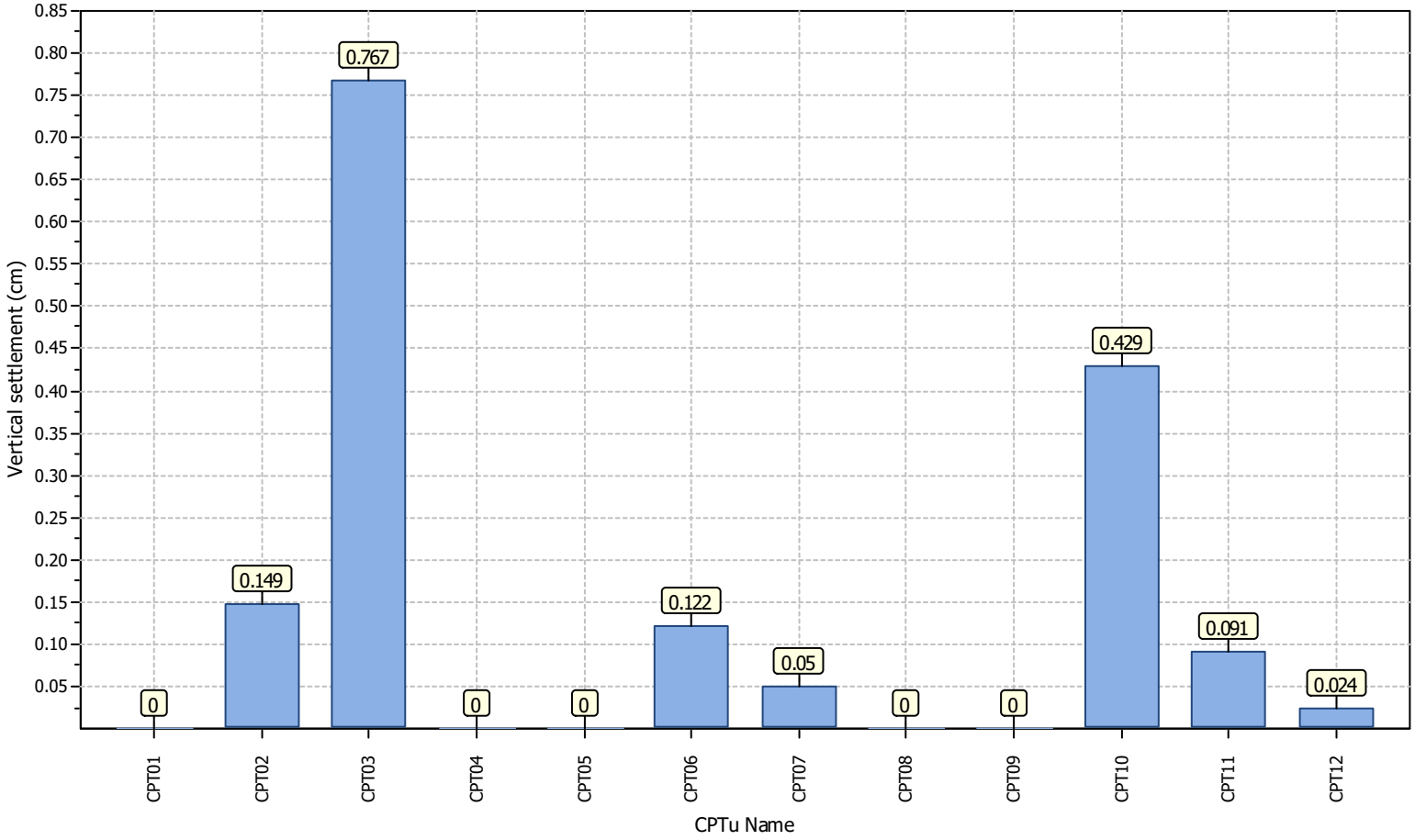
Project title : SLS Liquefaction Analysis

Location : Julian's Berry Farm

Overall vertical settlements report



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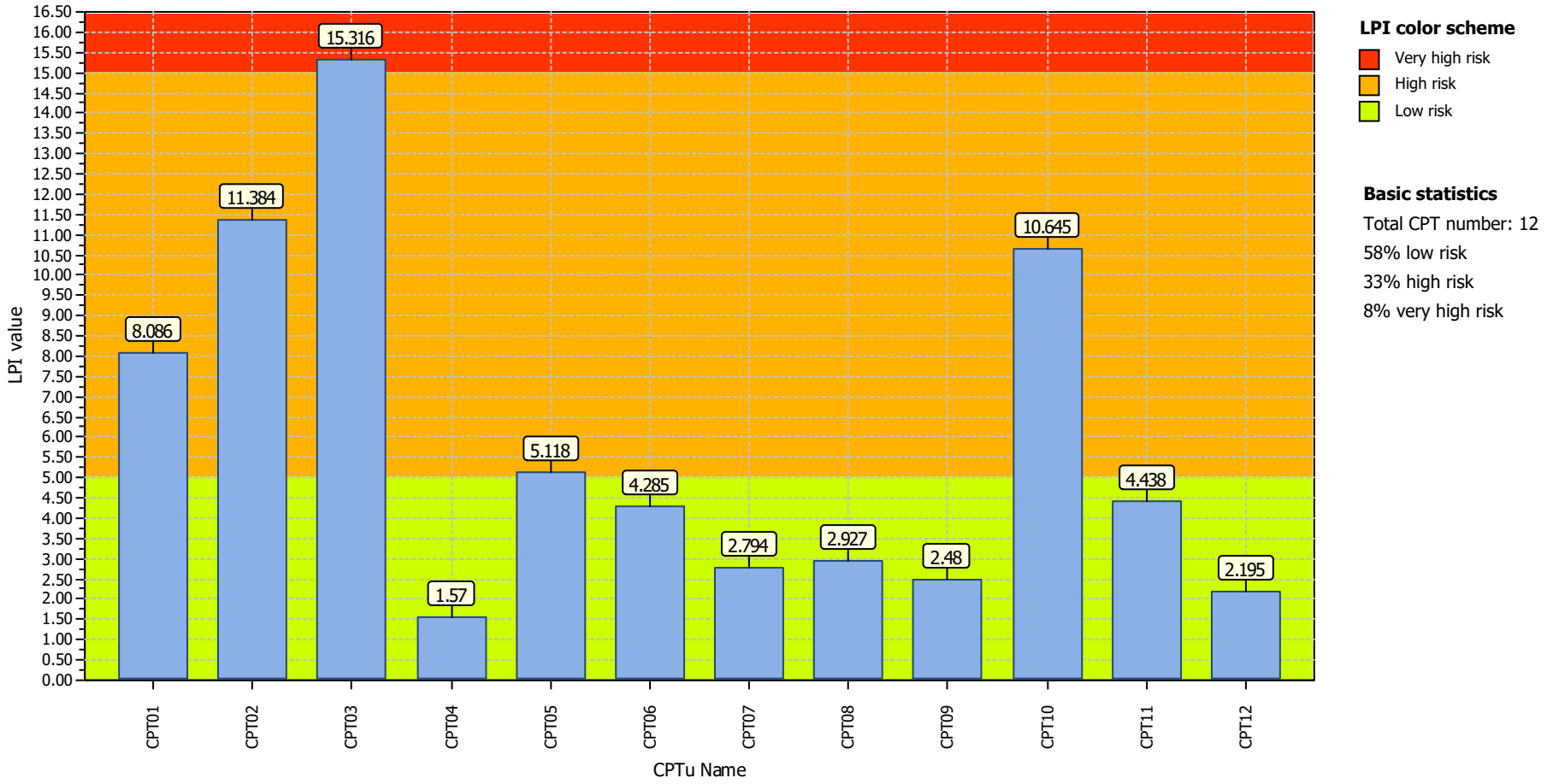
Project title : ULS Liquefaction Analysis

Location : Julian's Berry Farm

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 12
58% low risk
33% high risk
8% very high risk

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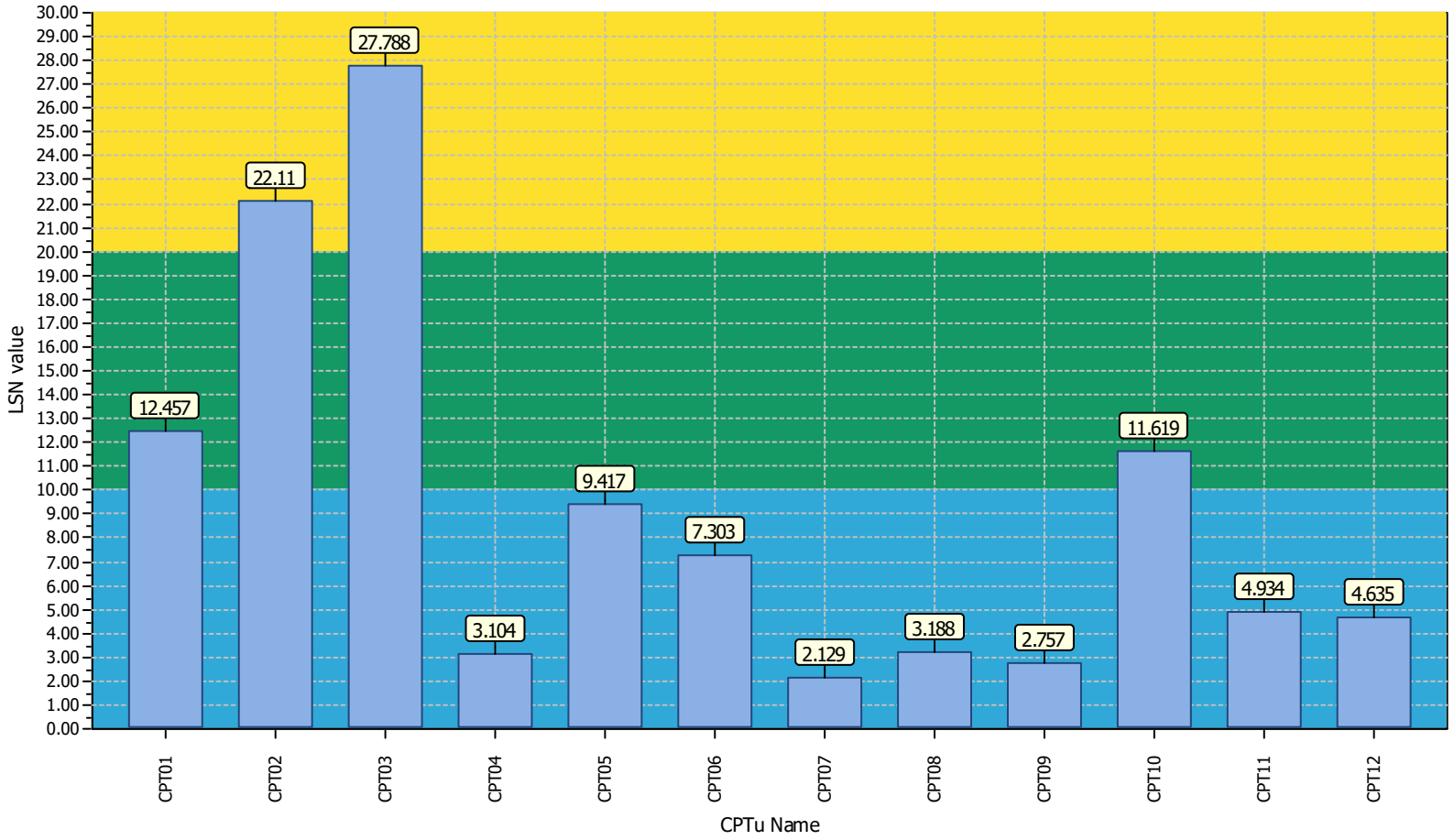
Project title : ULS Liquefaction Analysis

Location : Julian's Berry Farm

Overall Liquefaction Severity Number report



LSN color scheme

- Severe damage
- Major expression of liquefaction
- Moderate to severe exp. of liquefaction
- Moderate expression of liquefaction
- Minor expression of liquefaction
- Little to no expression of liquefaction

Basic statistics

Total CPT number: 12

67% little liquefaction

17% minor liquefaction

17% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

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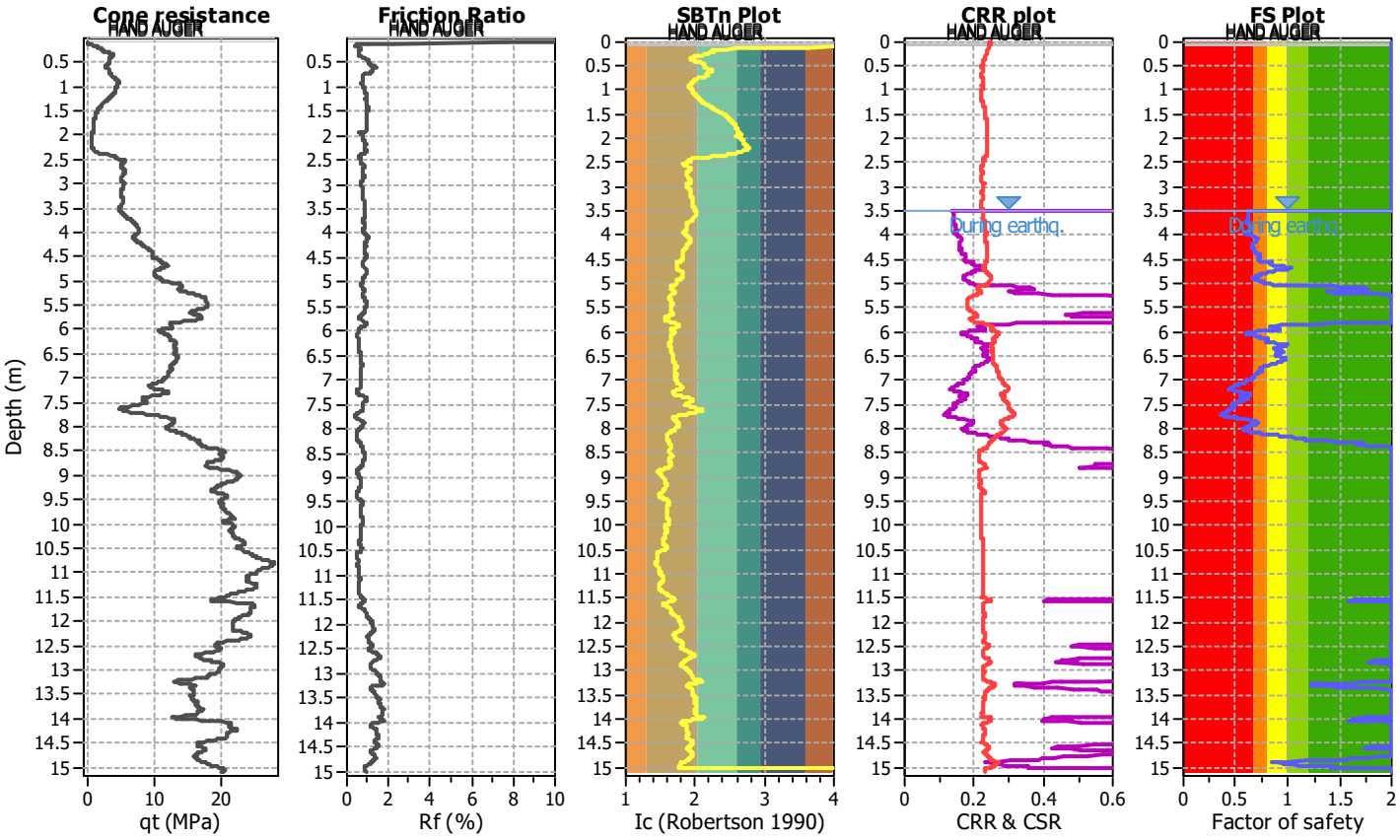
LIQUEFACTION ANALYSIS REPORT

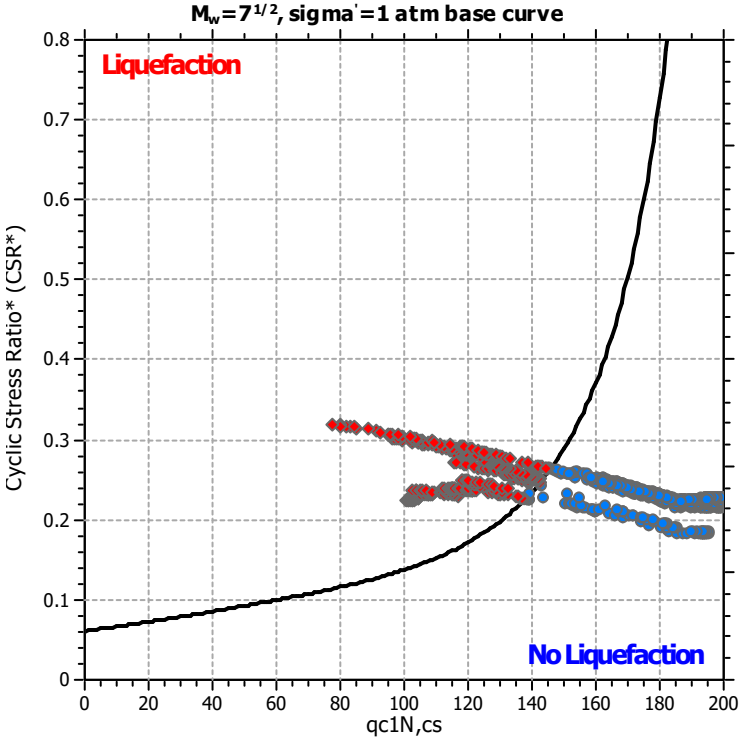
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

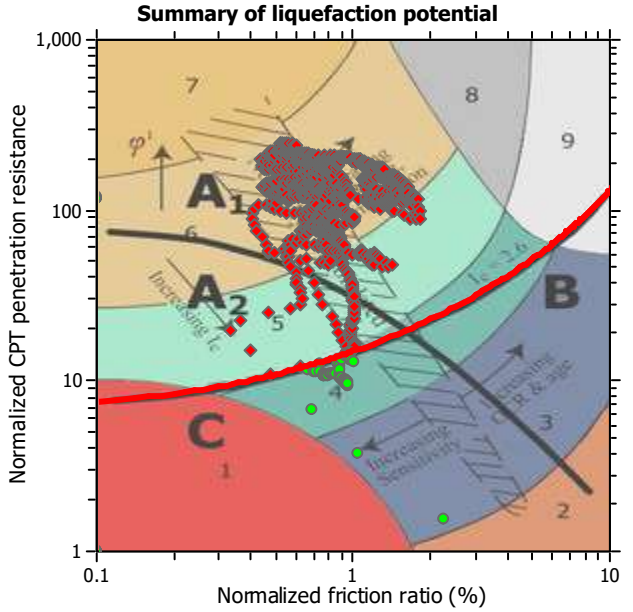
CPT file : CPT01

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	3.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	3.50 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

