MARLBOROUGH DISTRICT COUNCIL

RESOURCE CONSENT APPLICATION

U241145

RW Mac Holdings Limited

318 Wairau Bar Road, Spring Creek

Submissions Close

5.00 pm Thursday, 1 May 2025

MARLBOROUGH DISTRICT COUNCIL
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Application for Resource Consent

Applicant details

Application for Resource Consent

Sections 88 and 145, Resource Management Act 1991

To

Marlborough District Council

Applicant

I,

RW Mac Holdings Limited

59 High Street
Blenheim 7201

8661729

Ryan Wade MacDonald

318 Wairau Bar Road
Spring Creek 7273

0274235357

ryan@rjmac.co.nz

Apply for the following type(s) of resource consent

Discharge, Land use

Agent

Lizzie Wilkinson

PO Box 546
Blenheim 7240

5796211

kristen@smartalliances.co.nz

Project reference

9665-MacDonald Dwelling, 318 Wairau Bar Road, Spring Creek

Property details

Site and location details

The site at which the proposed activity is to occur is as follows:

Site address

318 Wairau Bar Road
Spring Creek
Marlborough
New Zealand

Legal description

LOT 1 DP 571054

Is there locale information in regards to the site?

No - there is no locale information in regards to the site

Site description

Description of the site at which the activity is to occur

This 0.8431 ha site, zoned 'Rural Environment Zone' within the proposed Marlborough Environment Plan (PMEP), currently has an existing dwelling located in the north eastern portion of the property. This dwelling is to be demolished, with a new dwelling to be constructed close to the original dwelling's location. A family flat with attached garage will be constructed to the south of the main dwelling.

The site is generally flat and is well vegetated with various trees, shrubs, and grass. The left bank of the Wairau River stop bank runs east to west in the south of the site.

The site was originally part of a larger site which, following a boundary adjustment in approximately 2021, resulted in the sites domestic well - P28w/0283 being located on the adjoining property to the east (Lot 2 DP 571054). The applicant has an easement over the neighbouring property for the well. This well only supplies domestic water to the existing dwelling on the subject site.

The neighbouring site to the east contains a large shed and yard to the north west with open paddocks and an established dwelling and curtilage to the east. The Wairau river is located along the site's southern boundary. To the west of the site is the Wairau Pa Marae. The surrounding area is all zoned 'Rural Environment Zone' within the PMEP. Directly north of the site is Wairau Bar Road followed by paddocks.

Wastewater from the dwelling is discharged to a septic tank. Stormwater and roof runoff is collected in a soak pit. Reticulated electricity and telephone supply are connected to the dwelling. The site has an established crossing place directly off Wairau Bar Road.

According to MDC Smart Maps Pro, the site is within the Level R (residual) flood hazard area in the southern half of the site and Level 3 (flood hazard area) on the river side of the stop bank, in the far south of the site and a soil sensitive area (impeded soils category B).

Owners and occupiers of the application site

Applicant is the only owner and occupier?

Yes - the applicant is the only owner and occupier

Proposed activity

Description of the activity

The activity to which the application relates (the proposed activity) is as follows:

To construct a four bedroom dwelling and two bedroom family flat with an attached shed on Lot 1 DP 571054.

To discharge domestic wastewater to land in a soil sensitive - impeded soils overlay on Lot 1 DP 571054.

Other activities that are part of the proposal to which the application relates

Are there permissions needed which do not relate to the Resource Management Act 1991?

Yes - there are permissions needed which do not relate to the Resource Management Act 1991

Permissions needed which do not relate to the Resource Management Act 1991

Building consent

Are there permitted activities that are part of this application?

Yes - there are permitted activities that are part of this application

Permitted activities that are part of this application:

The new dwelling and family flat with an attached shed comply with all the relevant rules and standards relating to bulk and location in the Rural Environment Zone of the proposed Marlborough Environment Plan (pMEP), with the exception of the main dwelling which is located within 25m of the sites western side boundary.

Domestic water to both dwellings can be supplied in compliance with General Rule 2.2.1 and associated Standard 2.3.1.2.

Additional resource consents

Are any additional resource consents needed for the proposal to which this application relates?

No - no additional resource consents are needed for the proposal to which this application relates

Consent summary

I apply for the following resource consents.

Consent information

Wastewater

Consent type

Discharge

Subcategory type

to Land

Description of consent being applied for

To discharge primary treated domestic wastewater from a four bedroom dwelling and two bedroom family flat (total maximum occupancy 12 persons), to land via a minimum 158.4m2 land application area with a Design Loading Rate of 12.5mm, on LOT 1 DP 571054.

Location of the consent

Easting

1683015.18

Northing

5407714.922

Supplementary details

Supplementary details form

9665-RPT-Eng-01.pdf (12 MB)

Triggering rules

Rules which trigger the consent

I include an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

The assessment under this section must include an assessment of the activity against
(a) Rules in a document; and
(b) Any relevant requirements, conditions, or permission in any rules in a document; and
(c) Any other relevant requirements in a document (for example, in a national environmental standard or other regulations))

Triggering rules assessment

Proposed Marlborough Environment Plan

The site is in the Rural Environment zone of the Proposed Marlborough Environment Plan. The property is also in the Soil Sensitive (impeded soils) overlay on SmartMaps. The south section of the property is in the Level R Flood Hazard overlay.

Standard 3.3.31.9. requires: "For a new discharge of human effluent to land commencing after 9 June 2016, the discharge must not occur into or onto a Soil Sensitive Area".

The discharge does not meet Standard 3.3.31.9 as it is a new discharge within a Soil Sensitive Area - Impeded Soils. This activity is therefore a discretionary activity in accordance with Rule 3.6.1.

Assessment of Effects on the Environment (AEE)

Clause 6 - Information required in assessment of environmental effects

6.1 An assessment of the activity's effect on the environment must include the following information:

6.1(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity

Provision not relevant

6.1(b) an assessment of the actual and potential effect on the environment of the activity

Smart Alliances Ltd undertook an engineering appraisal of the on-site wastewater management system, and water supply for the proposed development. The site was assessed by means of a desktop review of the available site information, a visual assessment of the site and the intrusive investigation by means of machine-excavated pit tests. Groundwater was not encountered within the subsurface investigation reported. The general soil profile for the site was assessed through the conducting of two machine excavated test pits. The general subsoil profile consisted of SILT loam / sandy CLAY loam. A category 4 soil is adopted for the design of the proposed on-site wastewater management system.

The site assessment identified that on-site wastewater disposal by a primary treatment unit coupled with land application through planted shallow beds is considered appropriate, given the site constraints and the soil conditions. Allocating a potential for two persons to occupy each bedroom, the total discharge for the site is a maximum of 1,980 litres/day (12 persons at 165 litres/person/day – with standard water reduction fixtures in the house). A proposed Land Application Area (LAA) was identified along the flat area to the south of the building platform. Two 20.0m long by 4.0m wide planted shallow beds are proposed to be contracted and are to be placed a minimum of 1m apart from side wall to side wall. The location of the LAA exceeds the required 8m setback from the landward toe of the stop bank to the south. Installation is to be carried out to meet AS/NZS 1547:2012. The proposed LAA is well vegetated and is exposed to sun and wind to allow adequate evapotranspiration to occur. Stormwater discharge from the dwelling and any hardstand areas should be directed away from the proposed LAA.