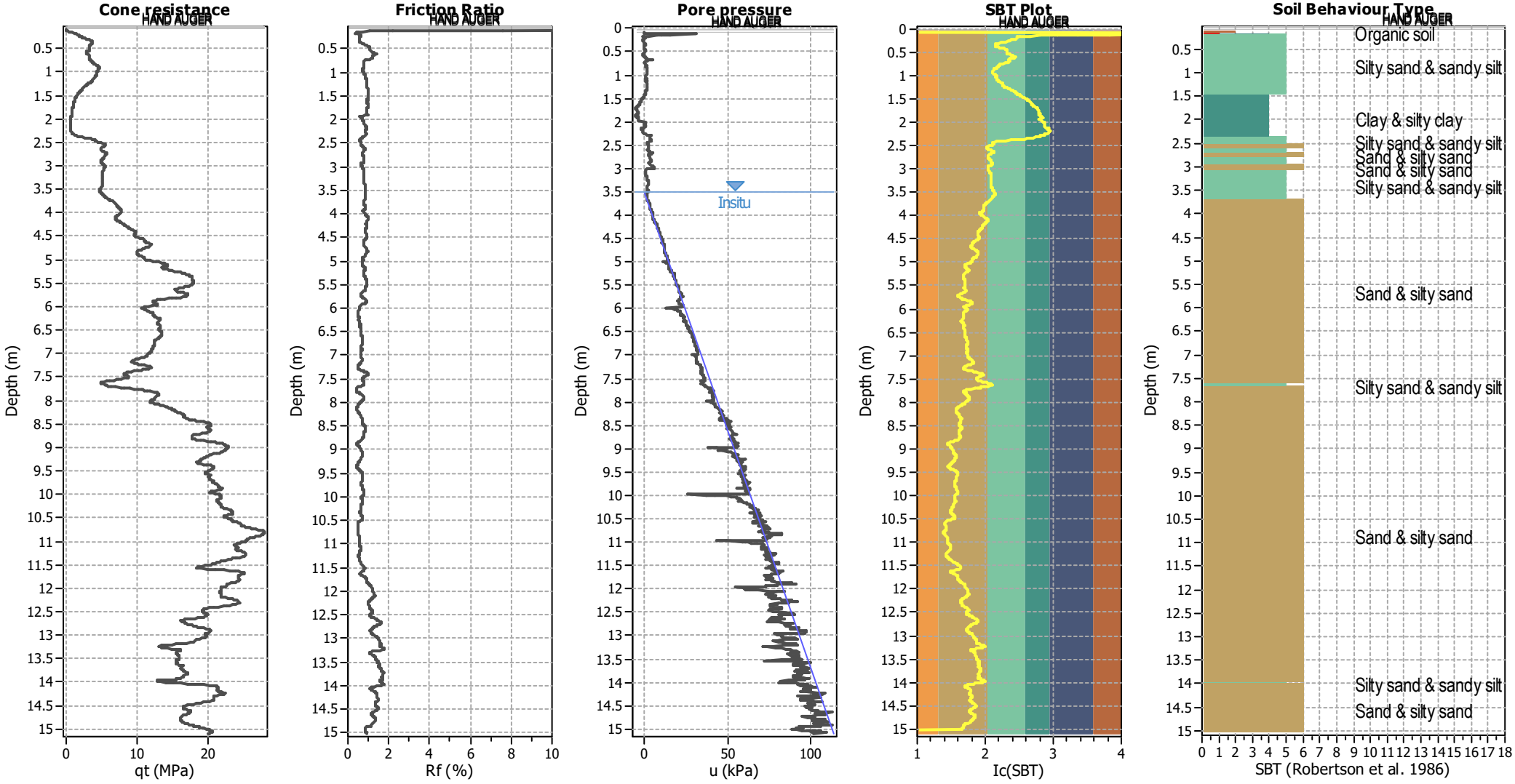






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



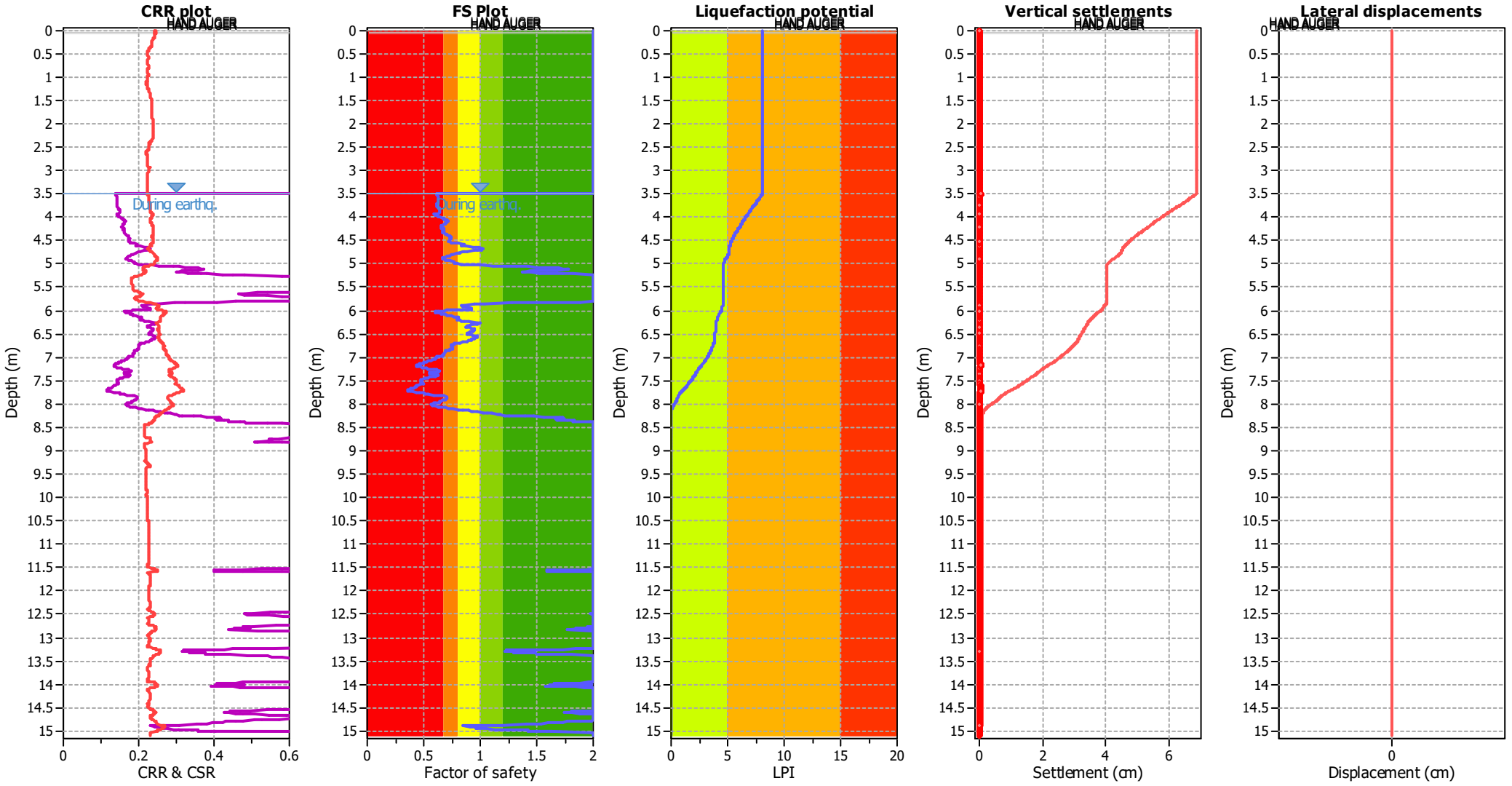
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	3.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	3.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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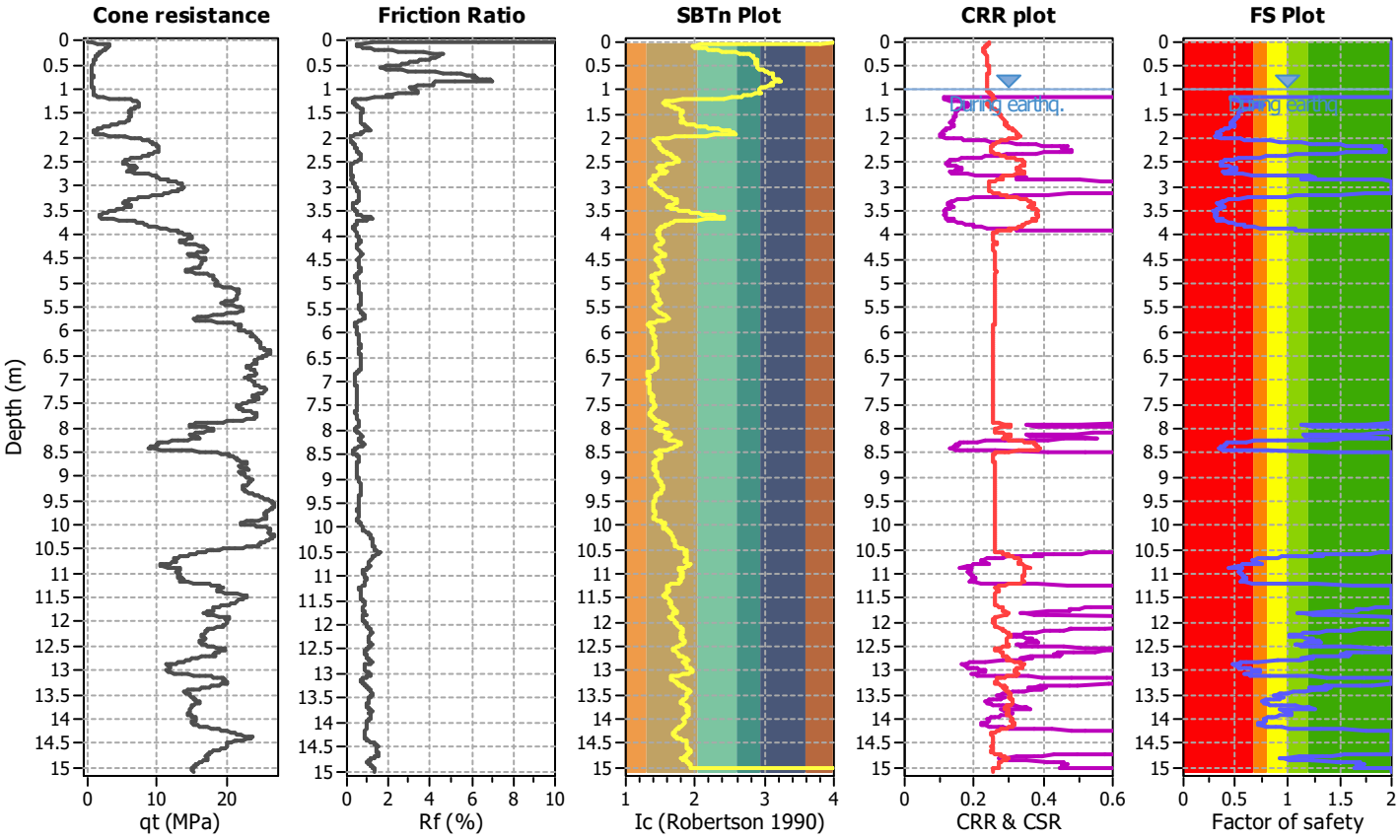
LIQUEFACTION ANALYSIS REPORT

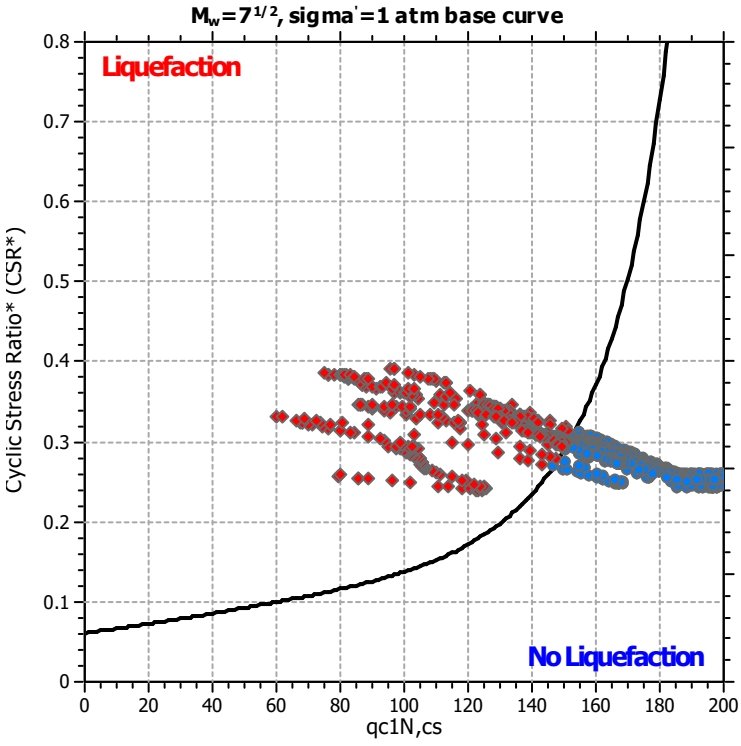
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

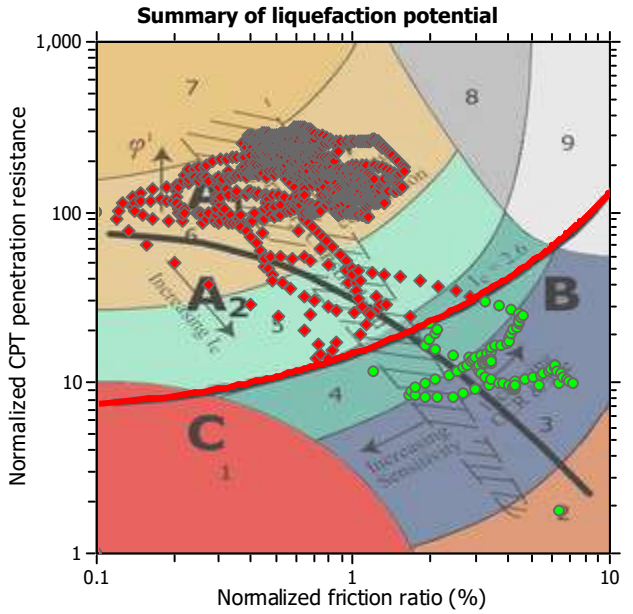
CPT file : CPT02

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.00 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.00 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

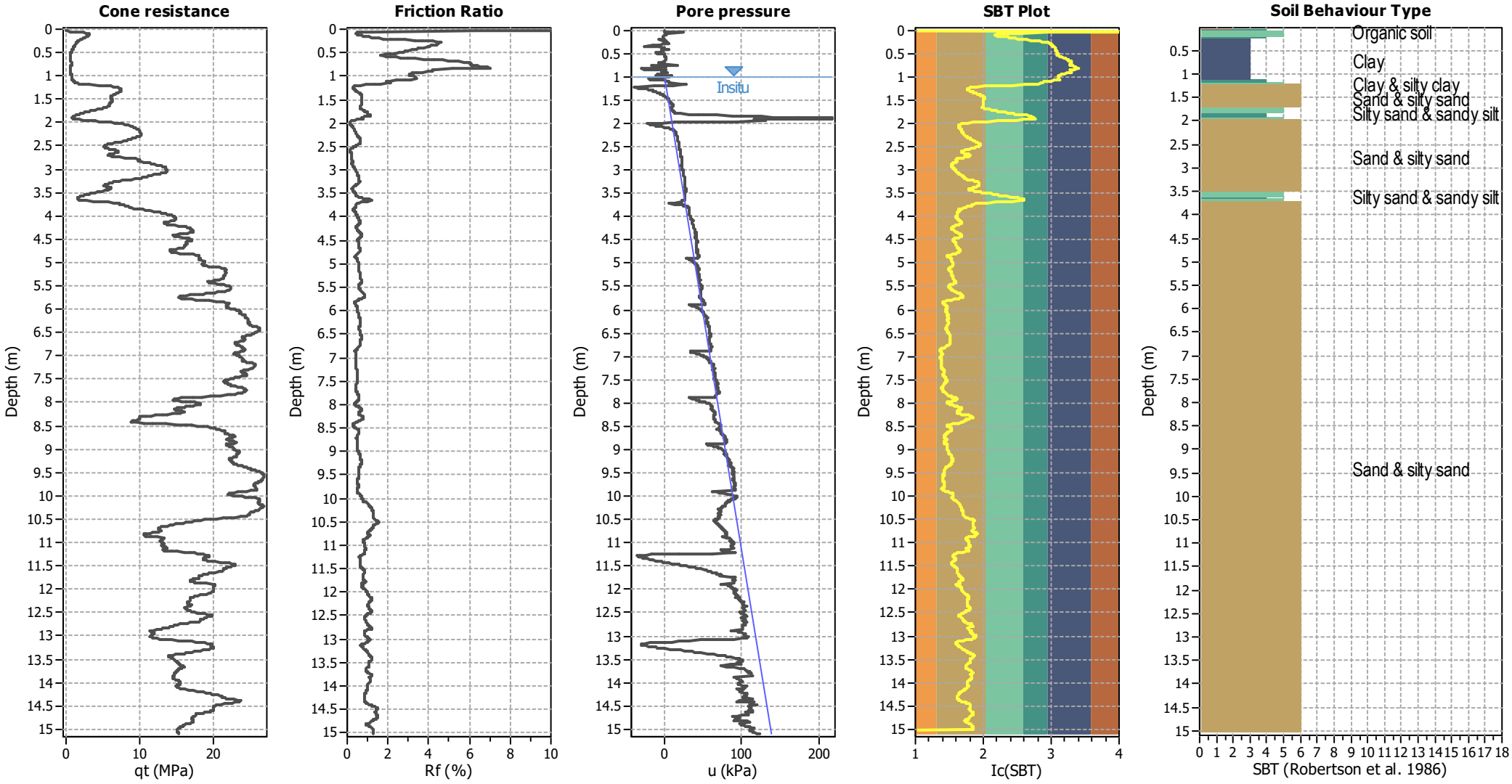






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



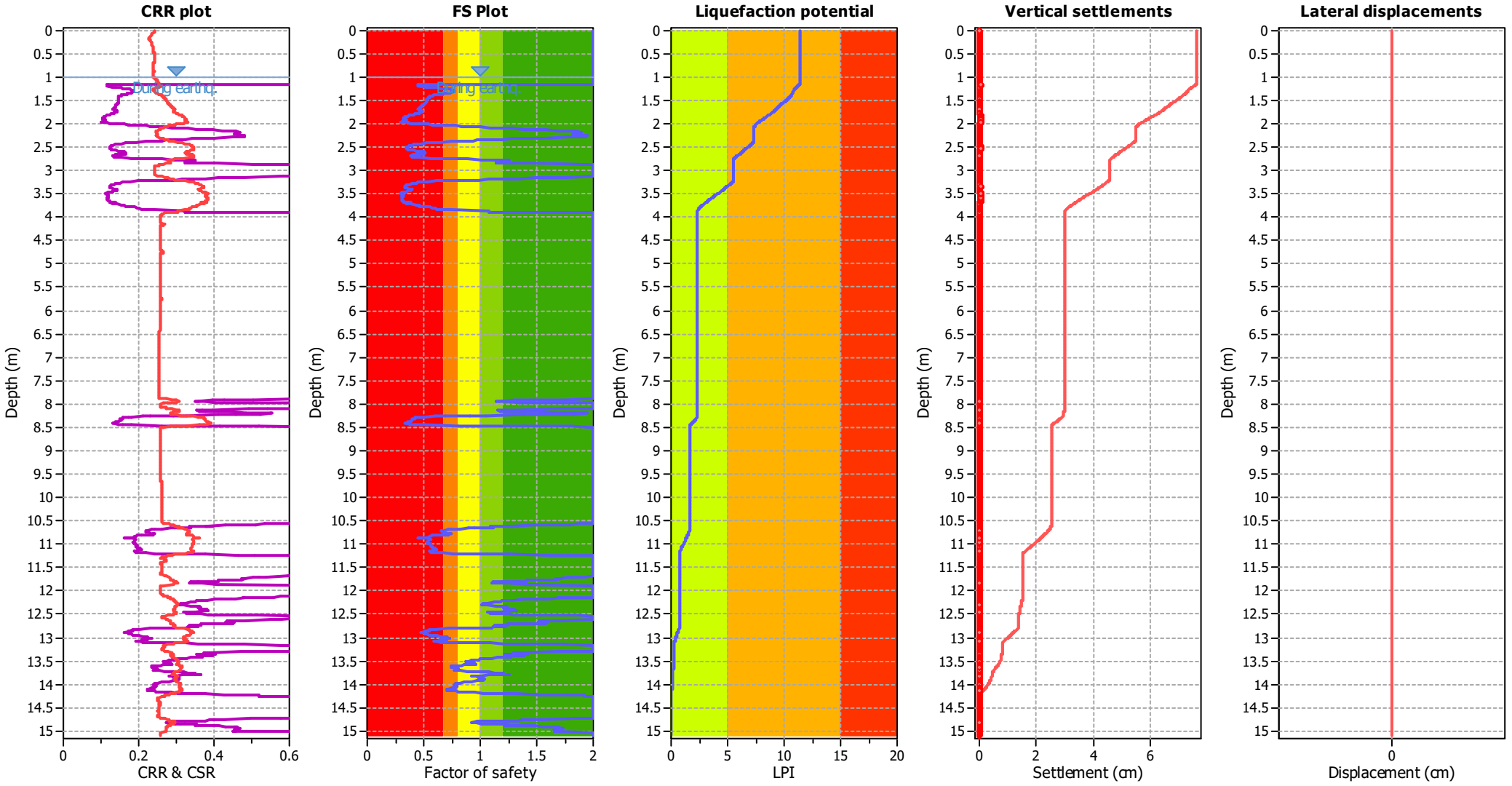
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.00 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.00 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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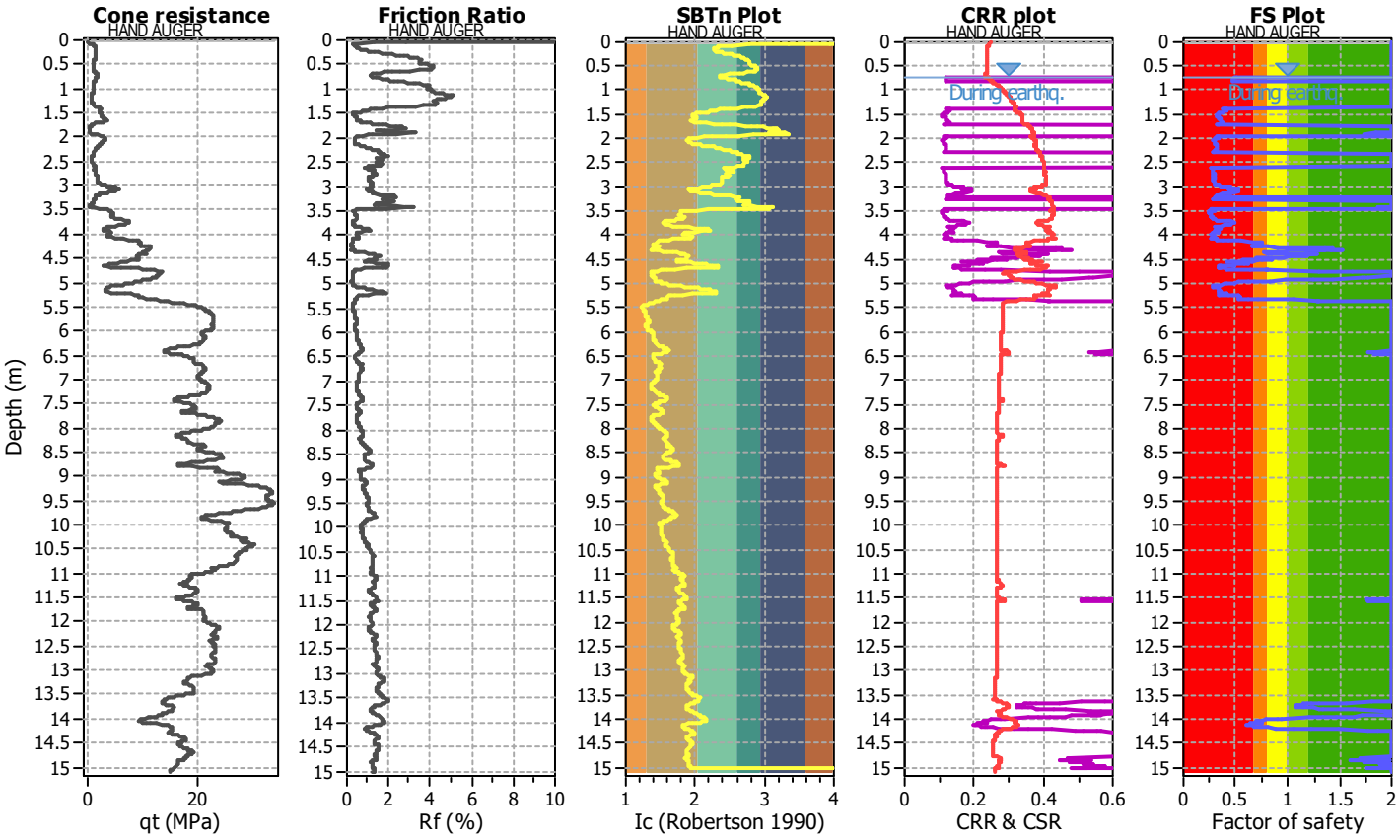
LIQUEFACTION ANALYSIS REPORT

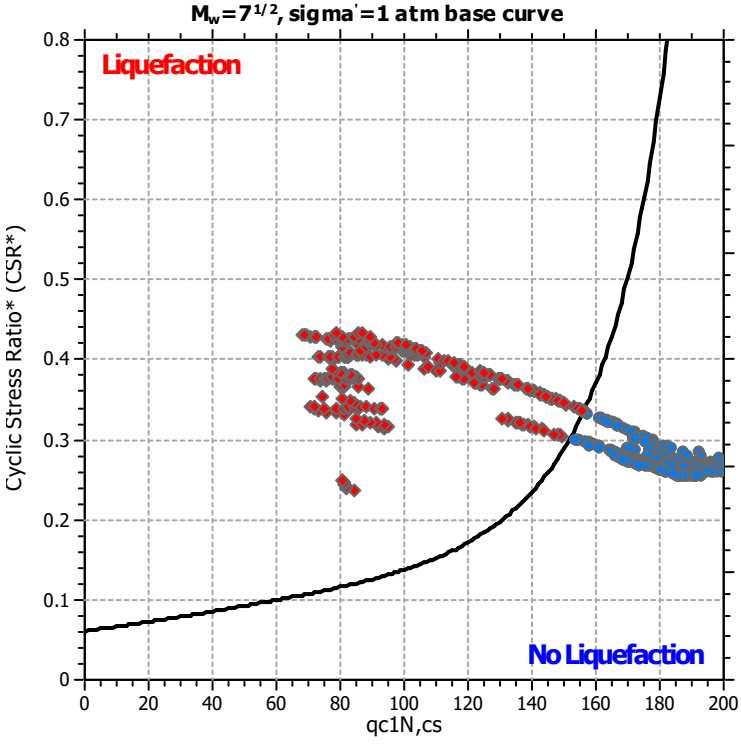
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