Maintenance of the installed wastewater system is integral to the effective long-term operation of the system.

6.1(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use

Provision not relevant

6.1(d)(i) if the activity includes the discharge of any contaminant, a description of the nature of the discharge and the sensitivity of the receiving environment to adverse effects

The Wairau River is located approximately 40m to the south of the investigation site. A stopbank is in place along the southern boundary of the property. Boreholes P28w/1616, P28w/2778 and P28w/0283 are located close to the east boundary of the property, in excess of 50m north east of the LAA.

Based on the nature of the receiving soil, the presence of established vegetation, and the conservative loading rates utilised, the provided setback from the is considered adequate.

Cumulative effects are not considered to be a risk as there are good separation distances to other discharges in the area. Risks to human health is considered to be less than minor as the LAA is not in an area frequented by the house occupants and the effluent will be assimilated within the disposal area.

There is a considerable reserve area should the system be underperforming and require extending.

The daily loading rate is conservatively designed. Provided the proposed system is installed, operated and maintained, any effects on the environment will be in accordance with the environmental outcome provided for by the Council guidelines.

A maintenance schedule in line with the system provider's specifications should be engaged to an appropriate and qualified provider which will ensure the onsite wastewater system is operating to a suitable standard.

6.1(d)(ii) if the activity includes the discharge of any contaminant, a description of any possible alternative methods of discharge, including discharge into any other receiving environment

No reticulated wastewater system is available within the vicinity of the site. The primary treatment system with planted shallow beds is considered appropriate on the nature of the receiving soils.

6.1(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect.

- Establishment of a maintenance and inspection contract with an accredited contractor
- The nautre of the land application area facilities evapotranspiration
- Owner has good knowledge of the system
- Sufficient reserve area will also be available if required
- Wastewater vents shall be a minimum of 600mm above natural ground level.

6.1(f) identification of the persons affected by the activity,

Provision not relevant

6.1(f cont.) any consultation undertaken,

Provision not relevant

6.1(f cont.) and any response to the views of any person consulted

Provision not relevant

6.1(f cont.) and any iwi consultation undertaken

Provision not relevant

6.1(g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved.

Provision not relevant

6.1(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).

Provision not relevant

Clause 7 - Matters that must be addressed by assessment of environmental effects

7.1 An assessment of the activity's effects on the environment must address the following matters:

7.1(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects

Provision not relevant

7.1(b) any physical effect on the locality, including any landscape and visual effects

Provision not relevant

7.1(c) any effect on ecosystems, including effects on plants or animals and any physical disturbances of habitats in the vicinity

Provision not relevant

7.1(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations

Provision not relevant

7.1(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants

Provision not relevant

7.1(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations

Provision not relevant

Applicant's proposed conditions for this activity

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Consent information

Building

Consent type

Land use

Subcategory type

Building

Description of consent being applied for

To construct a four bedroom dwelling and two bedroom family flat with an attached shed on LOT 1 DP 571054.

To construct a four bedroom dwelling within 25m of the eastern side boundary on Lot 1 DP 571054.

Location of the consent

Easting

1683063.863

Northing

5407726.034

Triggering rules

Rules which trigger the consent

I include an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

The assessment under this section must include an assessment of the activity against
(a) Rules in a document; and
(b) Any relevant requirements, conditions, or permission in any rules in a document; and

(c) Any other relevant requirements in a document (for example, in a national environmental standard or other regulations))

Triggering rules assessment

Proposed Marlborough Environment Plan

The site is in the Rural Environment zone of the Proposed Marlborough Environment Plan. The property is also in the Soil Sensitive (impeded soils) overlay on SmartMaps. The south section of the property is in the Level R Flood Hazard overlay.

Standard 3.2.1.1. provides: "No more than one residential dwelling must be constructed or sited per Record of Title unless the site is over 40ha, in which case one additional residential dwelling is permitted".

Therefore the proposed development is not in accordance with Rule 3.2.1.1.

Standard 3.2.1.11: For a site larger than 4000m2, the following minimum setbacks must be provided:

Habitable buildings:

(a) 8m for the front boundary; (b) 25m for the rear boundary; (c) 25m for a side boundary

All other buildings (excluding crop protection structures):

(a) 8m for the front boundary; (b) 5m for the rear boundary; (c) 5m for the side boundary.

All other buildings (excluding crop protection structures):

(a) 8m for the front boundary;

(b) 5m for the rear boundary;

(c) 5m for the side boundary.

The site is a total of 8,431m2 meaning Standard 3.2.1.11. is applicable. The proposed 4 bedroom dwelling will meets the required setbacks from the front rear and western side boundaries. However, the dwelling will be located 20m from the sites eastern side boundary.

The proposed 2 bedroom family flat meets the setback requirements for a habitable building and the attached garage meets the setbacks required for a non habitable building.

The proposed development is a discretionary activity in accordance with Rule 3.6.1: "Any activity provided for as a Permitted Activity, Controlled Activity or Restricted Discretionary Activity that does not meet the applicable standards".

Assessment of Effects on the Environment (AEE)

Clause 6 - Information required in assessment of environmental effects

6.1 An assessment of the activity's effect on the environment must include the following information:

6.1(a) if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity

Provision not relevant

6.1(b) an assessment of the actual and potential effect on the environment of the activity

Under the pMEP, the site could be used for worker accommodation, homestay, home occupation, a veterinary clinic and golf course, among others as a permitted activity. A desktop assessment has identified that many properties in the immediate vicinity feature residential dwellings with additional structures such as offices, storerooms, farm sheds, and extensive garages, some of which include sinks and other amenities.

The anticipated environmental impact of the proposed activity is expected to be less significant than that of other activities permitted under the PMEP, as the development has been designed to cater to the needs of the current occupants and their extended family. This approach has led to a design that accommodates the proposed occupants' requirements while maintaining a cohesive and functional layout. It is not the intention to establish a separate, self-contained household; rather, the occupants plan to live under a single management arrangement, whereby the applicants will live in the family flat while the new house is being constructed. Upon completion of the new house, the family flat will be occupied by extended whanau.

This is a large site with ample outdoor amenity for both dwellings. However, it is anticipated that in keeping with the intended use of the family flat for extended whanau, the residential amenity of the site will be shared between both dwellings. It is noted that by way of comparison a six bedroom equivalent dwelling on this site would be a permitted activity.

Traffic associated with the development is not anticipated to increase substantially. It is not uncommon for dwellings in rural areas to have six bedrooms as proposed on this site. Furthermore, a four bedroom dwelling with a two bedroom sleep out could be constructed on the site as a permitted activity which results in the same effects as is proposed. With the development being within a large parcel of rural land, there is adequate on site parking and manoeuvre space for vehicles. Both the main dwelling and the family flat will be access via a shared driveway from the existing entranceway off Wairau Bar Road.

The new dwelling is situated to the north of the family flat with attached shed. This means that the family flat and most of the shed will be obscured from public view to the north along Wairau Bar Road. There is also a dense ake ake hedge which will be retained to the west of the entranceway which further blocks the shed from view of the road. The portion of the shed visible from Wairau Bar Road will be similar in appearance to other well designed new farm shed in the area which can be established as permitted activities.

The main dwelling is located within 25m of the eastern side boundary. There have been no reported issues regarding the proximity of the existing dwelling to the eastern site boundary (approximately 7.2m). The written approval of the affected landowners to the east has been obtained.

The family flat will result in the loss of primary production potential on the site. The flat is 97m2 in area with a 27m2 deck. This represents 1.4% of the site area. As shown on the site plan the family flat is not intruding in to the existing paddock in the south western corner of the site. It is located within the curtilage of the main dwelling.

Construction of the proposed dwelling and family flat and shed will generate temporary noise and vehicle movements, which are typical for the area during construction activities.

Domestic water for both dwellings will be supplied from well P28w/0283. This is located on the neighbouring property to the east and secured by an easement. The wastewater design for the property has a daily design flow of 1,980l. The well can adequately supply this amount of water leaving adequate supply for sundry residential activity such as watering gardens. Based on the wastewater calculations it is considered that water use on the site will be less than the 5m3 provided per dwelling/day as a permitted activity in pMEP. There will only be two dwellings taking water from well P28w/0283.

6.1(c) if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use

Provision not relevant

6.1(d)(i) if the activity includes the discharge of any contaminant, a description of the nature of the discharge and the sensitivity of the receiving environment to adverse effects

Provision not relevant

6.1(d)(ii) if the activity includes the discharge of any contaminant, a description of any possible alternative methods of discharge, including discharge into any other receiving environment

Provision not relevant

6.1(e) a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect.

Provision not relevant

6.1(f) identification of the persons affected by the activity,

LOT 2 DP 571054 - neighbour to the east Brigham MacDonald

6.1(f cont.) any consultation undertaken,

The owner of LOT 2 DP 571054 has been shown the site plans and the resource consent application prior to giving their written affected party approval.

6.1(f cont.) and any response to the views of any person consulted

The affected party approval of Brigham MacDonald has been obtained.

6.1(f cont.) and any iwi consultation undertaken

Provision not relevant

6.1(g) if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved.

Provision not relevant

6.1(h) if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).

Provision not relevant

Clause 7 - Matters that must be addressed by assessment of environmental effects

7.1 An assessment of the activity's effects on the environment must address the following matters:

7.1(a) any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects

Provision not relevant

7.1(b) any physical effect on the locality, including any landscape and visual effects

Two residential dwellings

The proposed development has been designed to create a cohesive extended whanau living environment.

Visual impacts from the road frontage are expected to be minimal and similar to the existing conditions, due to the established vegetation along the site. The two bedroom family flat and shed is unlikely to cause any negative visual impact from the road, given its distance from the frontage and its partial obscurity behind the proposed four bedroom dwelling. There is no anticipated visual impact for properties located south of the Wairau River, due to the significant distance to the nearest dwelling and the dense, well-established vegetation along the stopbank at the southern boundary of the site.

Boundary setback

The proposed main dwelling will be 20m from the eastern side boundary. Standard 3.2.1.11. states that this should be 25m.

The nearest residential dwelling which is located on the neighbouring property to the east is approximately 140m from the proposed main dwelling. This area is characterized by established vegetation and large farm sheds. The proposed development is not expected to create any greater negative visual impact than what is already present. Given the rural nature of the site, it is consistent with local development patterns for dwellings to be concentrated in one portion of the property.

7.1(c) any effect on ecosystems, including effects on plants or animals and any physical disturbances of habitats in the vicinity

Provision not relevant

7.1(d) any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations

It is not anticipated that the proposed development would result in a negative impact on scientific, historical, spiritual, or cultural values. It is anticipated that the development would increase

recreational values of the property as the proposed development will allow the applicant and his family to enjoy the property in a manner that meets their family needs to its full extent well into the future. Regarding the natural aesthetic values, it is not anticipated that the development would result in a decrease in value as the development has been planned with regard to locale, material use, and legislative requirements.

7.1(e) any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants

Provision not relevant

7.1(f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations

Provision not relevant

Applicant's proposed conditions for this activity

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Part 2 RMA

Matters of national importance (Section 6 Resource Management Act 1991)

1. Assess your application against the following matters of national importance:

6.1 (a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:

Provision not relevant

6.1 (b) the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:

Provision not relevant

6.1 (c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

Provision not relevant

6.1 (d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

Provision not relevant

6.1 (e) the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:

Provision not relevant

6.1 (f) the protection of historic heritage from inappropriate subdivision, use, and development:

Provision not relevant

6.1 (g) the protection of protected customary rights.

Provision not relevant

6.1 (h) the management of significant risks from natural hazards.

The new dwelling is located clear of the pMEP flood hazard overlays on the property. The new family flat is located within the Level R Flood Hazard Overlay.

Policy 11.1.11 of the Natural Hazards Chapter of pMEP states: "Identify land that has potential to experience flooding of deep, fast flowing water in an extreme flood event that overwhelms stop banks and other constructed flood defenses as residual risk areas (Level R) and avoid locating intensive residential, commercial or industrial developments on land subject to a Level R flood risk".

The engineering report has assessed the flood risk to both the new dwelling and the family flat on site and concludes that:

"A minimum floor level of 600 mm above the natural ground level as measured at any point of the building footprint is considered adequate. The building footprint includes any access manholes and vents to any associated on-site wastewater management system. Minimum floor levels will be sufficient where land is subject to Level 4 flood risk, as this will mitigate any adverse effects by ensuring any house or other habitable structure is above flood waters and that people can still safely reside in the house/structure during and immediately after a flood event."

Other matters (Section 7 Resource Management Act 1991)

1. Assess your application against the following matters:

7.1 (a) kaitiakitanga:

Provision not relevant

7.1 (aa) the ethic of stewardship:

Provision not relevant

7.1 (b) the efficient use and development of natural and physical resources:

Provision not relevant

7.1 (ba) the efficiency of the end use of energy:

Provision not relevant

7.1 (c) the maintenance and enhancement of amenity values:

The effect of one main dwelling and a family flat on this site will provide for the family needs of the applicant and therefore increase his and his families enjoyment of the onsite amenity. The effects of the two dwellings on the surrounding area are considered to be similar or the same as one six bedroom dwelling which could be constructed as a permitted activity. However, the dynamics of the applicants family means a single six bedroom dwelling does not meet his or his families needs. The applicant and his immediate family need somewhere to live while the new house is being constructed and following their move into the main dwelling the family flat will be occupied by extended whanau. The two residential buildings will operate as one residential unit, sharing outdoor amenity and contained within one area of residential curtilage.