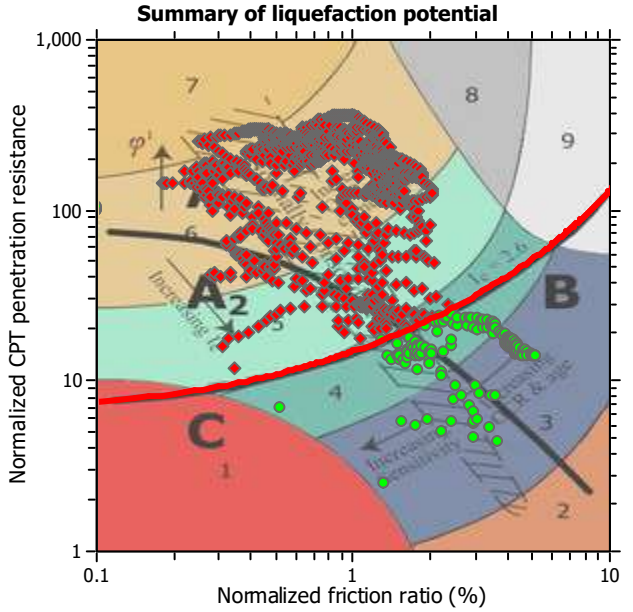
CPT file : CPT03

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.73 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.73 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

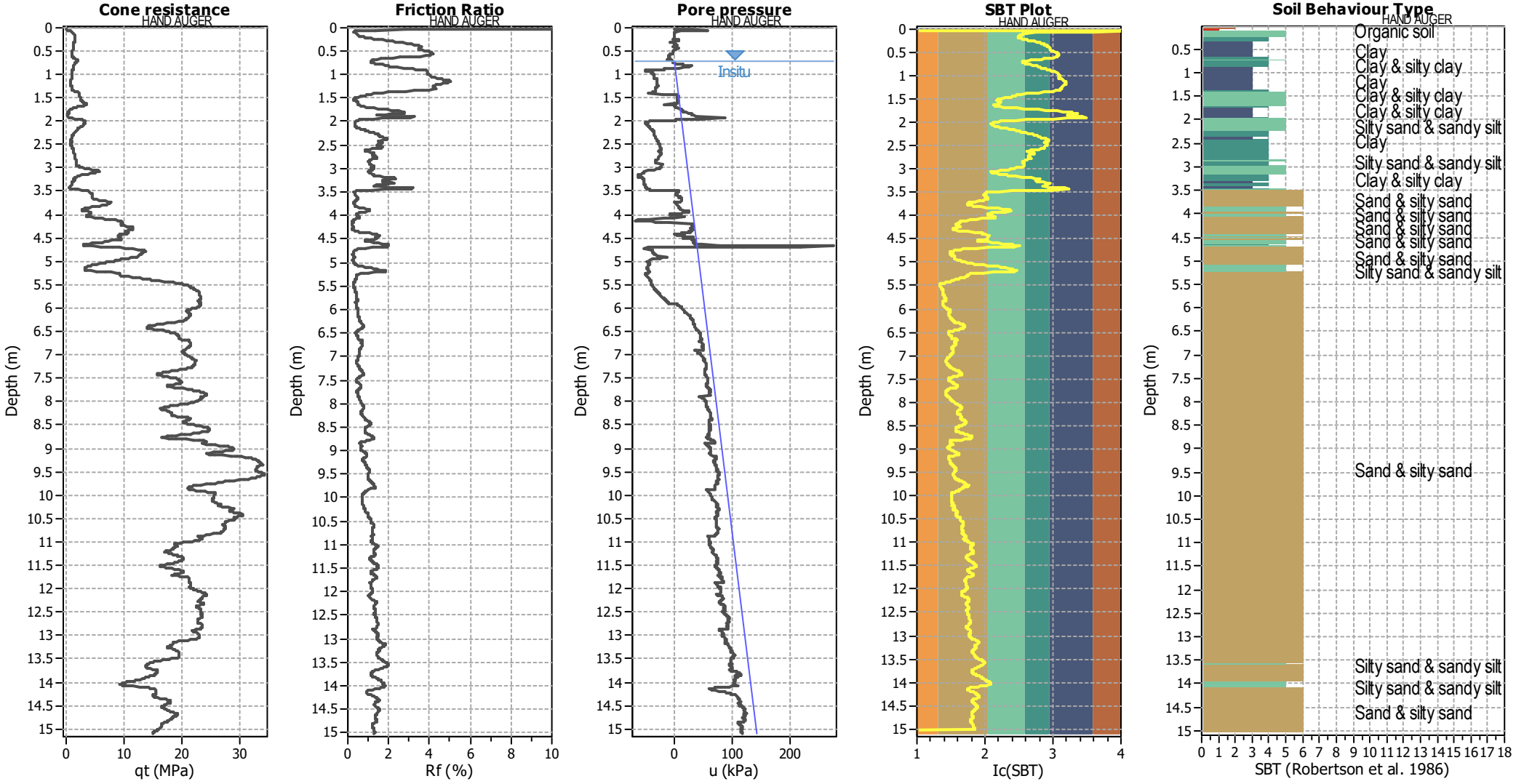






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



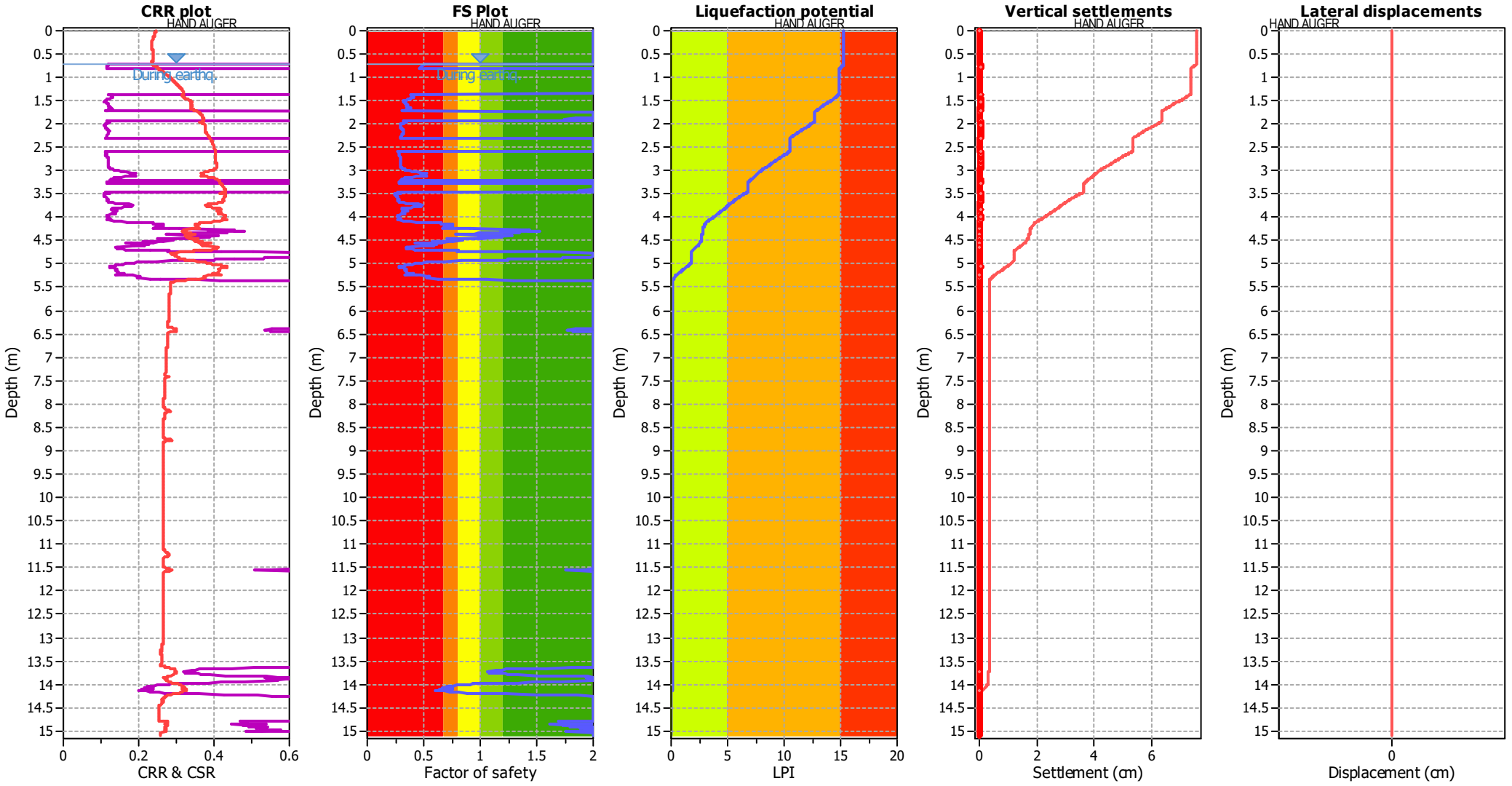
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.73 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.73 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.73 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.73 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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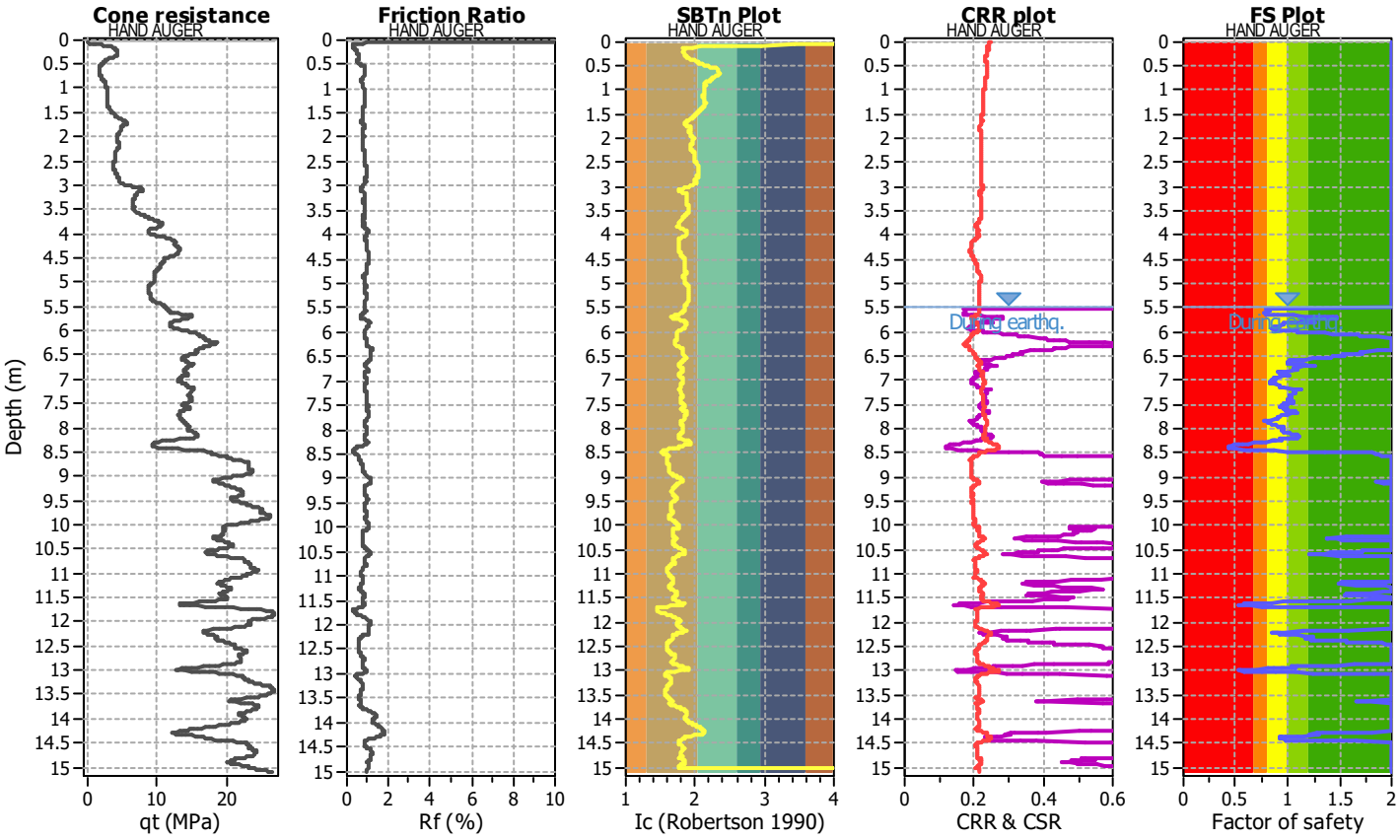
LIQUEFACTION ANALYSIS REPORT

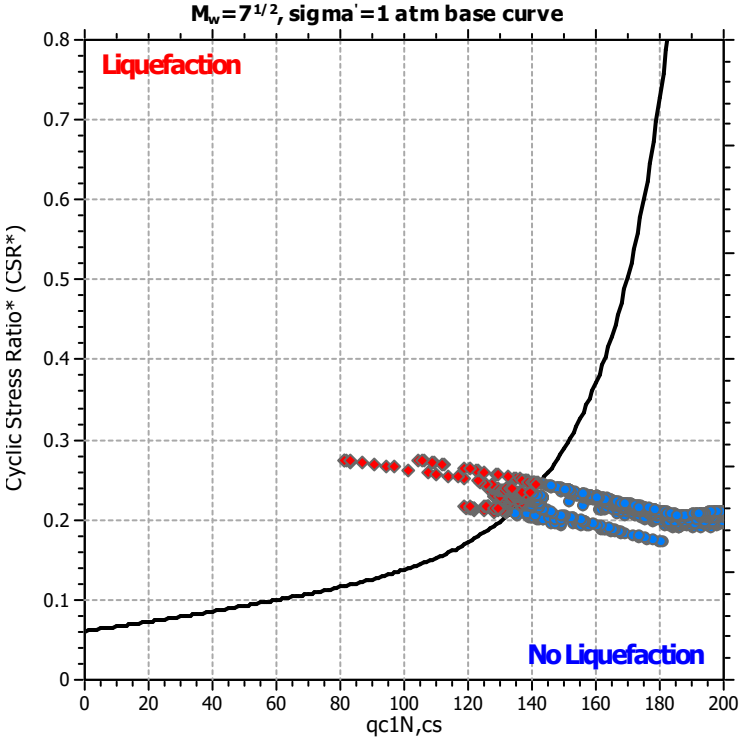
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

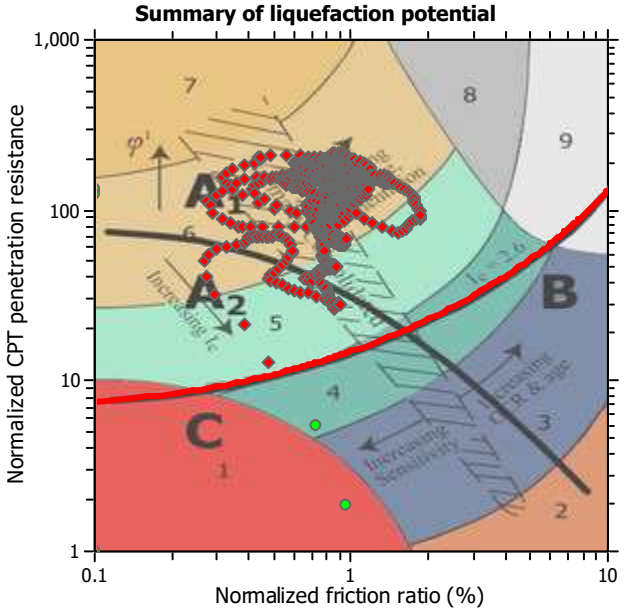
CPT file : CPT04

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	5.50 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	5.50 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

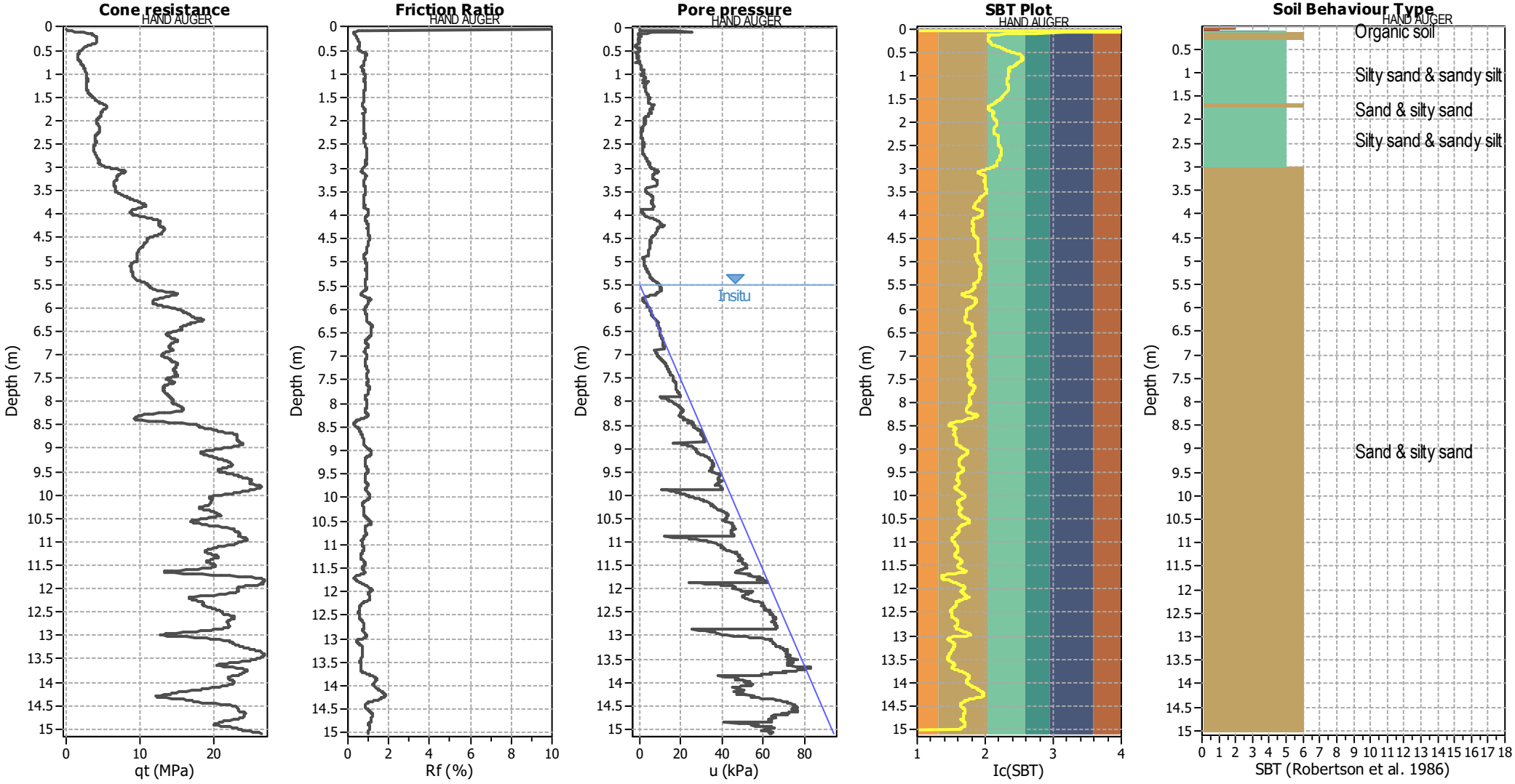






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



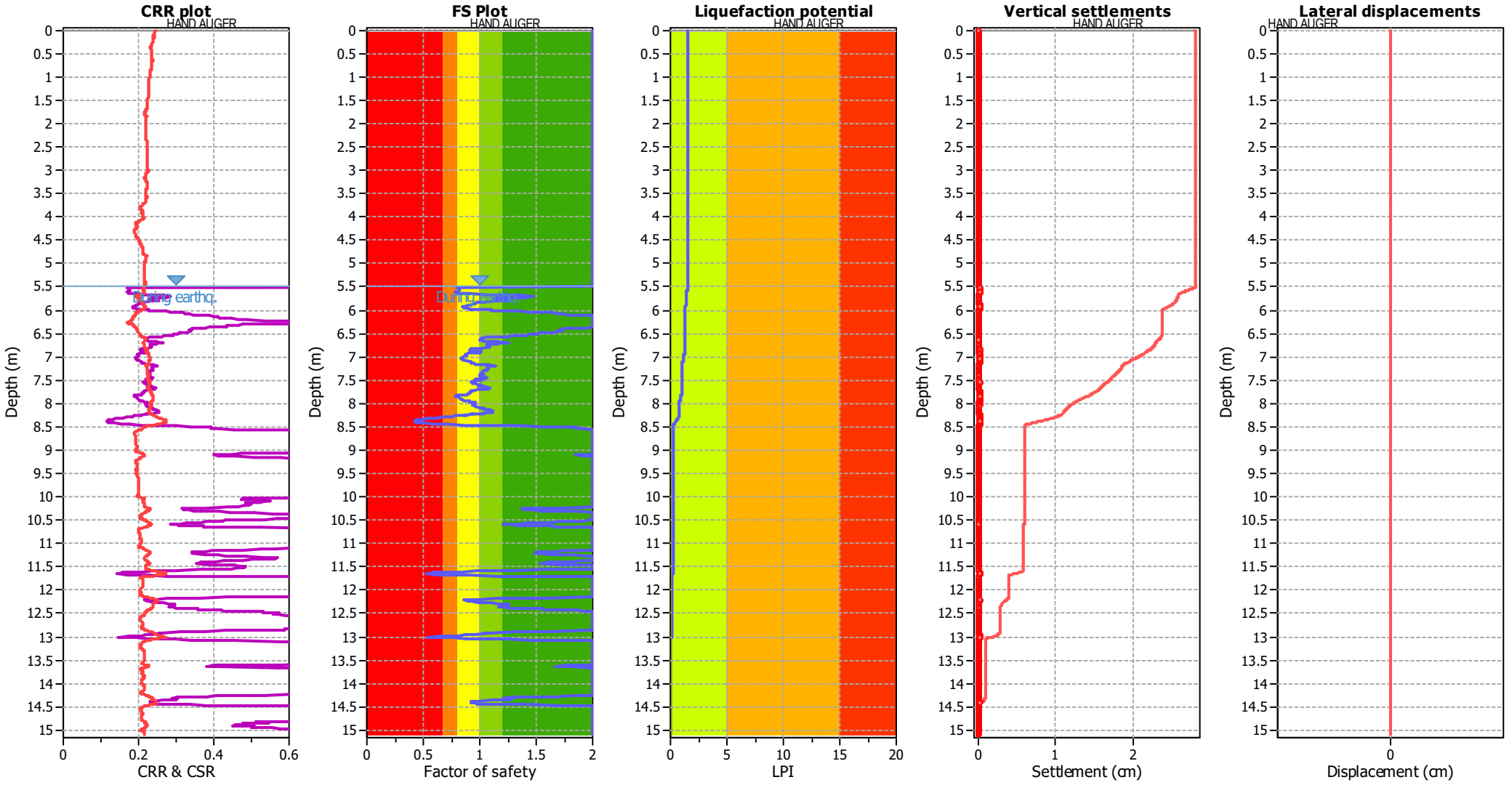
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	5.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	5.50 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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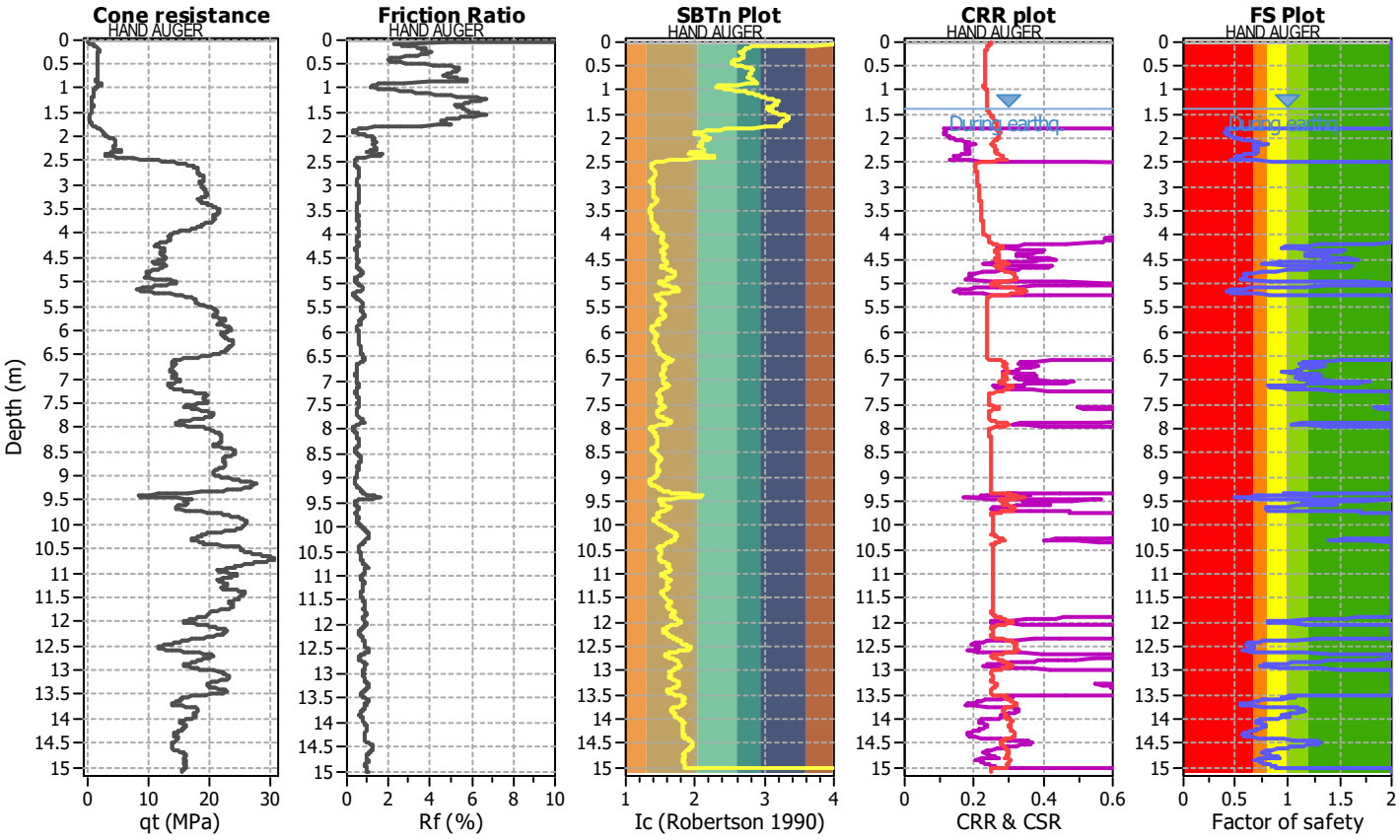
LIQUEFACTION ANALYSIS REPORT

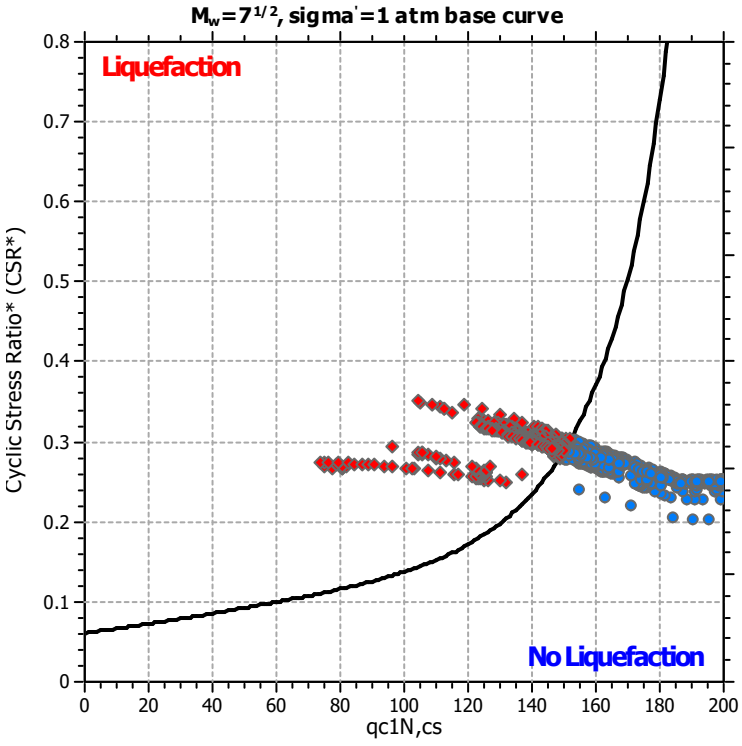
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

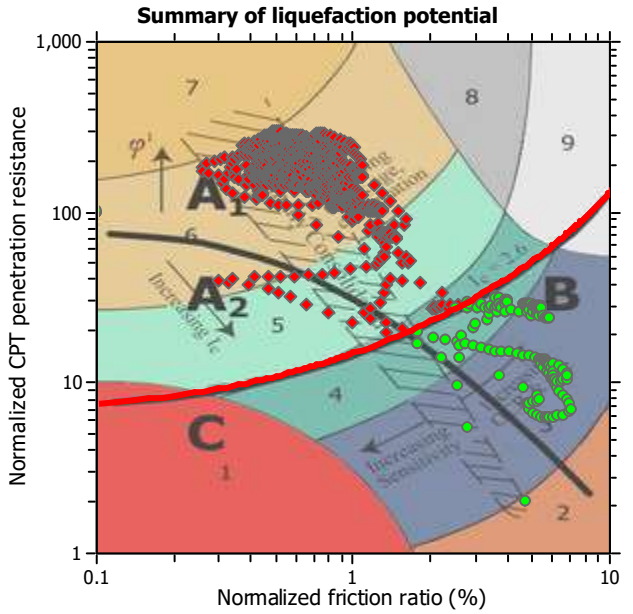
CPT file : CPT05

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.40 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

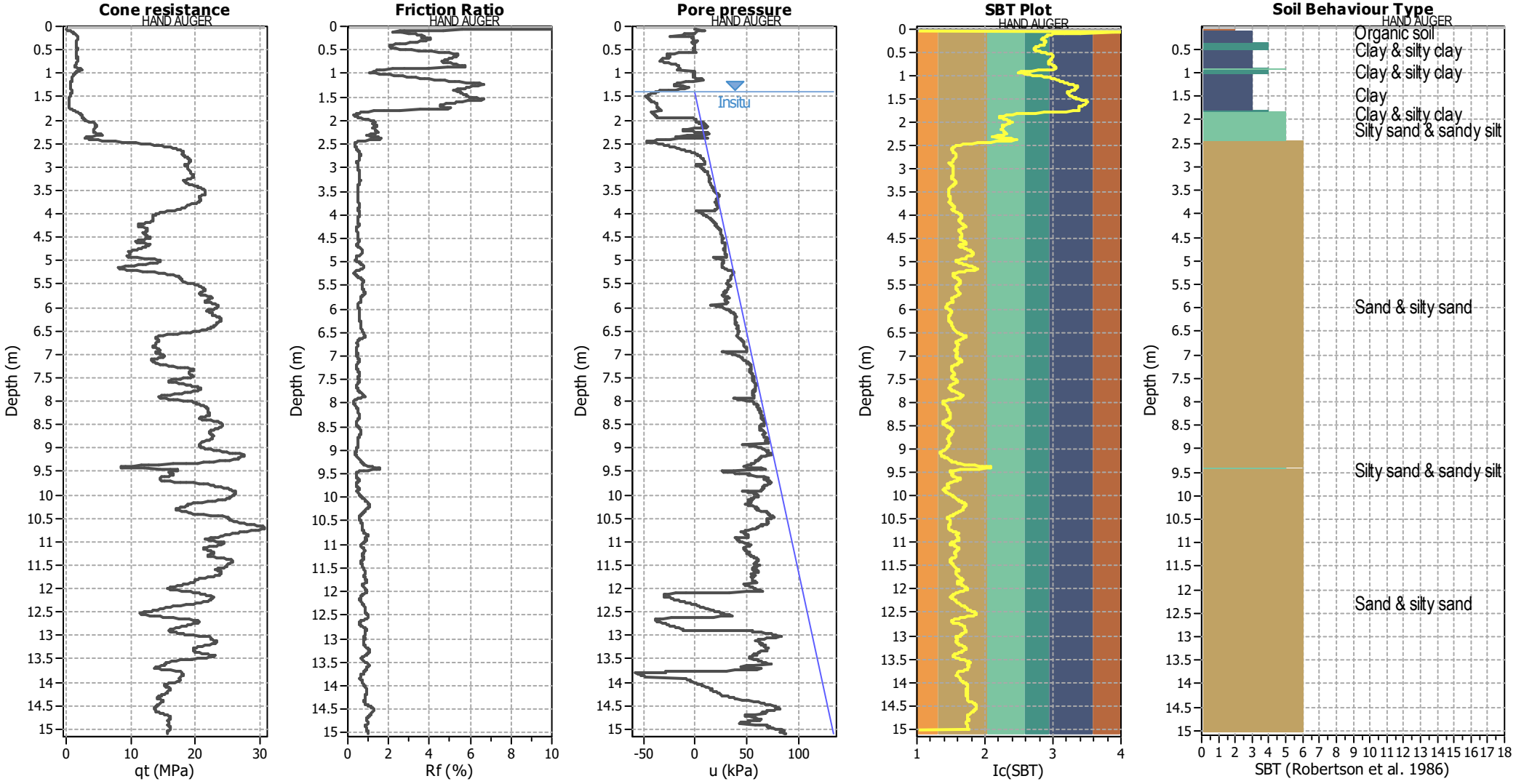






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



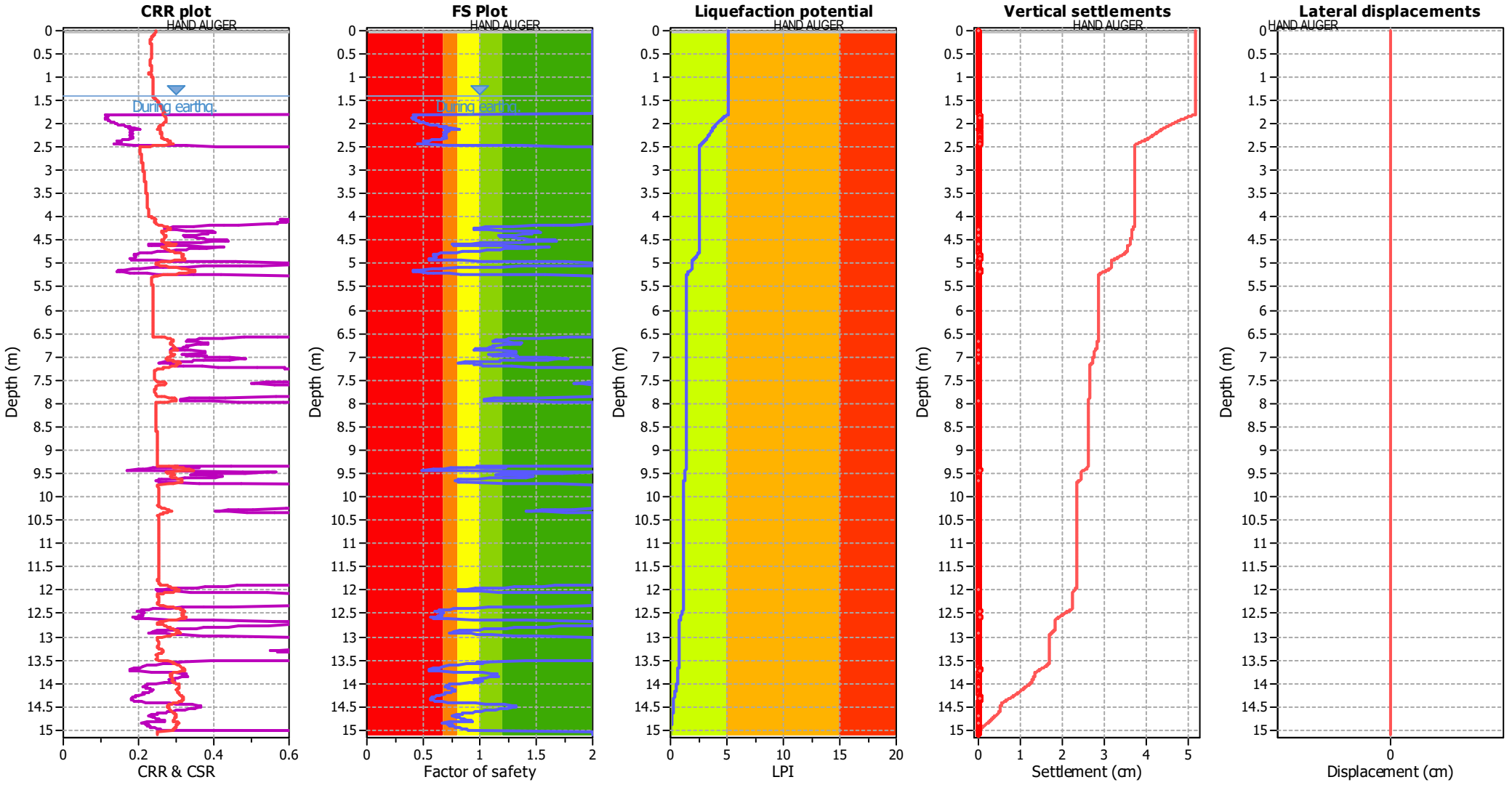
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.40 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.40 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.40 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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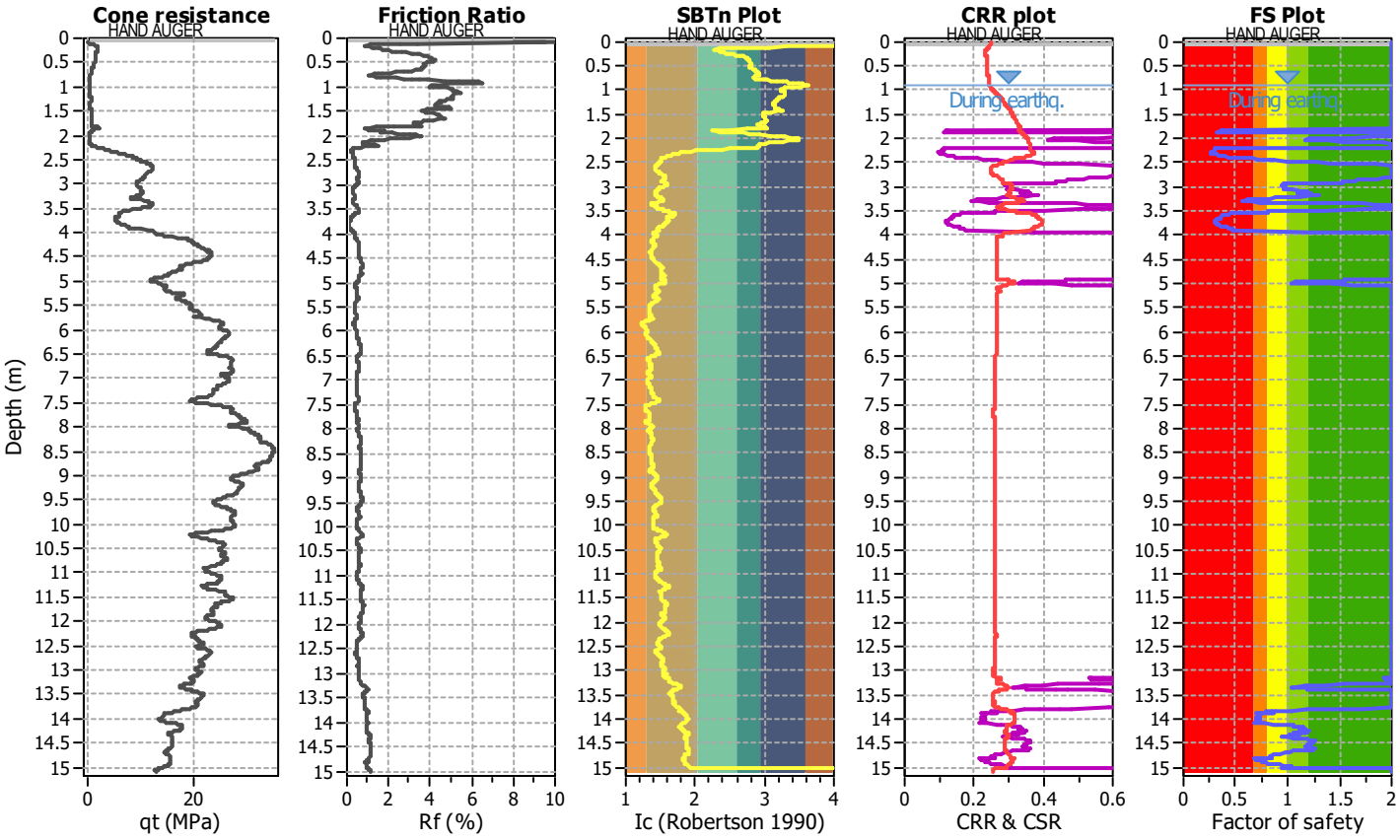
LIQUEFACTION ANALYSIS REPORT

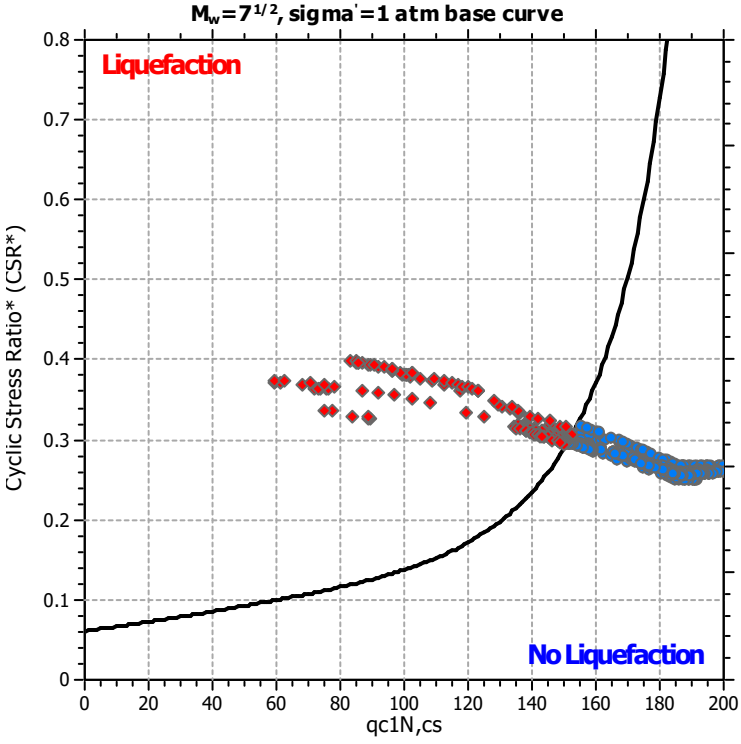
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

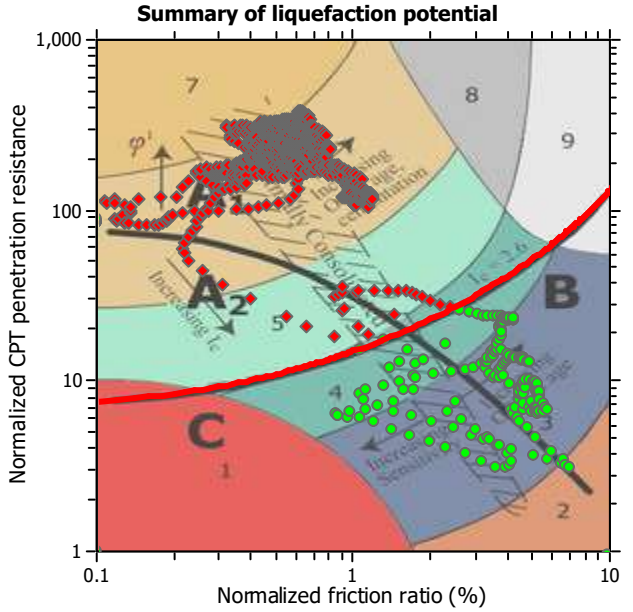
CPT file : CPT06

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.90 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.90 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