It is unlikely that the family flat will be visible from Wairau Bar Road. The nearest neighbour to the main dwelling has provided their written approval to the location of the main dwelling in relation to his boundary.

7.1 (d) intrinsic values of ecosystems:

Provision not relevant

7.1 (f) maintenance and enhancement of the quality of the environment:

Provision not relevant

7.1 (g) any finite characteristics of natural and physical resources:

Provision not relevant

7.1 (h) the protection of the habitat of trout and salmon:

Provision not relevant

7.1 (i) the effects of climate change:

Provision not relevant

7.1 (j) the benefits to be derived from the use and development of renewable energy

Provision not relevant

Treaty of Waitangi (Section 8 Resource Management Act 1991)

Assess your application against the principles of the Treaty of Waitangi (Te Tirti o Waitangi)

The principles of the Treaty are embodied in the principles and purpose of the RMA and in the statutory acknowledgement referral procedures.

The referral procedure provides the opportunity for matters of concern to be identified and addressed through the resource consent process.

Any matters arising are expected to be reported through this process which will allow the applicant and consent authority to respond to them in consultation with iwi.

Statutory instruments

I include an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1) (b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.

The assessment under this section must include an assessment of the activity against –
(a) Any relevant objectives, or policies in a document; and
(b) Any relevant requirements, conditions, or permission in any rules in a document; and
(c) Any other relevant requirements in a document (for example, in a national environmental standard or other regulations)

Statutes that are relevant to your proposed activity

Assessment under the Resource Management Act 1991

The proposal is in accordance with the RMA's Purpose and Principles.

Assessment under the National Policy Statement for Freshwater Management

The NPS for Freshwater Management requires consideration of the extent to which the discharge would avoid contamination of any freshwater ecosystem.

The nearest freshwater body is the Wairau River located approximately 40m to the south of the LAA. An engineer has assessed the wastewater system and receiving environment and determined the risk to waterways to be low. An assessment against the Setback Distance Matrix extracted from AS/NZS 1547:2012 Appendix R is presented in Appendix F of the Wastewater Report.

Assessment under the National Policy Statement on National Policy Statement for Highly Productive Land

The property is identified as having Land Use Capability (LUC) Class 2 soils. The NPS-HPL seeks to protect highly productive land from inappropriate use and development now and into the future.

The main dwelling is an expected and permitted land use on this site. The dwelling will contain four bedrooms. The family flat is proposed to meet the extended whanau living requirements for the applicant in a more appropriate way than constructing a six bedroom dwelling which would also be a permitted activity. The separate dwellings provide the applicant and his immediate family with accommodation while the main dwelling is being constructed. Following construction the family flat will provide supported living for extended family who will still be able to maintain a degree of independence. The family flat is located within the curtilage of the main dwelling and they will share outdoor residential amenity areas. The family flat is 97m2 in area.

As the family flat will be within the curtilage of the main dwelling and small in area, it can be considered to comply with S3.9(2)(g) which allow for the use of development of highly productive land where the use is a small scale activity and has no impact on the productive capacity of the land.

Assessment under the Marlborough Regional Policy Statement

There are no policies in the Marlborough Regional Policy Statement that have been found to vary from or make additional requirements to those in the proposed Marlborough Environment Plan. Assessment under the Marlborough Regional Policy Statement can therefore effectively be provided for by an assessment of the policies of the proposed Marlborough Environment Plan.

Assessment under the Proposed Marlborough Environment Plan

Volume 1 Chapter 14 Use of the Rural Environment

Policy 14.3.3 – Ensure that activities requiring a resource consent in a rural location are located in appropriate locations by avoiding remedying or mitigating adverse effects on:

(a) the life supporting capacity of soils, water, air and ecosystems;

The proposed development is not expected to result in impacts that result in increased negative effects than those presently experienced. Smart Alliances Ltd have carried out an engineering appraisal for the proposed development. It is assessed that the proposed wastewater and stormwater management systems are most appropriate with reference to the receiving environment.

(b) natural character of rivers, wetlands and lakes;

It is not anticipated that the proposed wastewater management system will impact the Wairau River based on the distance from the effluent field to the river, the nature of the receiving soil, the presence of established vegetation, and the conservative loading rates utilised.

(g) the character and amenity of the rural environment (including: noise, dust, visual, traffic, vibration and amenity effects), and effects on areas with specific amenity and rural character values; and

The proposed development is not assessed to result in increased negative effects than those presently experienced. Dust, noise, and increased traffic are anticipated in association with construction works. These are to be short term and within keeping of developments within the area.

Policy 14.4.1 – Subdivision, use and development of Marlborough's rural environments should be of a density, scale, intensity and location that individually and cumulatively recognises the following elements:

(a) a general lack of buildings and structures other than for primary production activities;

The proposed development has been assessed against other sites within the local area. Dwellings can be broadly summarised as being close to the road frontage, consisting of one large dwelling and multiple outhouses/sheds/garages, large distances between neighbouring dwellings, and immediately surrounded by garden planting followed by vineyards. The proposed development is not assessed to impact the surrounding areas productivity capacity.

(b) a very high ratio of open space in relation to areas covered by buildings;

The proposed development complies with all applicable standards with reference to permanent building coverage, having a site coverage of approximately 6%.

(c) open space areas in pasture, trees, vineyards, crops or indigenous vegetation;

The proposed development is not modifying existing pasture, trees, vineyards, crops or indigenous vegetation.

(d) areas with regenerating indigenous vegetation, particularly in the Marlborough Sounds;

The area for the proposed development does not contain indigenous vegetation.

(e) tracts of unmodified natural features, indigenous vegetation, streams, rivers and wetlands;

The proposed development is not anticipated to modify the Wairau River as the wastewater system is compliant with appropriate rules.

(f) farm animals and wildlife;

It is not anticipated that the proposed development will impact the surrounding environment's capacity to provide for farm animals and wildlife.

(g) noises, smells and sights of agriculture, viticulture, horticulture and forestry;

The applicant is aware of the existing land uses in the immediate area and do not anticipate any future problems. As the occupants on the family flat will be living in conjunction with the applicant and his immediate family in the main house, they will be aware of general farm noise and small.

(h) post and wire fences, purpose-built farm buildings and scattered dwellings;

The applicant is aware of the existing land uses in the immediate area and do not anticipate any future problems.

(i) low population density;

The main dwelling and family flat will accommodate up to 12 people. The main family dwelling could be extended to provide 6 bedrooms (12 people) as a permitted activity. The proposed density on the site is therefore not considered to compromise the rural amenity of the area.

(k) generally narrow carriageways within wide road reserves, often unsealed with open drains, low-speed geometry and low traffic volumes;

The applicant and his family have experience in driving the narrow carriageway along Wairau Bar Road. There are no known problems with the existing entranceway on to the property.

(l) a general absence of urban-scale and urban-type infrastructure, such as roads with kerb and channel, footpaths, mown berms, street lights or advertising signs; and

None of the above are included within the proposed development.

(m) the safe and efficient operation of the land transport network.

The proposed development is not anticipated to impact the operation of the land transport network.