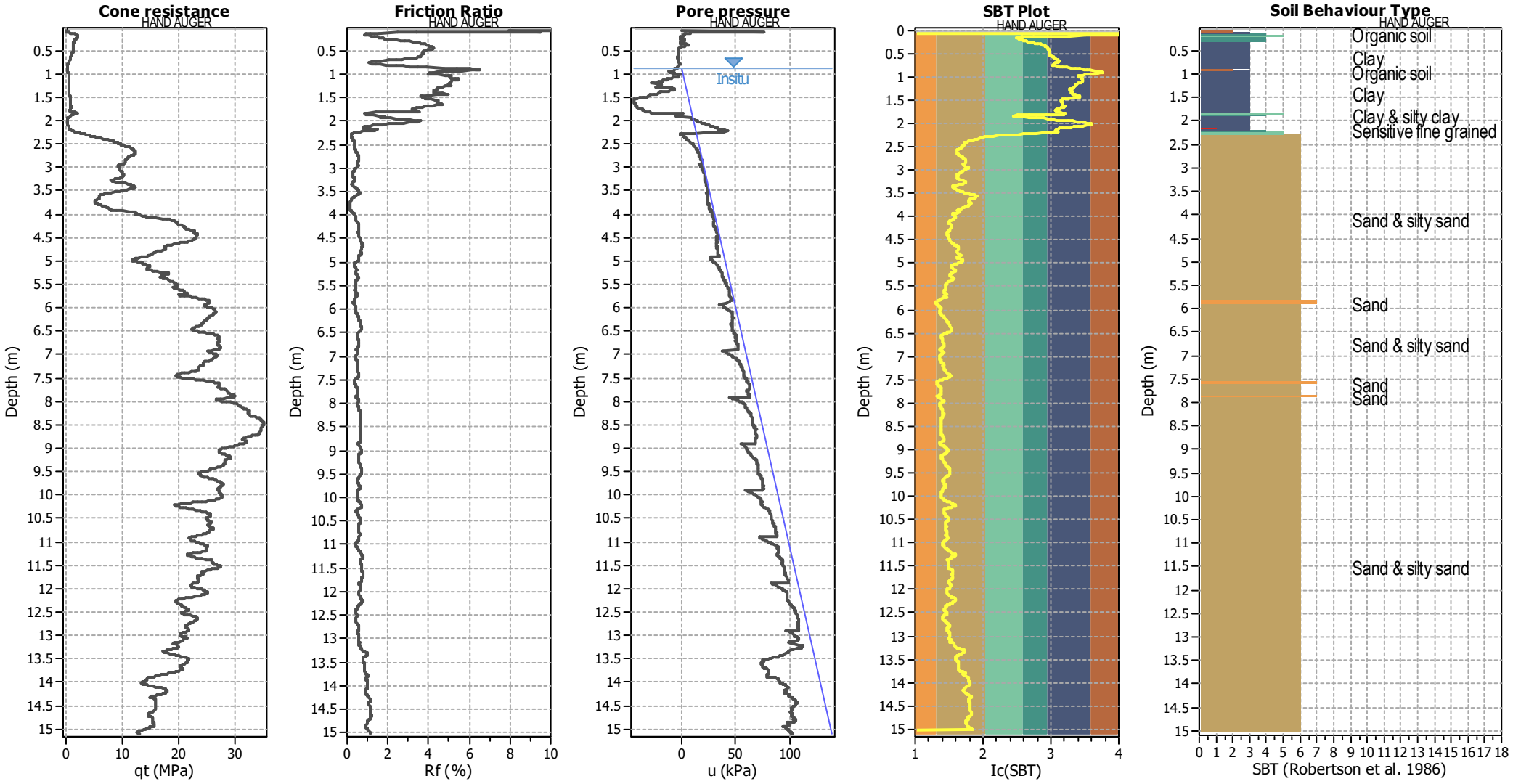






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



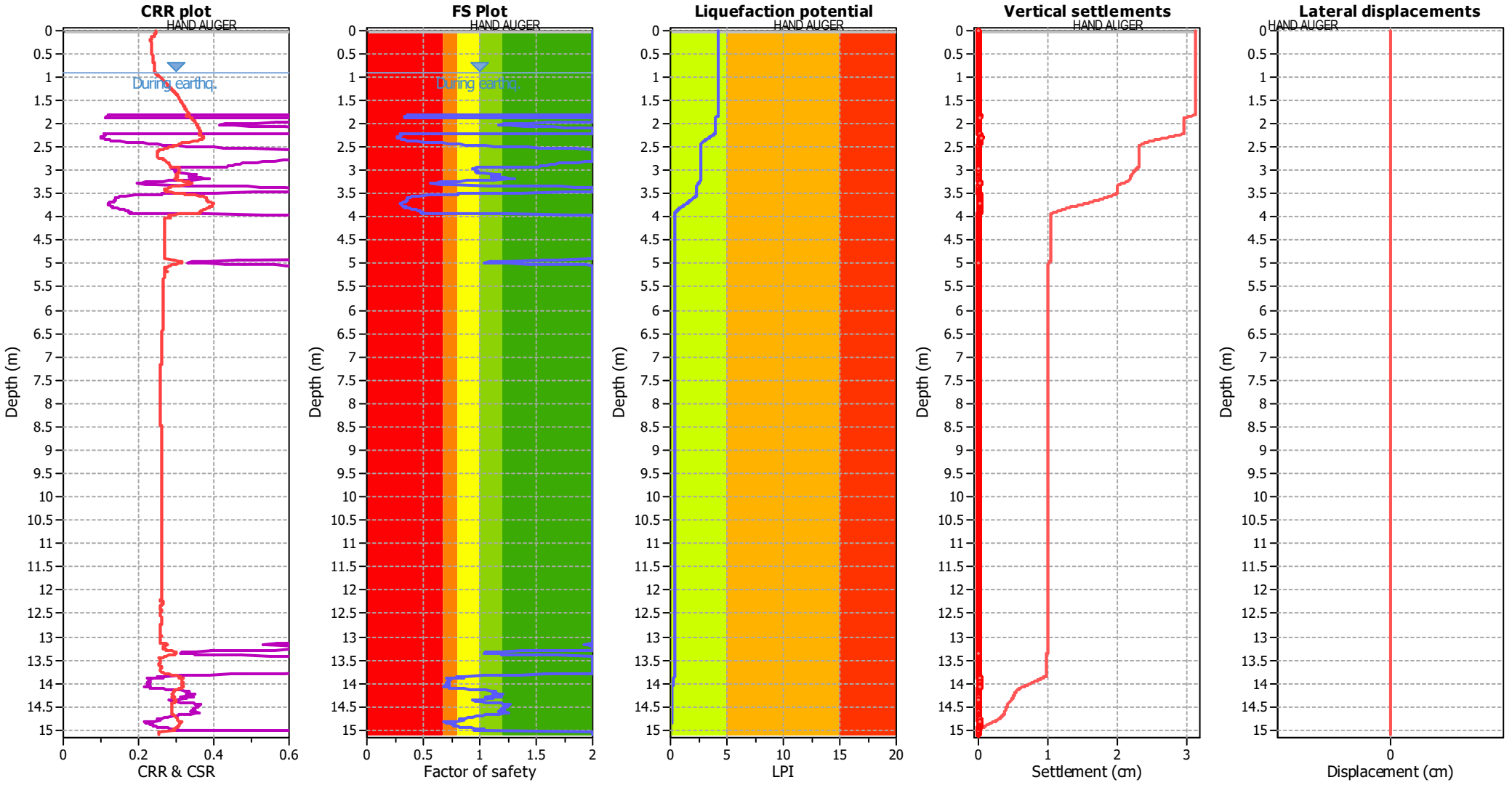
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.90 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.90 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.90 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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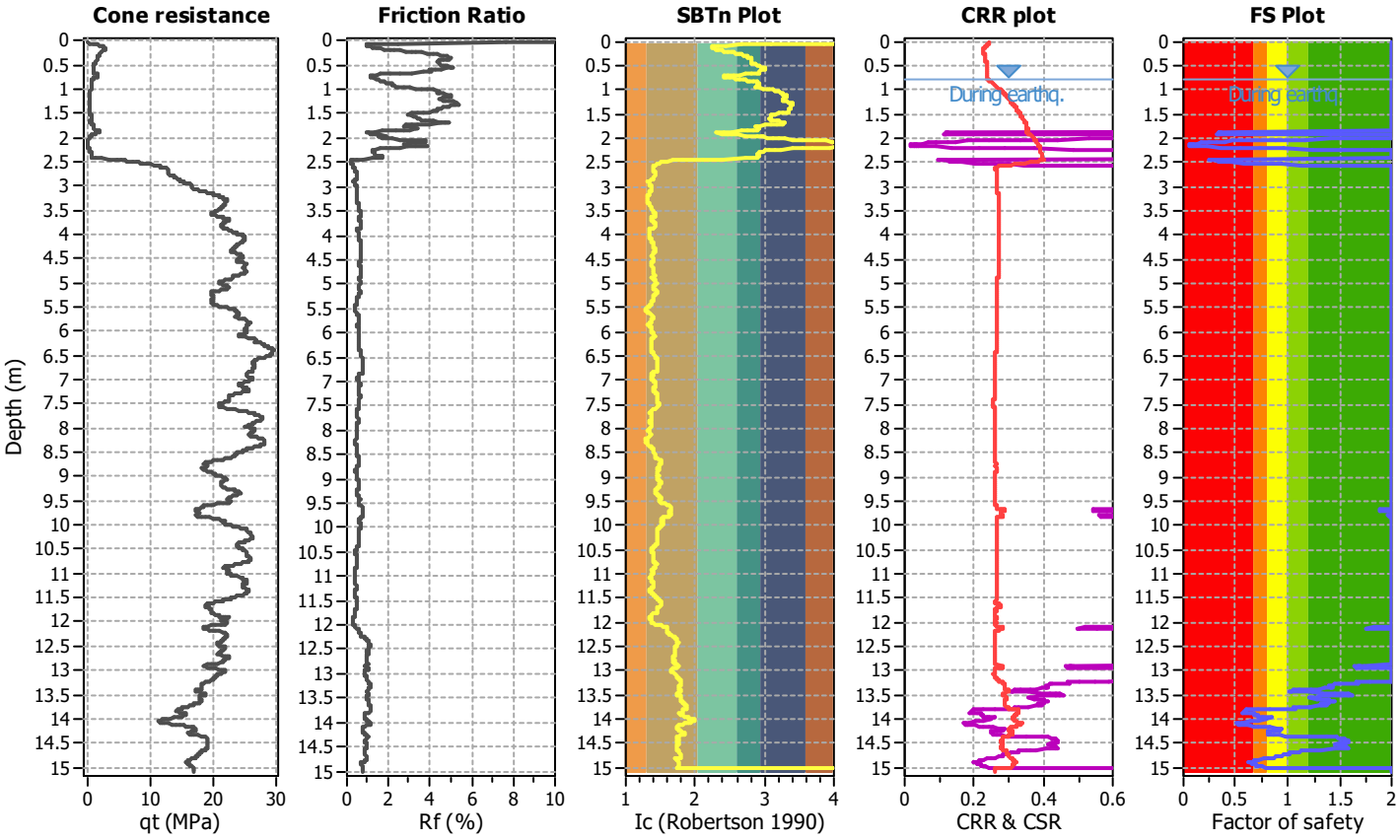
LIQUEFACTION ANALYSIS REPORT

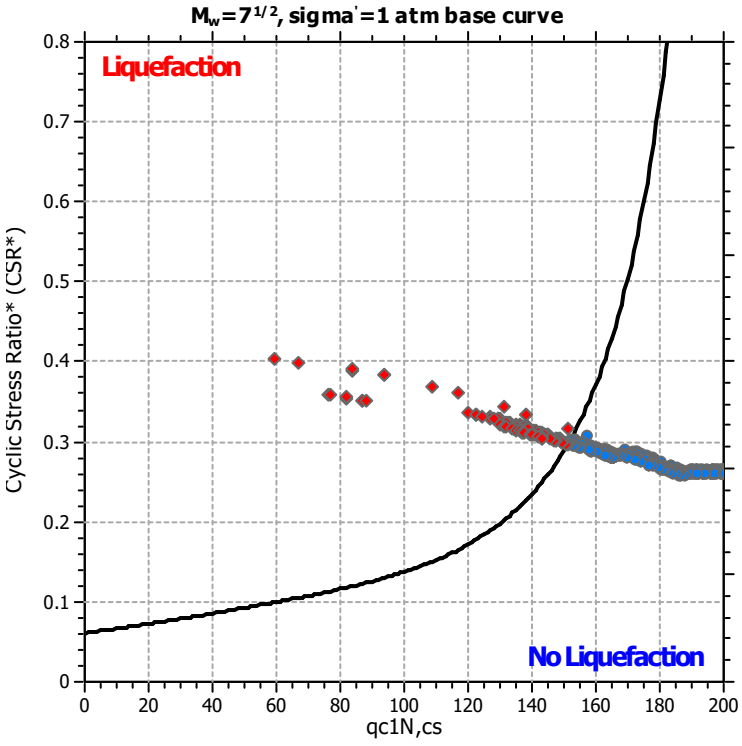
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

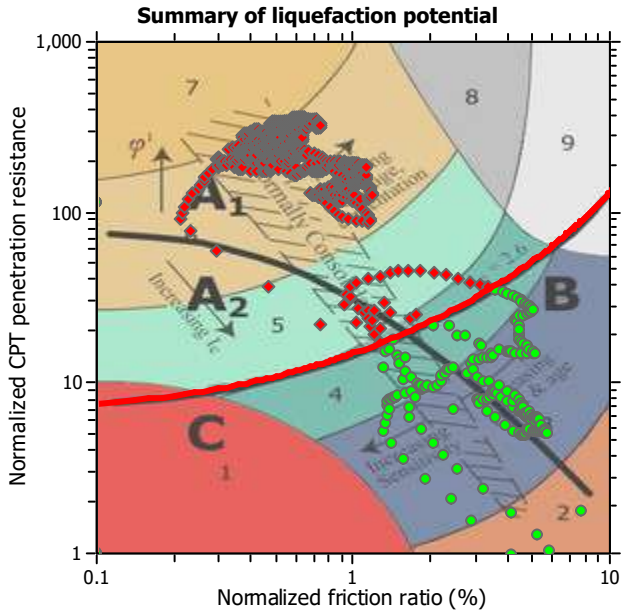
CPT file : CPT07

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.78 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.78 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

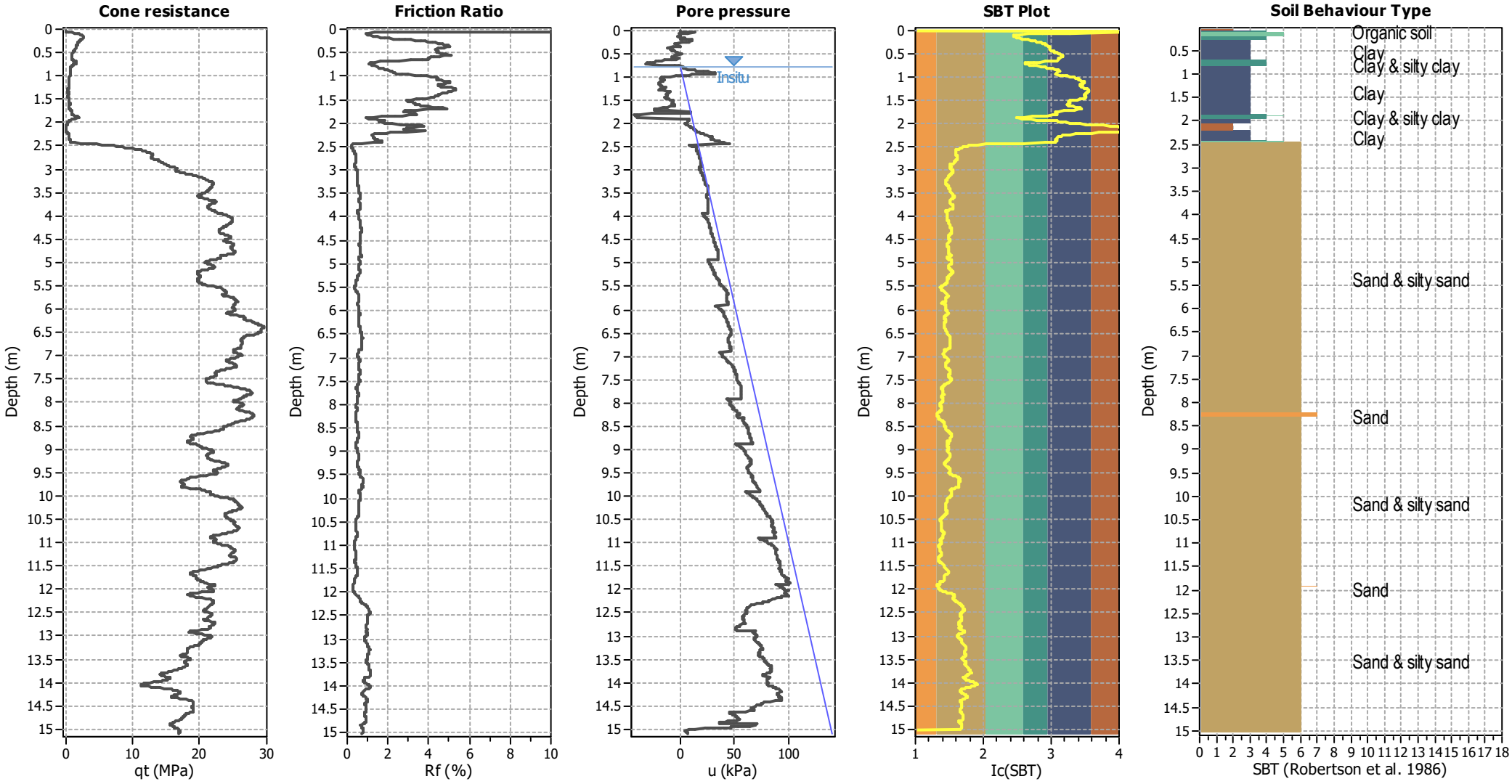






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



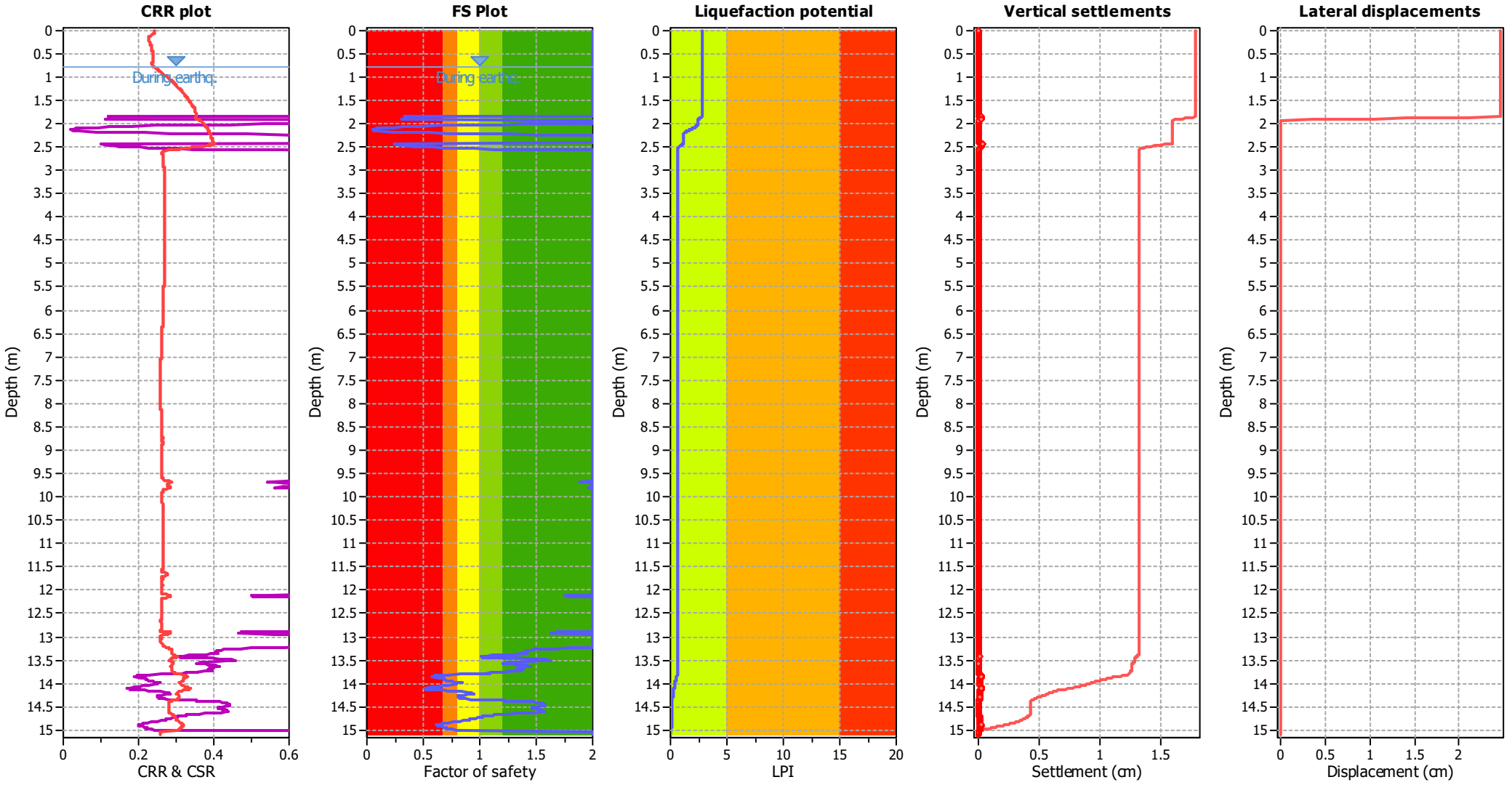
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.78 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.78 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.78 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.78 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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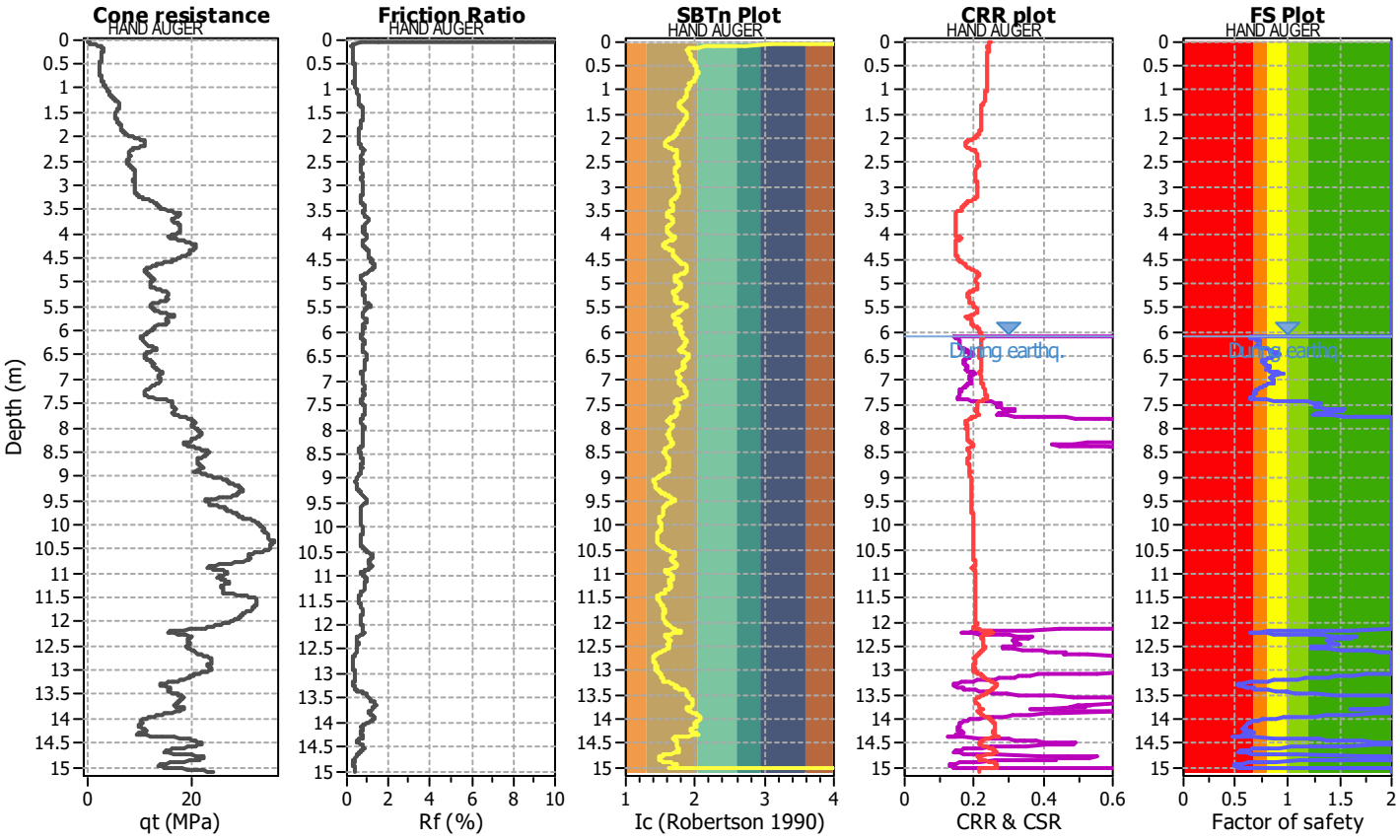
LIQUEFACTION ANALYSIS REPORT