Policy 14.4.2 – Retain an open and spacious character in Marlborough's rural environments with a dominance of open space and plantings over buildings by ensuring that the scale and siting of development is such that:

(a) it will not unreasonably detract from the privacy or outlook of neighbouring properties;

The nearest residential dwelling to the east at 336 Wairau Bar Road is approximately 140m from the proposed family flat. This area is characterized by established vegetation and large farm sheds. The proposed development is not expected to create any greater negative visual impact than what is already present. Given the rural nature of the site, it is consistent with local development patterns for dwellings to be concentrated in one portion of the property.

The neighbour to the east has provided his written approval to the development.

There is a distance of approximately 70m from the western elevation of the proposed dwelling to the Wairau Pa Marae buildings on the adjoining property to the west. Both the marae and the applicant have trees along the common boundary which further enhances each properties privacy.

(b) sites remain open and with a rural character as viewed from roads and other publicly accessible places; and

The main dwelling and family flat will comprise approximately 6% site coverage. They will be located close together and share outdoor amenity space. The family flat is situated to the south of the main dwelling and is thus obscured from view from the Wairau Bar Road. The shed may be visible from the road, however sheds are an anticipated and permitted land use in rural areas. Containing the main dwelling and the family flat within the same curtilage promotes the retention of the sites open rural character.

(c) the character and scale of buildings is compatible with existing development within the rural area.

The proposed development footprint is within keeping of the surrounding developments.

Policy 14.4.3 – Ensure buildings are set back a sufficient distance from property boundaries and road frontages to:

(a) maintain privacy and outlook for people on adjoining allotments, including for existing houses on small allotments;

The proposed development is compliant with reference to the setback distance for the front boundary. There are no dwellings to the north of the site within a great distance (over 2km), for this reason those included within the impact assessment for this issue are the public using the Wairau Bar Road. The proposed development utilises the existing vegetation to maintain privacy for both road users and occupants. The flat is obscured from view by the main dwelling. A main dwelling visible from the road can be expected on any rural site.

There is ample space and trees between the dwellings and the marae to the west. The owner of the property to the south has provided their written approval.

(b) encourage a sense of distance between buildings as well as between buildings and road boundaries;

The proposed development is to be situated slightly further away from Wairau Bar Road than the existing dwelling. This will reduce the potential for a feeling of encroachment experienced by public using the Wairau Bar Road.

(c) maintain the pleasantness, coherence, openness and attractiveness of the site as viewed from the road and adjoining sites; and

This has been addressed above.

(d) manage any potential reverse sensitivity effects.

The main dwelling and family flat will be occupied by the applicant and his family all of whom are accustomed to the expected impacts of farming activities.

Policy 14.4.10 – Control the establishment of residential activity within rural environments as a means of avoiding conflict between rural and residential amenity expectations and avoiding reverse sensitivity effects on existing activities.

The current dwelling is among a small area of development with reference to buildings and associated amenities followed by established paddocks and vineyards. There has been a

residential dwelling at the site for over 50 years and residential activity is therefore well-established and it is not anticipated that the proposed development would result in sporadic spreading of residential activity.

The proposed development is not anticipated to result in reverse sensitivity effects in the area.

Volume 1 Chapter 16 Waste

Policy 16.2.5 – In deciding whether to grant resource consent for any discharge of solid waste to land and the need to impose conditions to avoid, remedy or mitigate adverse effects, decision makers need to determine whether there will be:

(a) soil or groundwater contamination from the accumulation or leaching of heavy metals, hazardous substances or other contaminants;

The proposed wastewater system is compliant with PMEP Chapter 3 Rule 3.3.30.3. with contamination assessed to be considered low risk as the septic tank is of good size (4,500l) and application beds are heavily planted.

(b) contamination of waterbodies through run-off of sediment or leachate;

The risk to surface water is minor as a good separation distance from the point of discharge (approximately 40m) to the closest water body is provided. A functioning system provides little risk to water sources. There is a considerable reserve area should the system be underperforming and require extending. The daily loading rate is conservatively designed.

(c) erosion, land instability and/or run-off of sediment into waterbodies due to land disturbance activities associated with the activity;

The risk to groundwater is minor as a good separation distance from the point of discharge (in excess of 1m) is provided. A functioning system provides little risk to water sources. There is a considerable reserve area should the system be underperforming and require extending. The daily loading rate is conservatively designed.

(d) adverse effects on public health or amenity; or

Cumulative effects are not considered to be a risk as there are good separation distances to other discharges in the area. Risks to human health is considered to be less than minor as the LAA is not in an area frequented by the house occupants and the effluent will be assimilated within the disposal area.

(e) adverse effects to the mauri of ecosystems, wāhi tapu sites and other sites of cultural significance by discharges of sediment or leachate onto or into land.

A functioning system provides little risk to water sources.

Policy 16.3.1 – Ensure that wastewater management systems are designed, located and installed to effectively treat and/or contain the contaminants present in wastewater.

Based on the nature of the receiving soil, the presence of established vegetation, and the conservative loading rates utilised, the provided setback and wastewater management system is considered adequate.

Policy 16.3.4 – When considering discharge permit applications to discharge contaminants onto or into land, have regard to, as relevant to the discharge:

(a) the extent of treatment prior to discharge;

A minimum of 4,500L primary treatment unit is recommended for the site, the treated effluent quality will generally achieve or better the following results:

- BOD after 5 days (average) < 100 g/m3
- Suspended solids (average) < 60 g/m3

(b) the location of the land application area and the sensitivity of the receiving environment;

A total areal loading of 158.4m2 minimum will be required for the LAA. Two 20.0m long by 4.0m wide planted shallow beds are proposed to be contracted and are to be placed a minimum of 1m apart from side wall to side wall. The installation of the disposal beds is to be in accordance with the product installer guide supplied by the manufacturer. The LAA is located in excess of 8m from the landward toe of the stopbank to the south.

Cumulative effects are not considered to be a risk as there are good separation distances to other discharges in the area.

(c) the method of distribution to and within the land application area following treatment;

As detailed within the Smart Alliances Ltd Engineering Report, the on-site wastewater management system has been designed in accordance with AS/NZS 1547:2012 – on-site domestic wastewater management. The site assessment identified that on-site wastewater disposal by a primary treatment unit coupled with land application through planted shallow beds is considered appropriate, given the site constraints and the soil conditions. Based on the nature of the receiving soil, the presence of established vegetation, and the conservative loading rates utilised, the provided setback is considered adequate.

(d) alternative options for managing the contaminants, including discharge to an alternative location or to a reticulated community sewerage system;

The primary treatment system with planted shallow beds is considered appropriate on the nature of the receiving soils.

(e) the need for reserve land application areas;

There is a considerable reserve area should the system be underperforming and require extending. The daily loading rate is conservatively designed.

(f) site constraints, including geology, topography, slope, climate and presence of waterbodies or structures;

(g) relevant guidelines and standards; and

The Smart Alliances Ltd Engineering Report, includes an assessment of the proposed system against the PMEP rules, objectives, and policies (see appendix G of attached report).

(h) potential cumulative effects.

Cumulative effects are not considered to be a risk as there are good separation distances to other discharges in the area.

Policy 16.3.6 – Avoid the use of soak pits for the disposal of contaminants in liquid waste.

The proposed wastewater system does not include soakpits.

Additional information

Applications affected by Section 124 or 165ZH(1)(c) of the Resource Management Act 1991

Does this application relate to an existing consent held by the applicant which is due to expire, and the applicant is to continue the activity?

No - this application does not relate to an existing consent

Section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011

Is the proposed activity to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011?

No - the proposed activity does not occur in such an area

Additional information required for subdivision consent

Does your application include one or more consents for subdivision?

No

Additional information required for application for reclamation

Does your application include one or more consents for reclamation?

No

Plans and technical reports

Report type	Report title	Author	External refere…	Keywords	Document
Consent notice/Covenant	Consent notice	-	-	-	consent notice _.pdf (167 kB)
Engineering report	Engineering Report 318 Wairau Bar Road, Lower Wairau	Smart Alliances Ltd	9665-RPT-Eng-01	-	9665-RPT-Eng-01.pdf (12 MB)
Record of title	-	-	-	-	record of title.pdf (196 kB)

Site Plan	Design SR	Simon Reeve	-	-	WD's McDonald Site Plan.pdf (130 kB)
Building plans	McDonald Shed	Simon Reeve	-	-	McDonald Shed 11.05.2024.pdf (2 MB)
Building plans	McDonald House	Simon Reeve	-	-	McDonald House 03.08.2024.pdf (4 MB)

Affected person approvals

Have you obtained affected person(s) approvals?

Yes - I have obtained affected person(s) approvals

Affected person approval obtained from

Property details of affected person(s)

336 Wairau Bar Road
Spring Creek
Marlborough
New Zealand

Person

Brigham MacDonald

Is the affected person an owner, occupier or special interest group?

Owner

Document

9665 - APA.pdf (262 kB)

Iwi

Have you obtained approvals from iwi?

No - I have not obtained approvals from iwi

Public notification (Section 95A(2)(b)) of the Resource Management Act 1991

Is public notification of the application requested by the applicant?

No - public notification of application is not requested

Lodgement fee

> Please see Marlborough District Council's fees page for more information.

Payment ID Code

0WOROL

Do you require a GST receipt for a bank payment?

Yes - I do require a GST receipt for a bank payment

If further charges are incurred, please invoice

Applicant

If refunds are applicable, please refund

Applicant

Fee comments

-

Declaration

I confirm that the information provided in this application and the attachments are accurate.

Yes

Authorised by (your full name)

Lizzie Wilkinson

Authorising person is:

Person authorised to sign on behalf of the applicant

Note to applicant

You must include all information required by this form. The information must be specified in sufficient detail to satisfy the purpose for which it is required.

You may apply for 2 or more resource consents that are needed for the same activity on the same form. If you lodge the application with the Environment Protection Authority, you must also lodge a notice in form 16A at the same time.

You must pay the charge payable to the consent authority for a resource consent application under the Resource Management Act 1991 (if any).

If your application is to the Environment Protection Authority, you may be required to pay actual and reasonable costs incurred in dealing with this matter (see section 149ZD of the Resource Management Act 1991).

Privacy information

The information on this form is required to be provided under the Resource Management Act 1991. A failure to provide this information means the Marlborough District Council will not be able to process your application. Council holds and stores the information, including the form and all associated reports and attachments, on the Council property files and internally by the Council. If you would like to request access to, or correct any details, please contact us.

The details of your application and any related communications will be made available to the public on the Council property files. If there is any communication or information that you would like to remain confidential, please note this in your communications with Council officers, or contact the Council's Privacy Officer at privacy@marlborough.govt.nz. Please note that your (the applicant) main details (name and address) can not be confidential.

For further information on your privacy rights, please see the Councils Privacy Statement.

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Engineering Report

Ryan MacDonald

318 Wairau Bar Road, Lower Wairau

October 2024 Issue 01 Our Ref: 9665

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Appendix B: Scala Penetrometer Test Results
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Appendix F: Setback Distance Matrix from AS/NZS 1547 Appendix R
Appendix G: Resource consent rules objectives and policies
Appendix H: Liquefaction Analysis

Document Control

Issue	Date	Detail	Author	Reviewed	Approved
01	16/10/24	Issued to Client	DR	RE	RE

1 Outline Recommendations

Smart Alliances Ltd have carried out an engineering appraisal of the ground conditions, excavation and fill, removal and retention of vegetation, access, stormwater control, the on-site wastewater management system, and water supply for the proposed new dwelling and Flat at 318 Wairau Bar Road, Lower Wairau (LOT 1 DP 571054).

The following recommendations must be read with respect to the balance of this report, the context of the proposed development and shall not be read in isolation.

A. Our recommendation is that a Hybrid TC2/TC3 type foundation building platform is created with the removal of 400mm of soil within the proposed building platform area and forming a minimum 600mm high reinforced gravel raft. The use of geo-fabric and geo-grid will be required to be placed within the raft layers. A TC2 type waffle slab designed to 200kPa (ultimate) is recommended for construction on top of the platform.

   An engineer should inspect the foundation cut prior to backfilling to confirm bearing and should observe the fill and reinforced gravel raft.

B. It is not anticipated that significant earthworks will be required for the proposed development. General excavation and filling recommendations have been provided.

C. Stormwater collected from the various roof areas should be directed to soak pits. One conventional rock-filled soak pit with the dimensions 3.1m x 3.1m x 1.8m (width-length-depth) will be required to service the stormwater discharge of the dwelling.

   Another conventional rock-filled soak pit with the dimensions 2.3m x 2.3m x 1.8m (width-length-depth) will be required to service the stormwater discharge of the flat. The soak pit should maintain minimum setbacks of 3m from foundations and 2m from boundaries.

D. The wastewater management system for the dwelling and the flat should comprise a primary treatment unit combined with planted shallow beds. A minimum disposal area of 158.4m^2 will be required. Two 20.0m long by 4.0m wide planted shallow beds are proposed to be contracted and are to be placed a minimum of 1m apart from side wall to side wall. Installation is to be carried out to meet AS/NZS 1547:2012.

E. A minimum floor level of 600 mm above the natural ground level as measured at any point of the building footprint is considered adequate. The building footprint includes any access manholes and vents to any associated on-site wastewater management system.

2 Introduction

Our client proposes the construction of a residential dwelling and a flat at their property, located at 318 Wairau Bar Road, Lower Wairau (LOT 1 DP 571054).

The purpose of this report is to present the results of the site investigation carried out in relation to the foundation conditions for the dwelling and flat, the expected excavation or filling, removal and retention of vegetation, access, stormwater disposal, the on-site wastewater disposal and water supply for the proposed development. Details of the development at the site are shown on the site plan presented in Appendix A of this report.

The site investigation was carried out on 23rd January 2023.