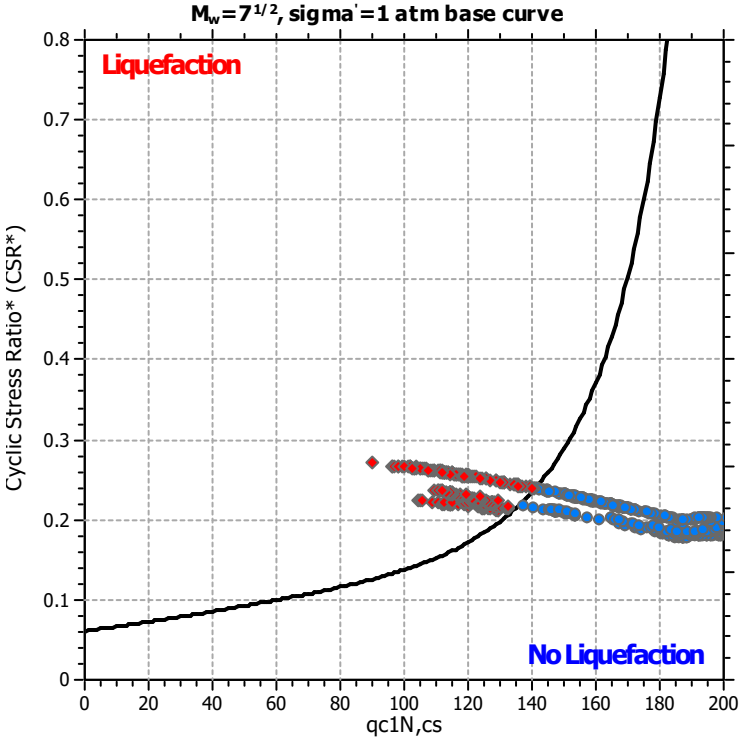
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

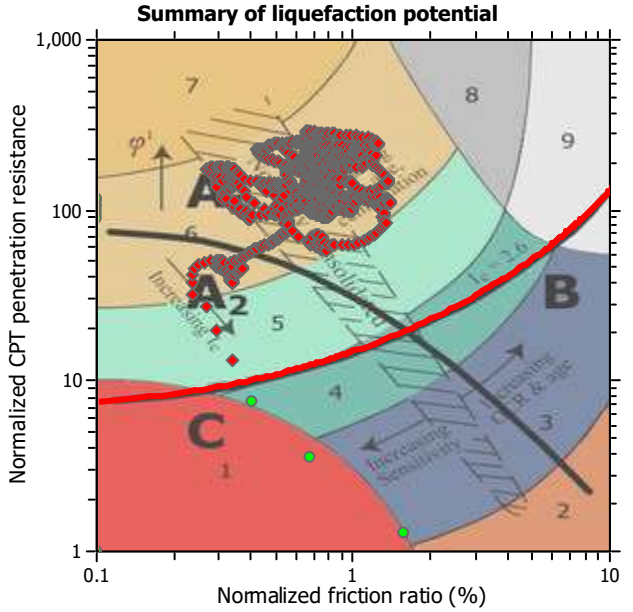
CPT file : CPT08

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	6.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	6.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

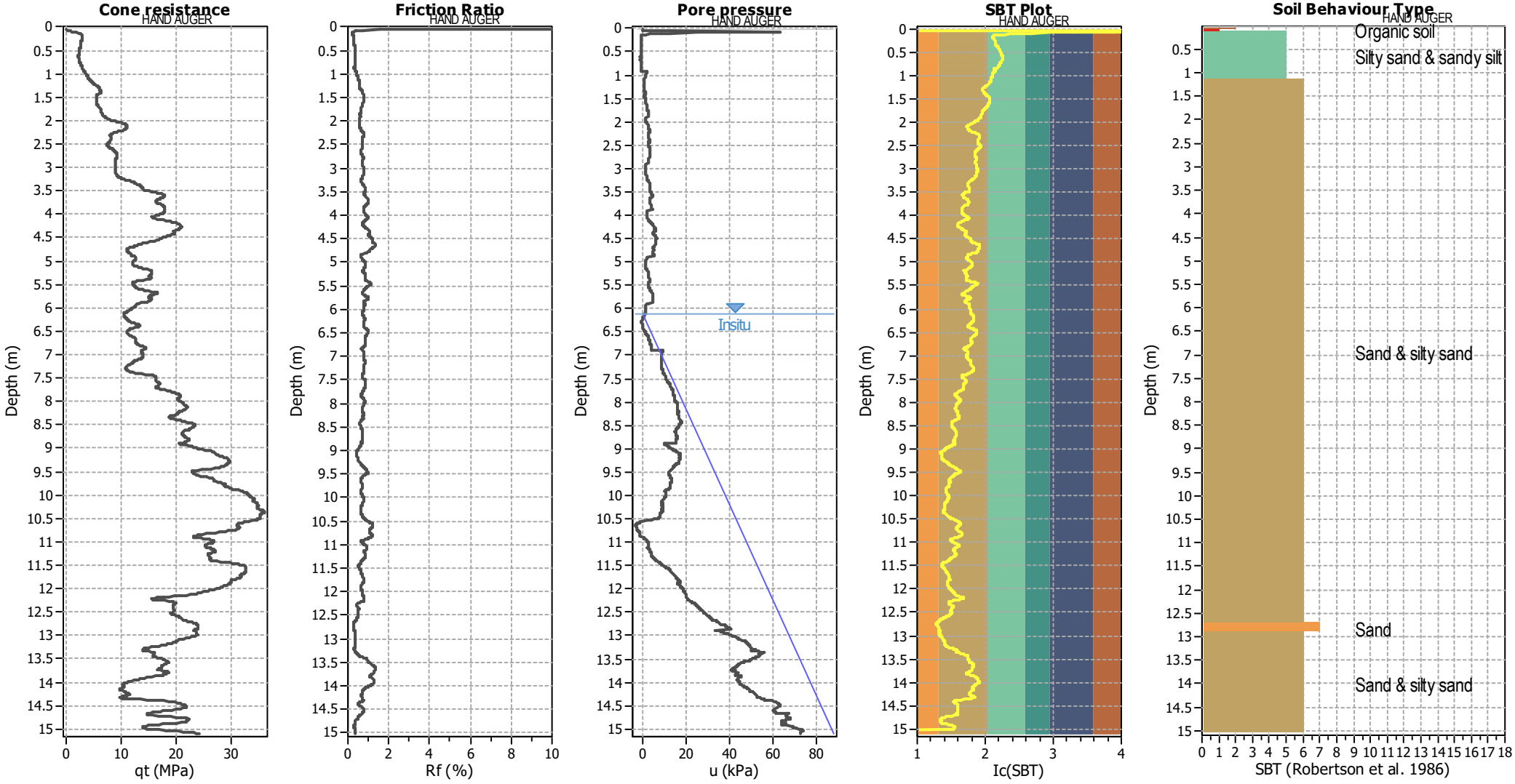






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



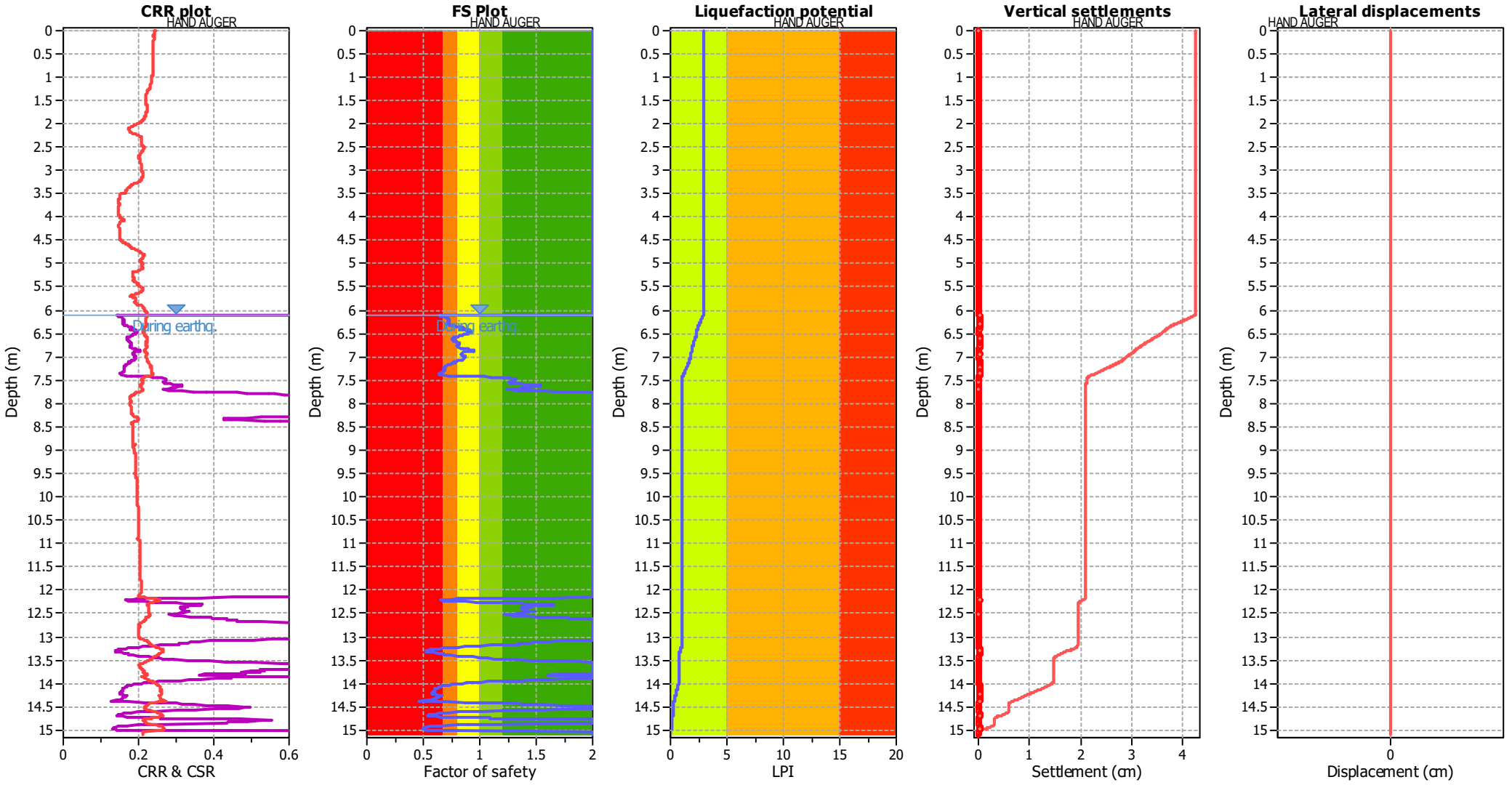
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	6.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	6.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	6.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	6.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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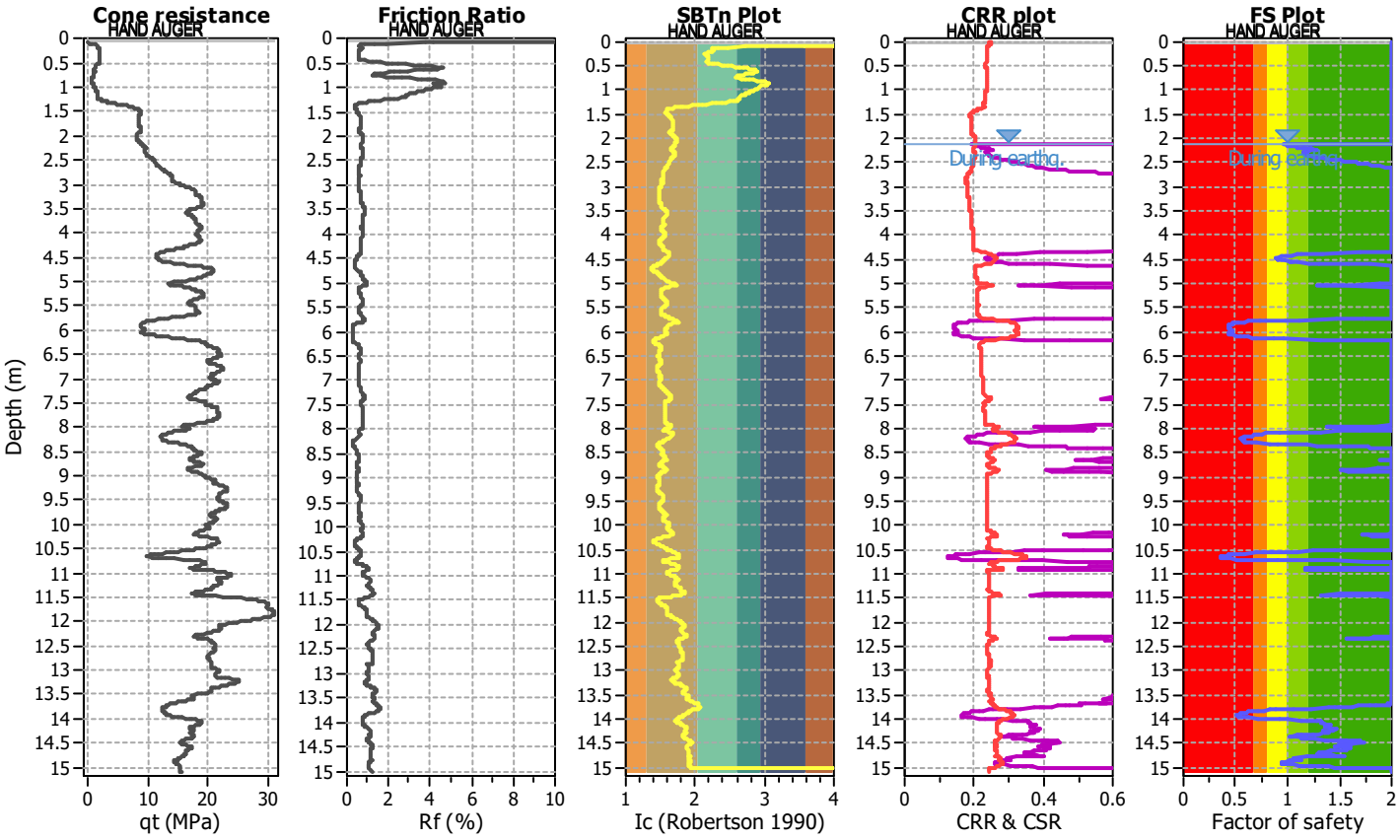
LIQUEFACTION ANALYSIS REPORT

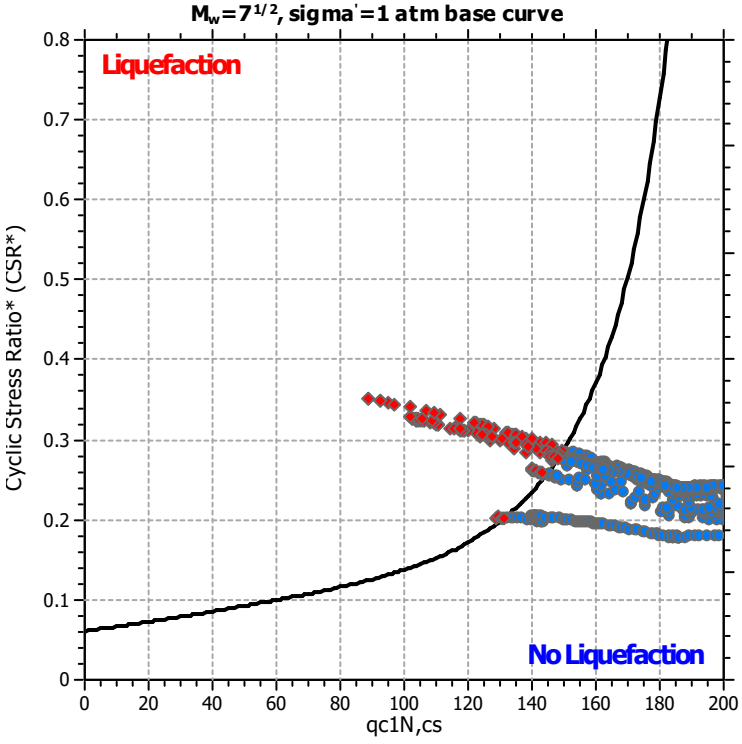
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