The proposed development will consist of a four-bedroom dwelling and a two-bedroom flat. The on-site wastewater outlined in this report was therefore designed to accommodate a six-bedroom dwelling.

3 Location & Site Description

The property is located at 318 Wairau Bar Road, Lower Wairau (LOT 1 DP 571054), with the proposed building site located in the northern extent of the site.

The property is accessed directly from Wairau Bar Road to the south. Access to the proposed build site is provided by means of a driveway off Wairau Bar Road.

An existing dwelling is located at the eastern portion of the subject property, this dwelling is going to be demolished, and the new dwelling will be constructed close to original dwelling's location on the site. The site is generally flat and is well vegetated with various trees, shrubs, and grass.

The Wairau River is located approximately 40m to the southwest of the investigation site. A stopbank is in place along the southern boundary of the property.

Photographs of the site are shown in Figures 1 through 5 below. A site plan showing the main features of the site is attached in Appendix A.

Figure 1: Photo looking south across existing dwelling and driveway.

Figure 2: Photo looking north across proposed new dwelling location.

Figure 3: Photo looking south at the existing stopbank.

Figure 4: Photo looking south-east across proposed flat location.

Figure 5: Photo looking north-west, towards the potential Land Application Area.

4 Geotechnical Assessment and Ground Conditions

The subsurface conditions relating to the site have been determined by a desktop review of the available site information, the conducting of seven Scala Penetrometer tests labelled from PT01 to PT07, and two hand auger tests labelled AG01 to AG02. The locations of the test positions can be found in the Test location plan attached.

The GNS Science New Zealand Geology Web Map (1:250k) indicates that the site is underlain by Holocene swamp deposits consisting of swamp deposits consisting of poorly consolidated silt; mud; peat and sand; and Holocene river deposits consisting of well sorted floodplain gravels. A review of the available investigation data for the area and site-specific tests indicates a subsoil profile consisting of 0.30m of silt loam TOPSOIL, then gives way to a SILT loamy unit extending to a depth of 0.70m below the existing ground level, before transitioning into a sandy CLAY loam/silty CLAY with fine sand layer, consistent with the expected geology of the area. A profile of the hand auger test completed on site is attached. No groundwater was encountered during the site investigation.

According to the Marlborough District Council Liquefaction Assessment Guideline, the site is located within Liquefaction Investigation Zone B (LIZ B). The potential for seismically induced liquefaction is most often recognised in geologically recent, saturated, uniformly graded fine-grained sands and coarse silts. The actual manifestation of liquefaction in any site is however difficult to predict, as relatively small variations in soil density and grading can alter liquefaction susceptibility. The nature of a particular earthquake, the induced ground acceleration and length of sustained shaking, will also determine whether an area will sustain any liquefaction induced settlement or ground damage.

A Liquefaction triggering analysis has been conducted on complying CPT test data collected in June 2018 within the property. As part of our site investigation, we have confirmed that the subsoils on the subject site are similar to the site from which the CPT data has been analysed. In our Geo-professional Opinion, the liquefaction risk and expected performance of the subject site is within the same magnitude as that of the CPT tested site. The resulting performance data does not preclude the development of the site for residential occupation.

The analysis of the CPT data was carried according to the recommendations outlined in the Marlborough District Council Liquefaction Assessment Guideline (September 2021). The analysis was carried out utilising Cliq (v.3.5.2.22) geotechnical software and was undertaken for Serviceability Limit State (SLS), Intermediate Limit State (ILS) and

Ultimate Limit State (ULS) using the Design Peak Ground Accelerations outlined in Table 1.

Table 1: PGA Values for Assumed Design Conditions. As taken from MDC Liquefaction Assessment Guidelines (2021)

Design Condition	Earthquake Return Period (years)	Design Peak Ground Acceleration (PGA)	Earthquake Moment Magnitude (M_w)
SLS	25	0.12g	6.4
ILS	100	0.26g	6.8
ULS	500	0.52g	7.3

In order to assess the theoretical liquefaction risk of the site, the analysis was conducted to determine the potential "free-field" ground settlement and the Liquefaction Severity Number (LSN) for the site. The liquefaction triggering analysis was undertaken using the "simplified procedure" outlined by Boulanger & Idriss (2014). The liquefaction-induced "free-field" vertical volumetric strains were estimated using the methods outlined by Zhang, et al. (2002). Default assessment values were utilised within CLiq during the liquefaction analysis. These included, but not limited to, assuming the existing ground level is level, a Cfc parameter of 0.0, a PL parameter of 16% and the application of a Soil Behaviour Type Index (Lc) cut-off of 2.6.

The LSN (van Ballegooy, et al, 2013) represents an assessment of the vulnerability of land to liquefaction-induced damaged. The value takes into account the depth of the potential liquefiable layers, with shallow layers having a greater influence on the LSN. The expected degree of liquefaction-induced ground damage is categorised in three LSN value ranges, as adapted in the MDC Liquefaction Assessment Guidelines. The expected ground damage ranges are outlined in Table 2.

Table 2: LSN Range and Expected Liquefaction-Induced Ground Damage. As taken from MDC Liquefaction Assessment Guidelines (2021).

LSN	Expected Liquefaction-induced ground damage category
<13	None to Minor
13 – 18	Minor to Moderate
18+	Moderate to Severe

A conservative groundwater depth of 1.50m was utilized during the analyses.

The results of the liquefaction analysis are attached in Appendix H and a summary of the results are presented in Table 3.

Table 3: Summary of Liquefaction Analysis

Liquefaction Analysis Parameter	Assumed Design Conditions -Peak Ground Acceleration (PGA)		
	SLS - 0.12g	ILS - 0.26g	ULS - 0.52g
Liquefaction Severity Number (LSN)	<9 (Little to no expression)	27 – 34 (moderate to severe)	27 – 34 (moderate to severe)
Vertical Settlements (mm)*	9 - 62	83 - 185	85 - 185
Lateral Displacement Index - LDI (mm)*	17 - 438	985 - 2069	989 - 2070

*Values are rounded to the nearest 5mm. The calculation assumes that no sand boils are present.

Although LDI has displacement's units, this value only provides an index to quantify potential lateral displacements for a given soil profile, soil properties, and earthquake characteristics, (earthquake ground motions (PGA) and earthquake magnitude). Lateral spreading is a highly complex process depending on both LDI and geometric parameters

such as: free-face height and distance from the base of the free-face to the point of interest.

Liquefaction-induced lateral ground displacement occurs predominantly in the vicinity of watercourses where liquefied soil can laterally displace towards the watercourse. The extent of the ground displacement is dependent on the nature of the earthquake and the geology as similar to those in liquefiable areas. The closest watercourse is Wairau River, located approximately 70m to the southwest of the building site.

The Wairau River channel has a moderate depth(±2m) and width (±80m) with moderately sloping banks. The wet stream channel has a depth of ±1.5m and the channel has vertical sides.

The proposed development area on the site is located approximately 70-90m to the north-east of the river edge.

The results of the liquefaction analysis further indicated that the Liquefaction Potential Index (LPI) and the Liquefaction Probability was low under SLS, high to very high for ILS and ULS conditions.