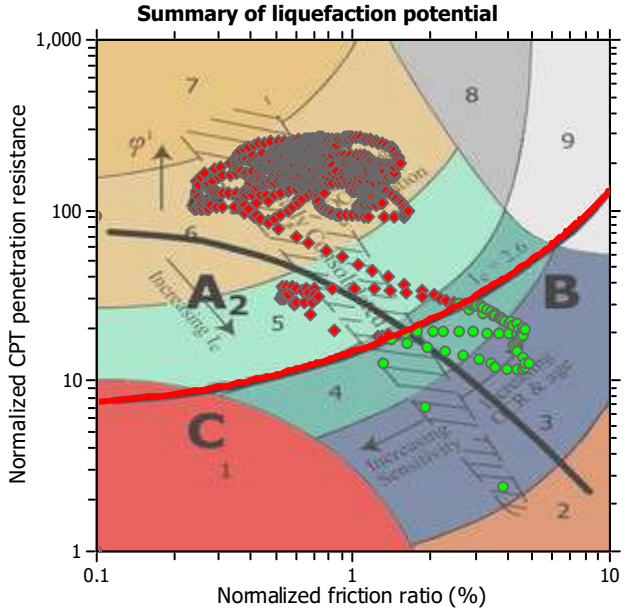
CPT file : CPT09

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

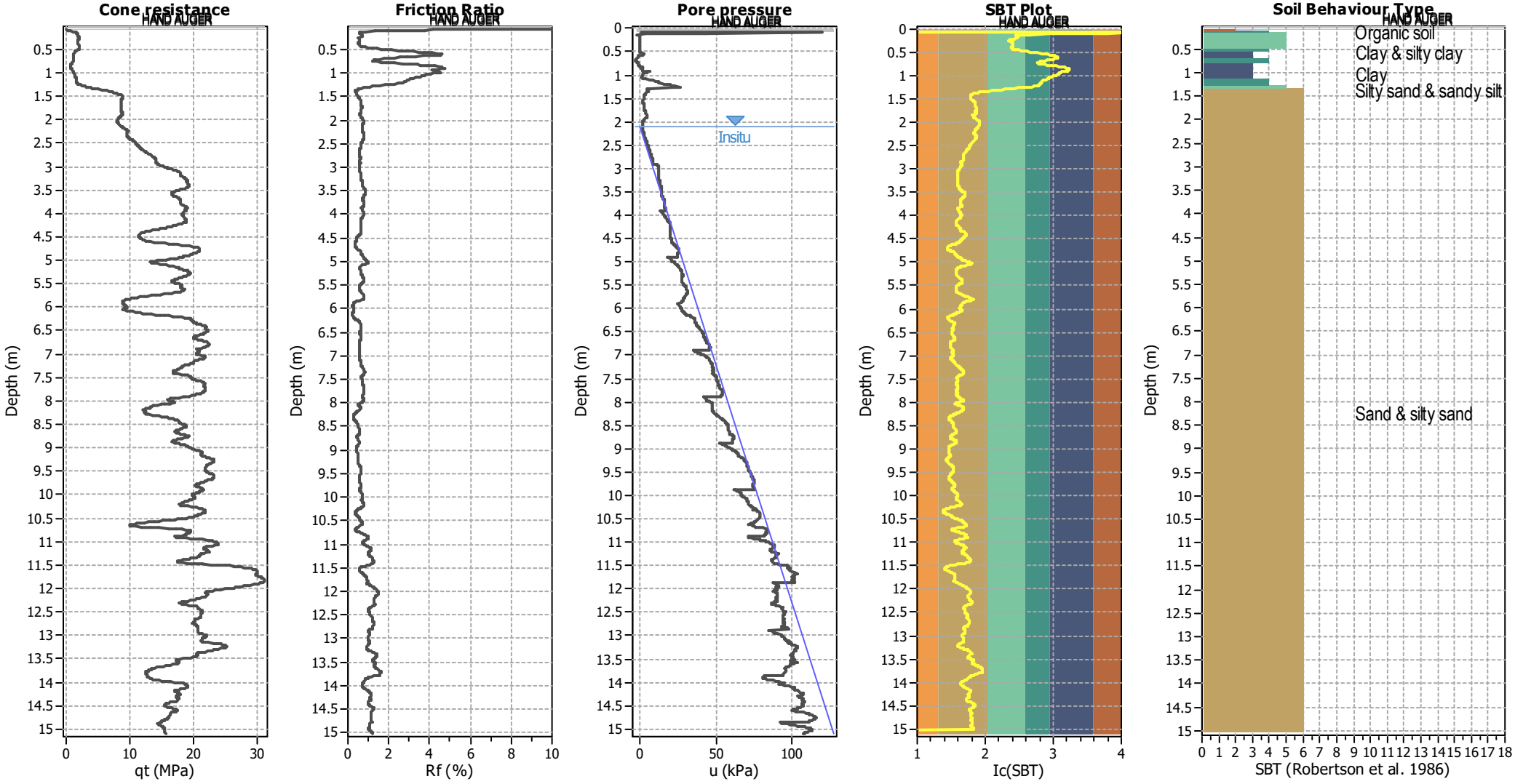






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



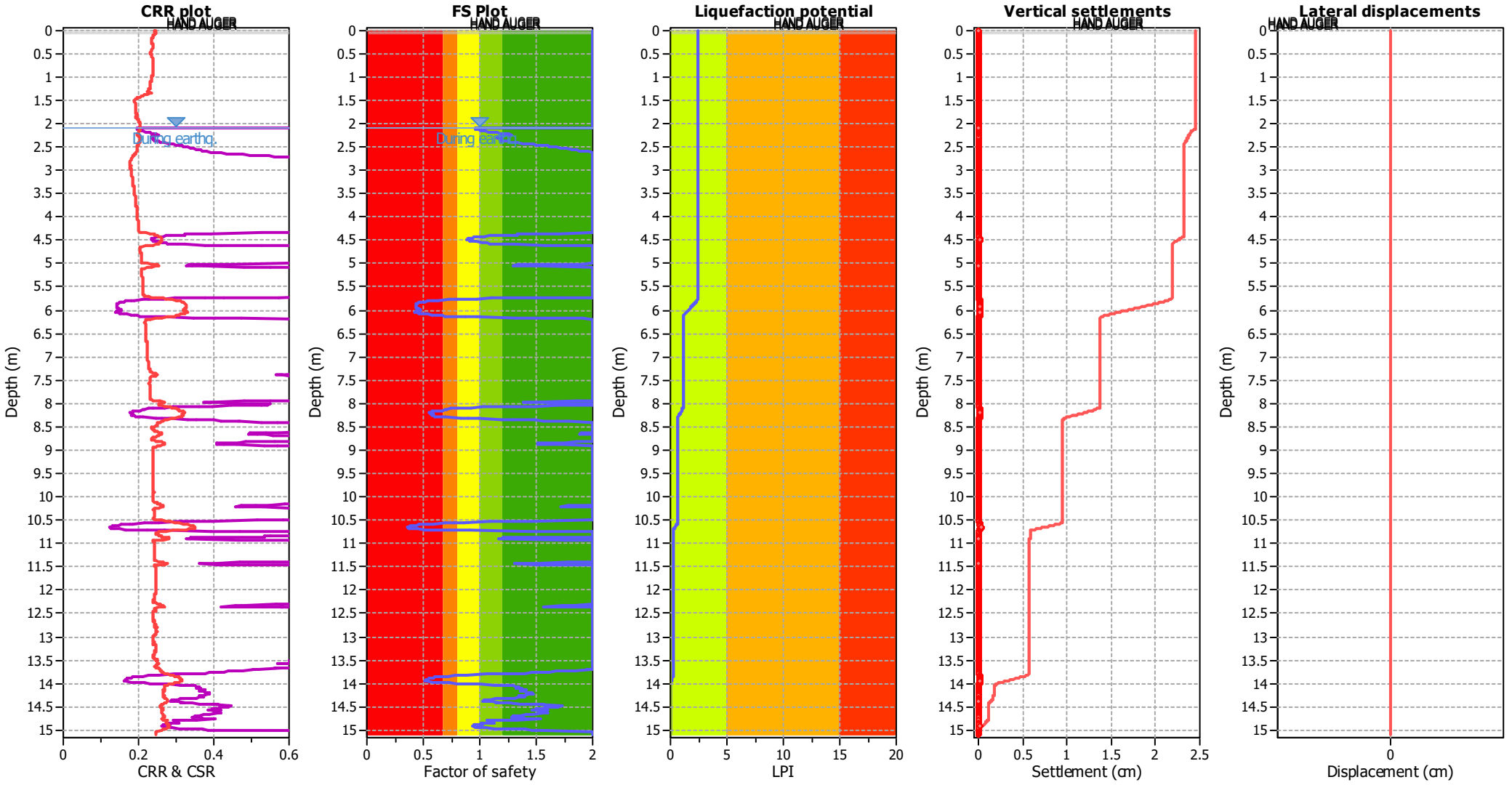
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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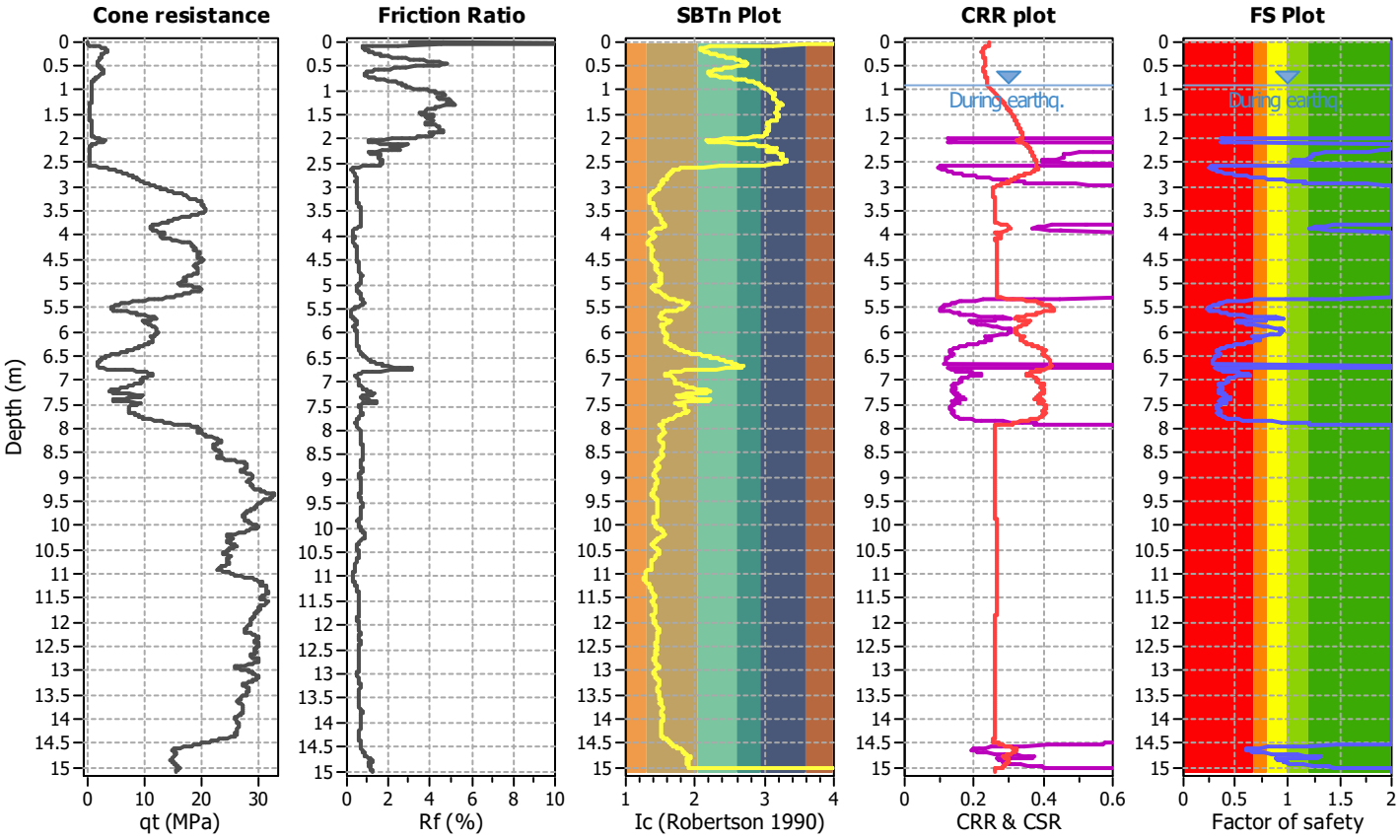
LIQUEFACTION ANALYSIS REPORT

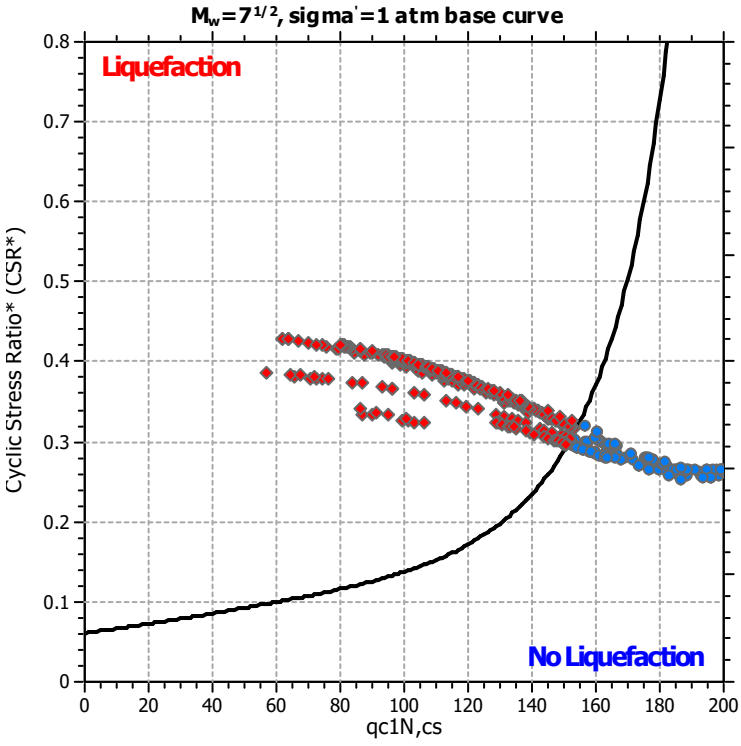
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

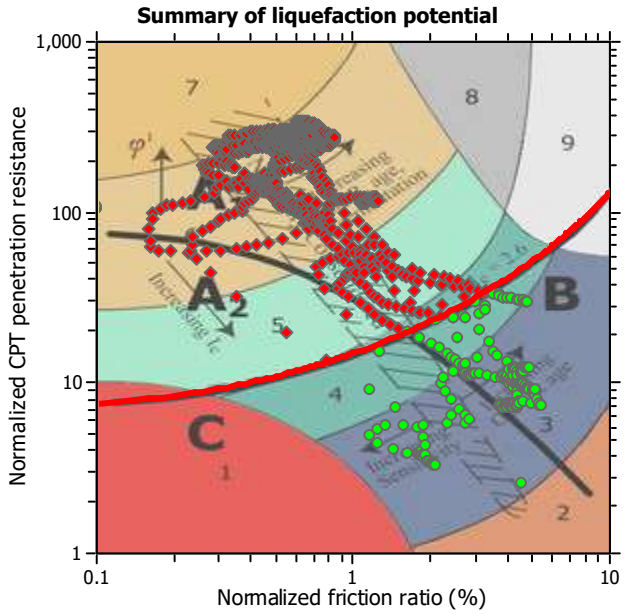
CPT file : CPT10

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.92 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.92 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

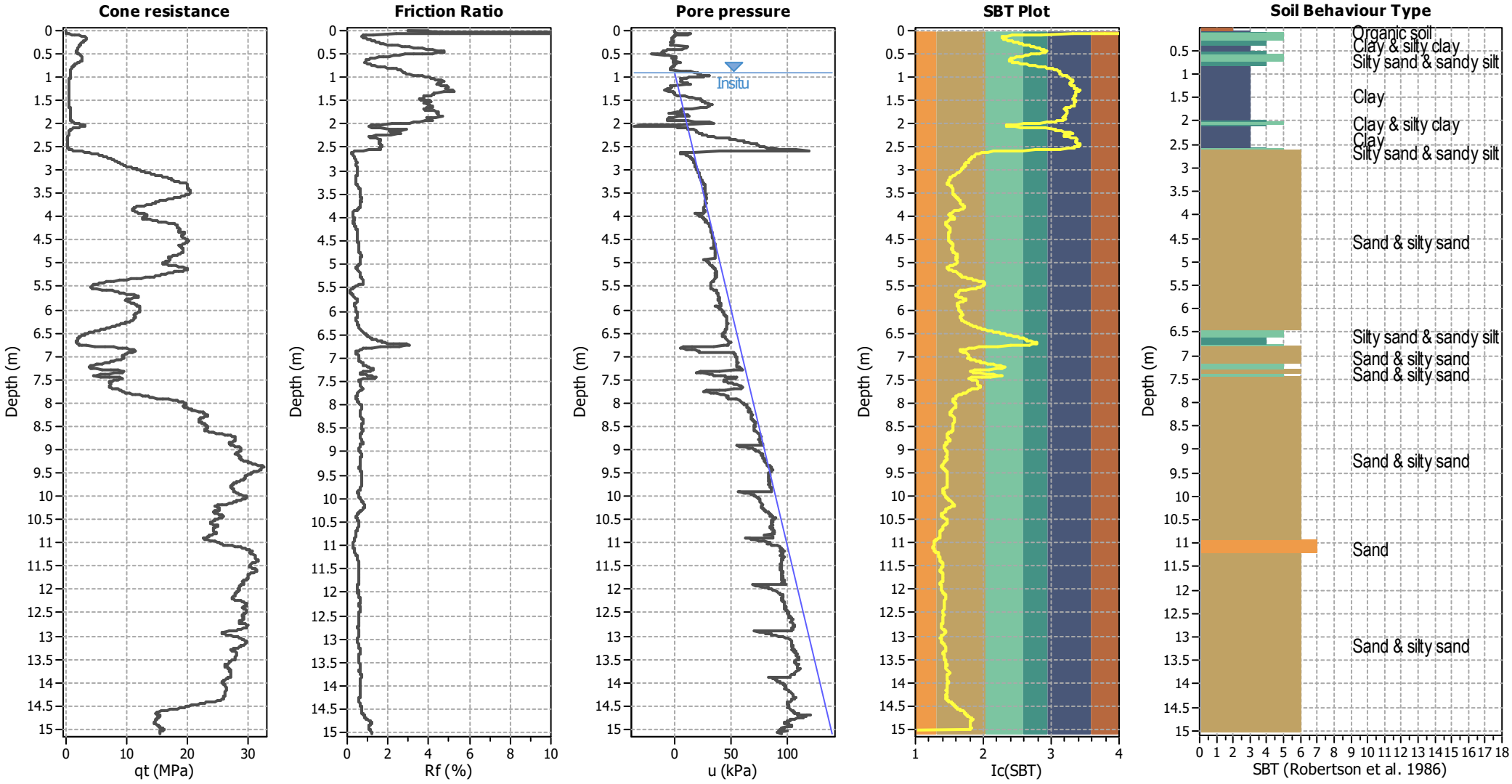






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



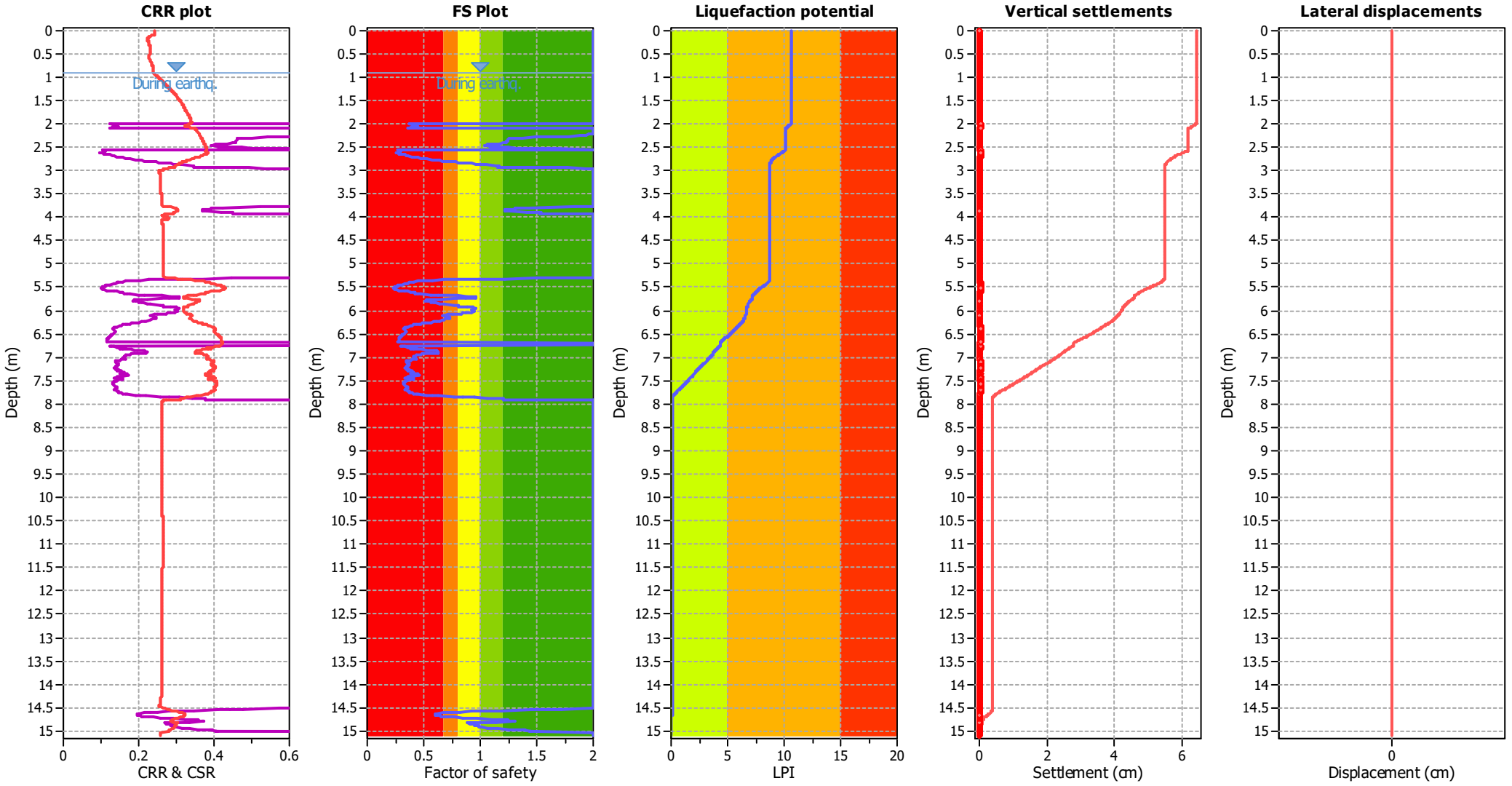
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.92 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.92 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	0.92 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	0.92 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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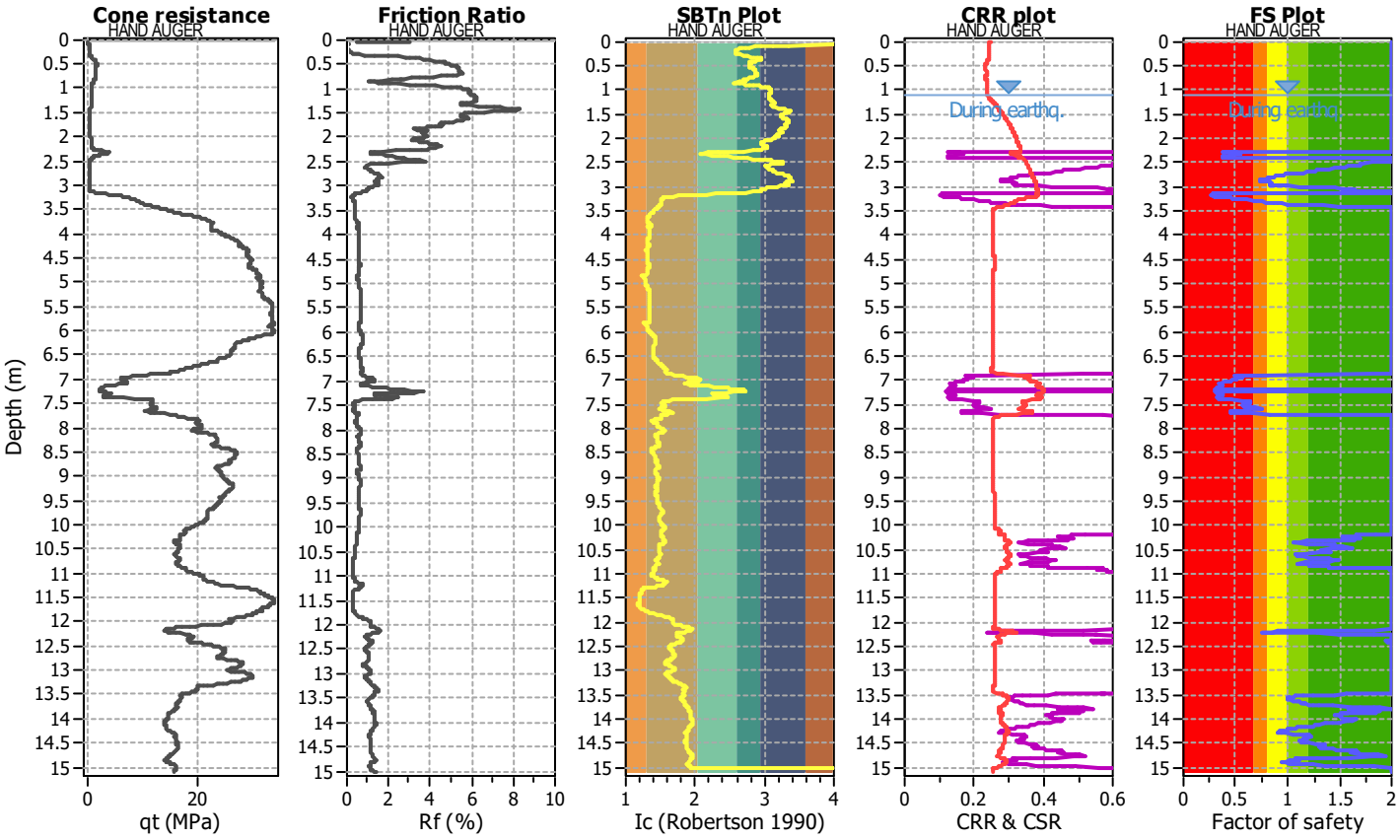
LIQUEFACTION ANALYSIS REPORT

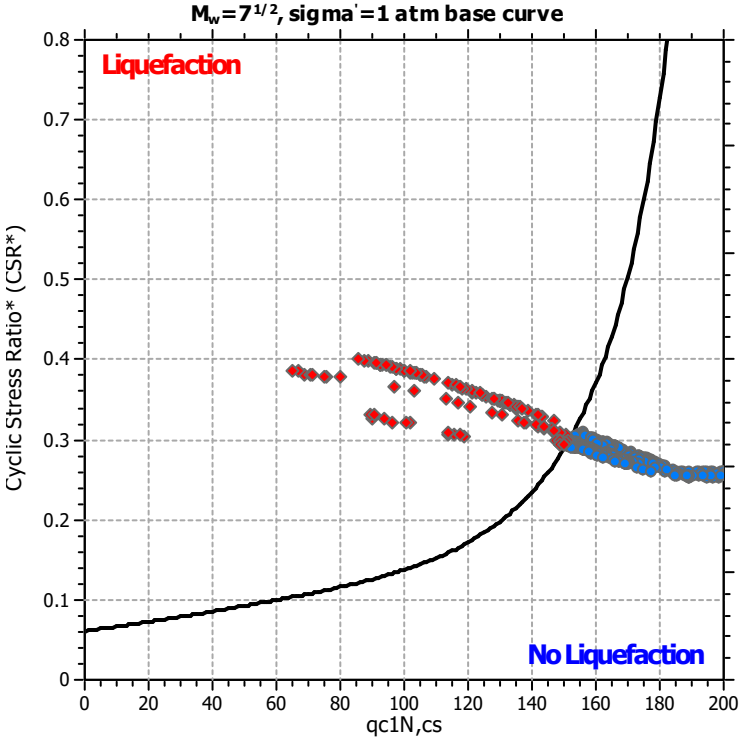
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

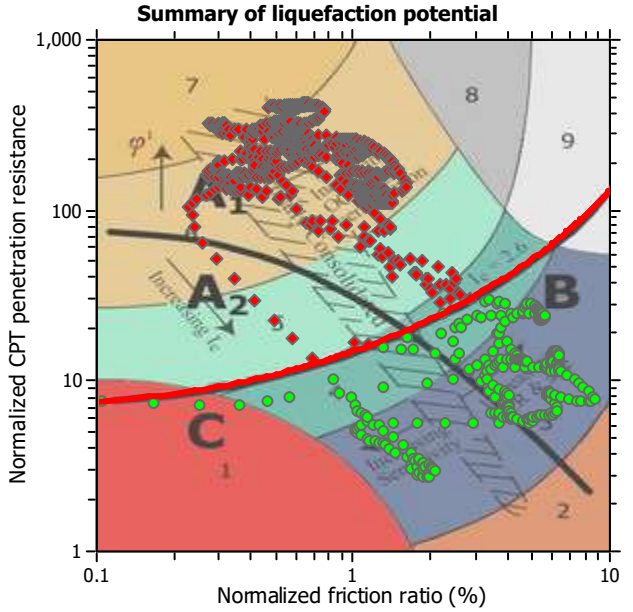
CPT file : CPT11

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.10 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.10 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

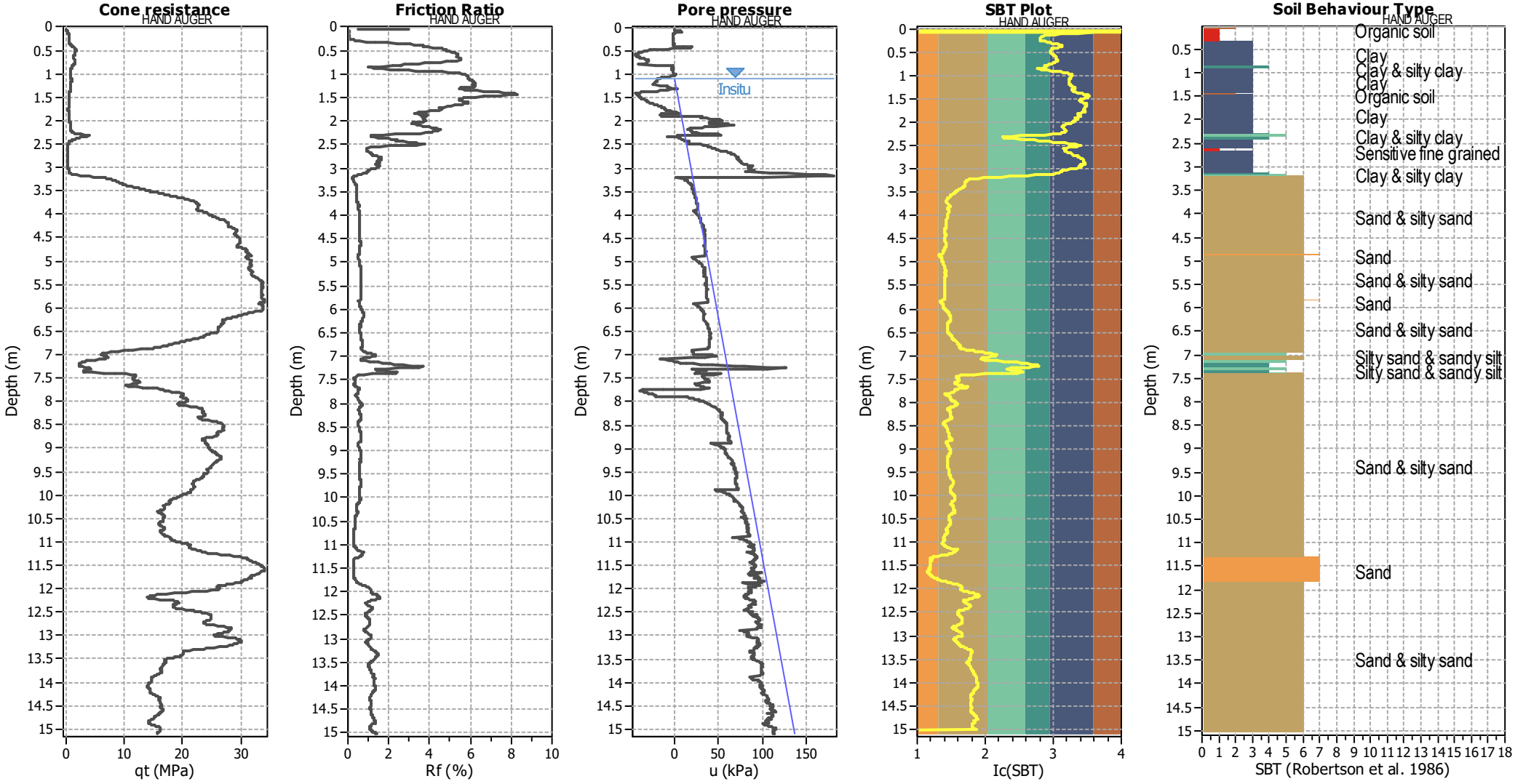






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



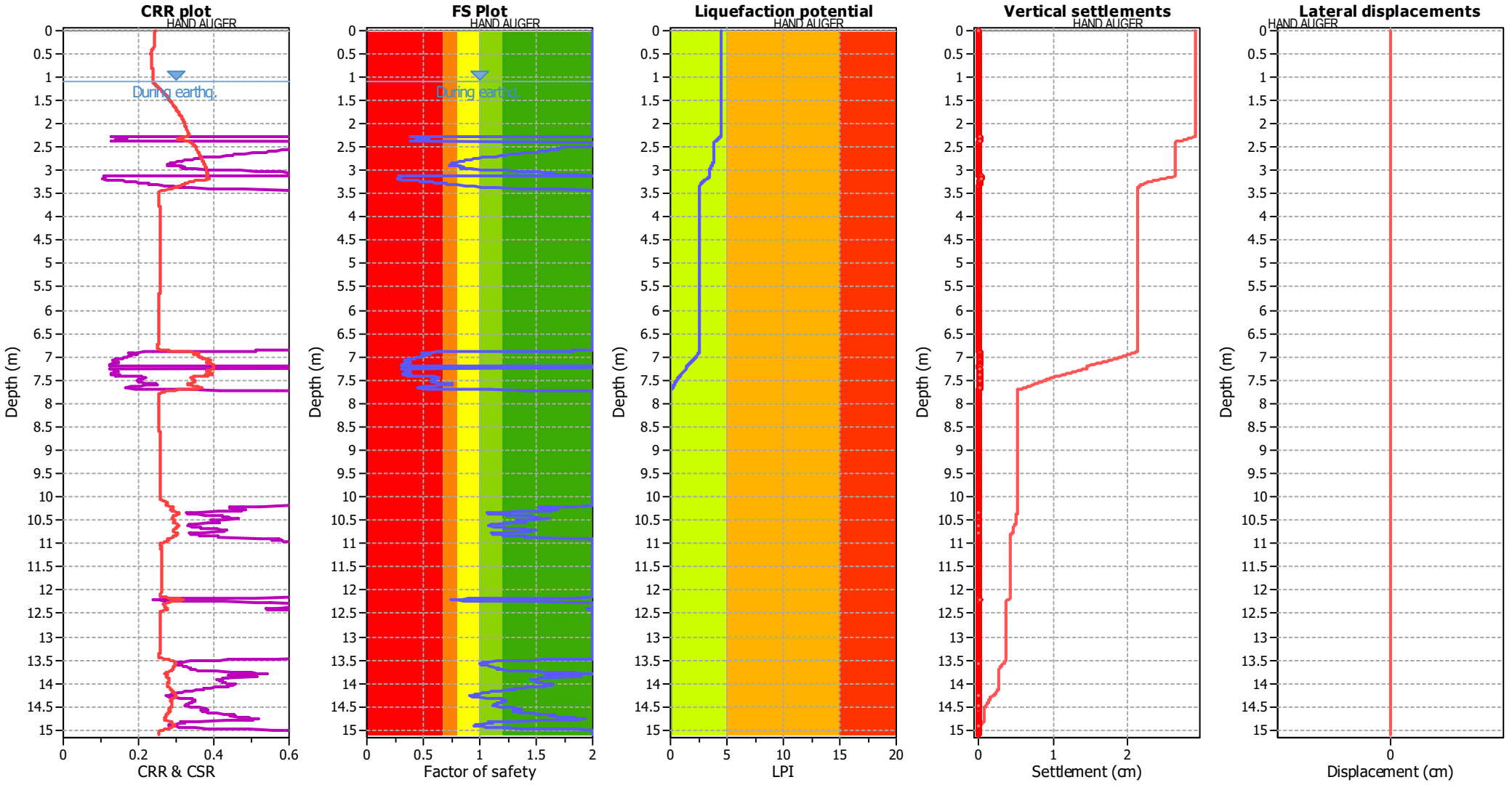
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.10	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.10 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.10 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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Peak ground acceleration:	0.44	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	1.10 m	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

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

LPI color scheme

- Very high risk
- High risk
- Low risk

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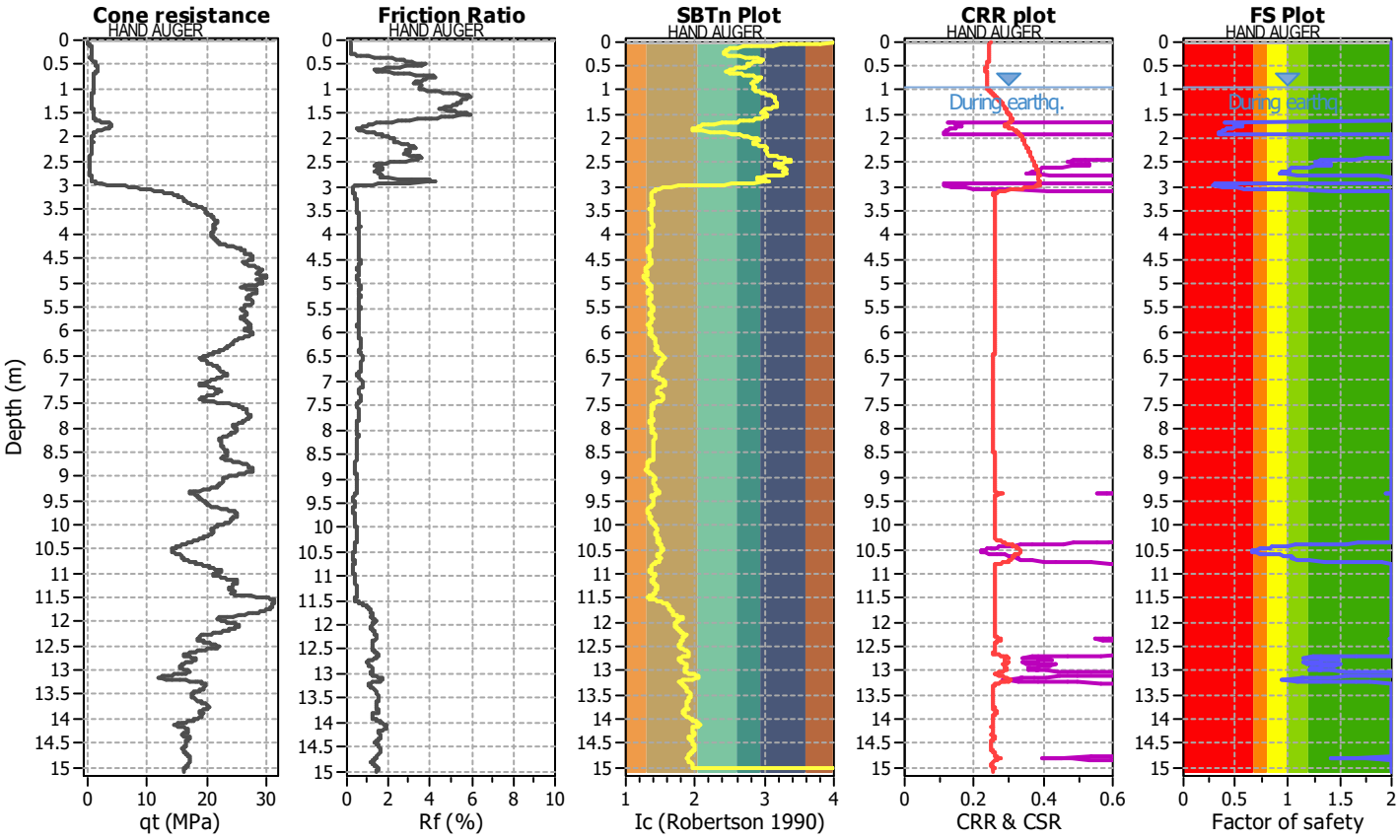
LIQUEFACTION ANALYSIS REPORT

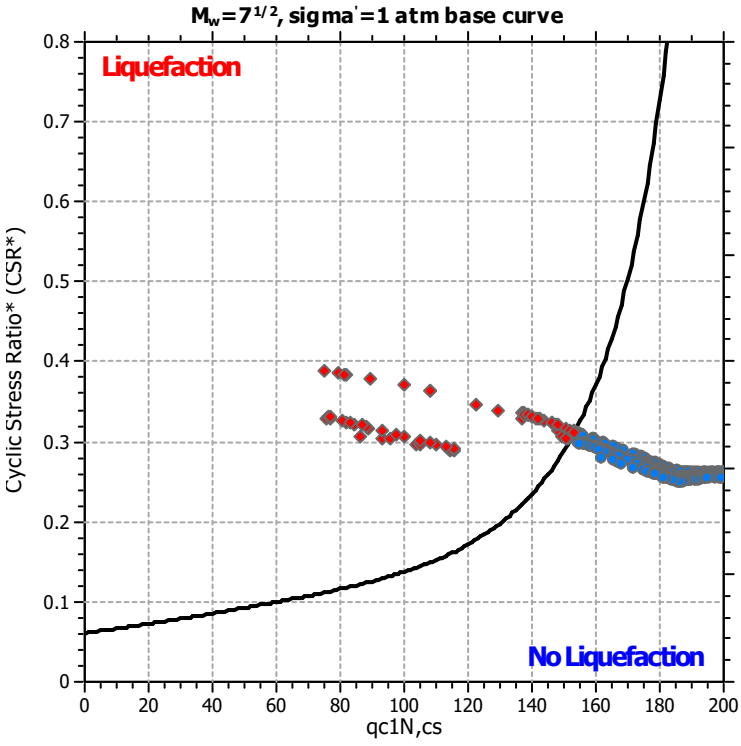
Project title : ULS Liquefaction Analysis **Location : Julian's Berry Farm**

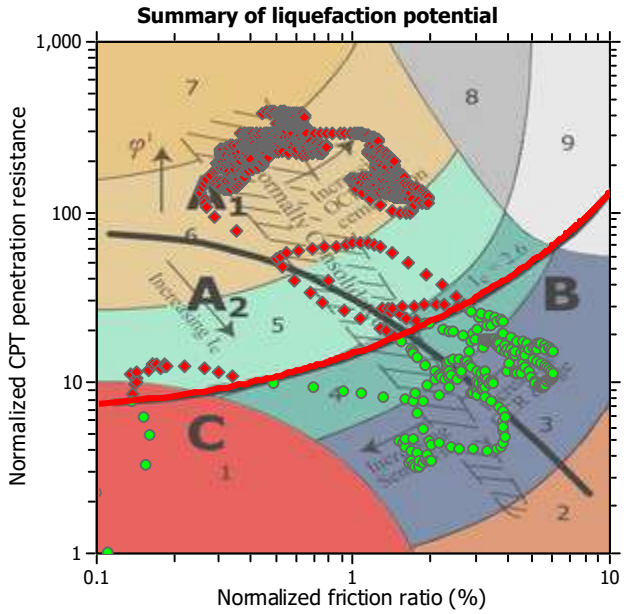
CPT file : CPT12

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	0.96 m	Use fill:	No	Clay like behavior applied:	Sand & Clay
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	0.96 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:	6.10	Ic cut-off value:	2.60	Trans. detect. applied:	No	MSF method:	Method based
Peak ground acceleration:	0.44	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

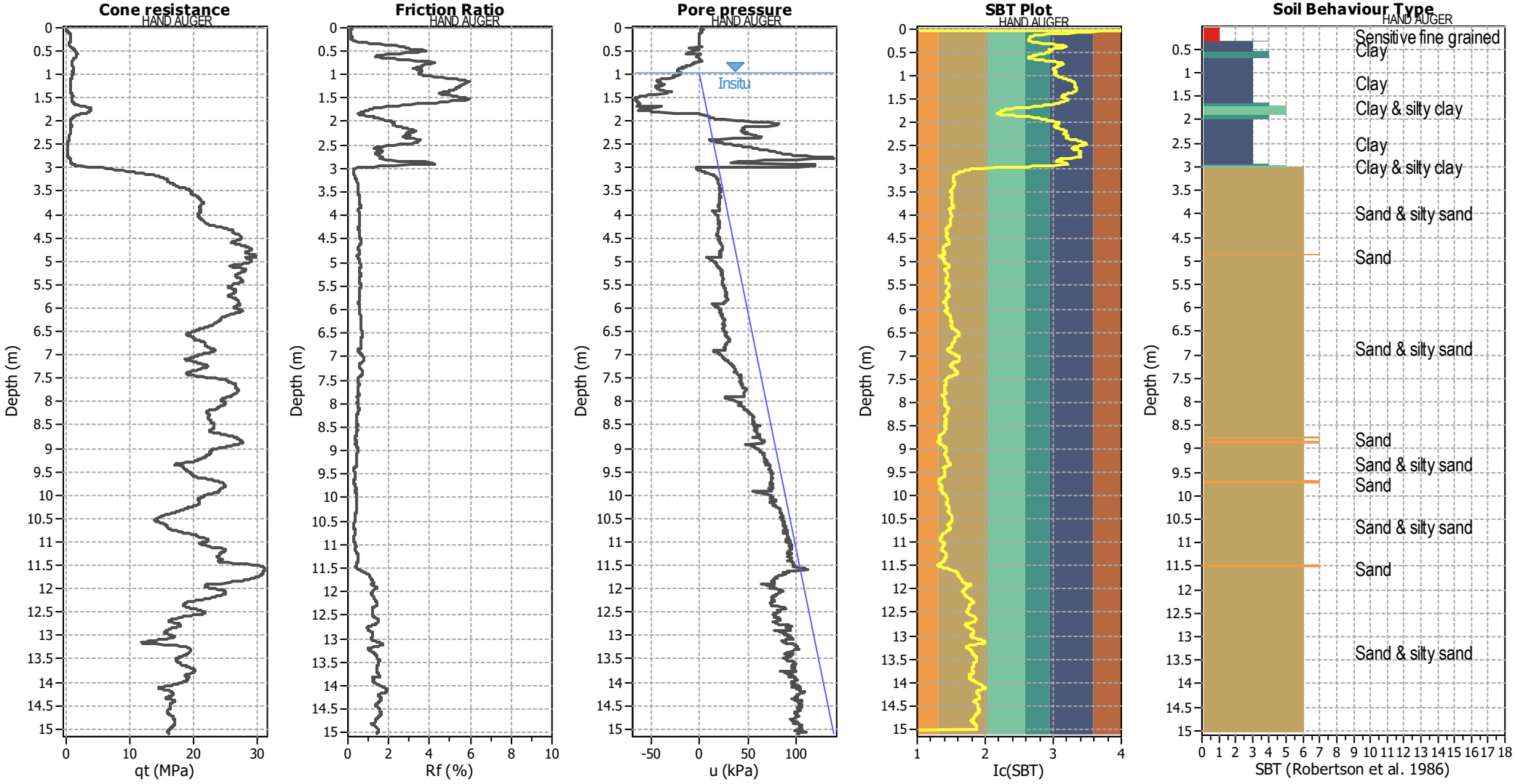






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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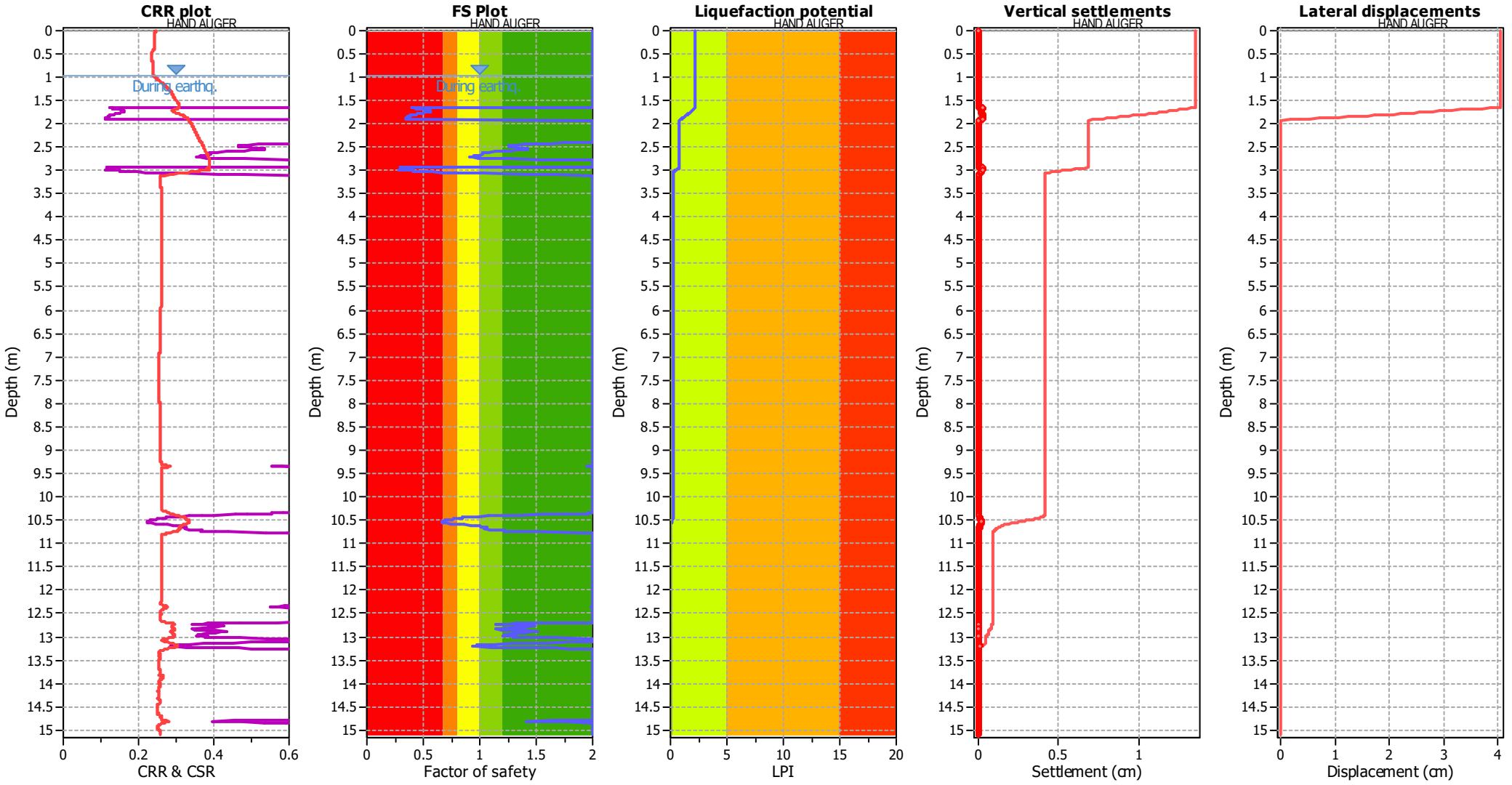
Liquefaction analysis overall plots



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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