It is considered that liquefaction induced settlements of up to 60mm under Serviceability Limit State (SLS) conditions and up to 185mm under Ultimate Limit State (ULS) conditions can be expected. The water table was considered at 1.50m depth.

Evaluating the lateral spreading with a groundwater depth of 1.50m, free face height of 2.00m and the Lateral Displacement Index for these values, shows a lateral displacement less than 50mm for SLS Condition and greater than 100mm in ULS Condition.

Lateral displacement for a free face height of 2.00m and SLS and ULS conditions are shown in Figures 1 and 2 below.

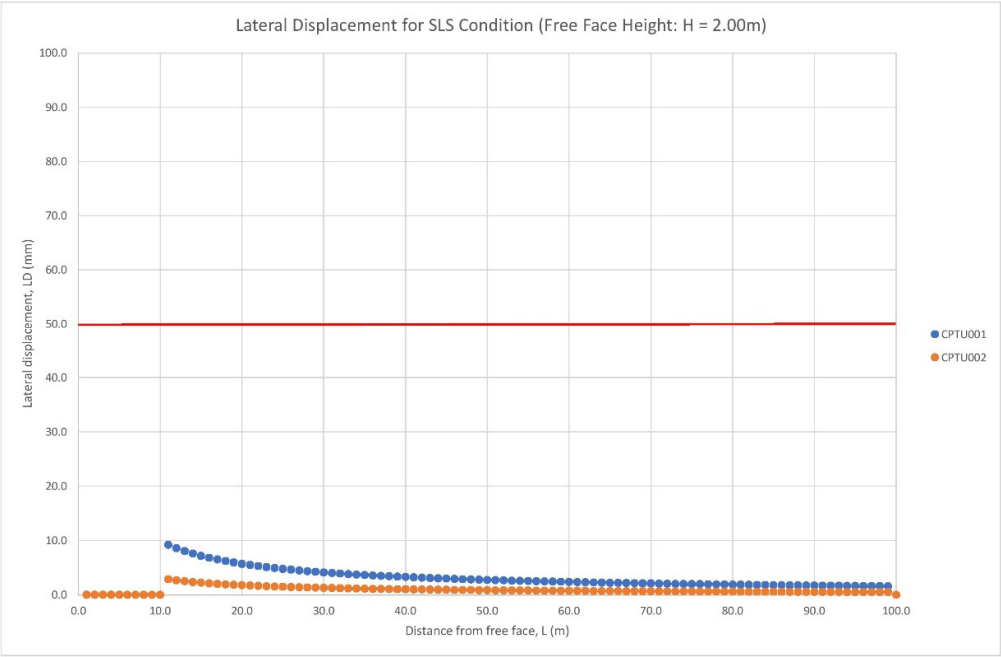


Figure 6: Lateral Displacement for SLS Condition and Free Face Height of 2.00m.

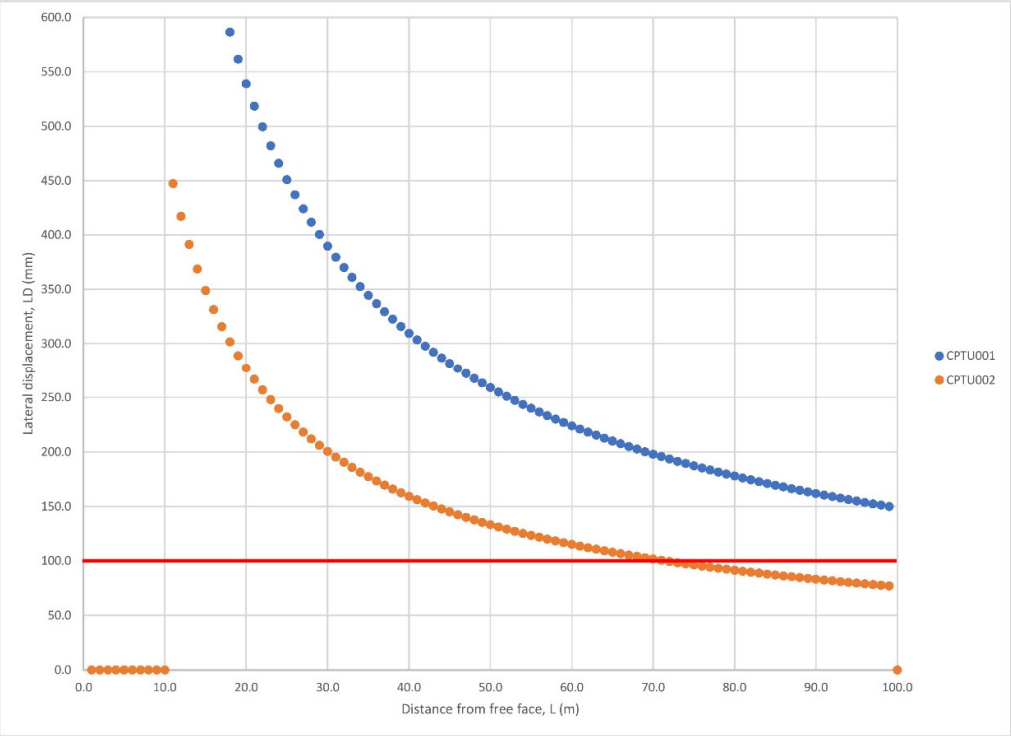


Figure 7: Lateral Displacement for ULS Condition and Free Face Height of 2.00m.

Review of the physical characteristics of the site as well as the depth and magnitude of the expected liquefaction on the site indicates that the incidence of lateral spread is considered to be in the moderate global lateral movement category and moderate lateral stretch category for distances greater than 70m.

On the basis of the foregoing, it is considered that an engineer designed foundation with reference to the attached results is necessary for any house construction.

The results of the Scala Penetrometer tests were interpreted using the procedure presented by MJ Stockwell in 'Determination of Allowable Bearing Pressure Under Small Structures' – NZ Engineering, June 1977. The testing indicated that the subsoil profile exhibited a soil bearing resistance of 200kPa (ultimate bearing capacity) at depths in excess of 1,450mm and 300kPa (ultimate bearing capacity) at depths in excess of 1,950mm below ground level. The ground does not meet the NZS3604:2011 definition of good ground and an engineered solution that complies with the New Zealand building code should be applied. A full set of the Scala Penetrometer results is attached.

Based on the potential settlement values, we consider the site is suitable for development as long as the foundations are designed by a chartered engineer with regards to the scala penetrometer test results and the calculated limit states for liquefaction/ lateral spread potential identified.

The site is considered that under ULS conditions, liquefaction induced settlement of up to 185mm can be expected and should be designed for. Due to the proximity of the Wairau River, lateral spread under ULS has been calculated to 200mm.

According to the Marlborough District Council Further Info 50 Year Flood Standard, the site is located within a Level 4 (Level R according Marlborough District Council Flood Hazard Area) hazard status. Level 4 hazard areas have the potential to suffer flooding of deep, fast flowing water in an extreme flood event that overwhelms stopbanks and other constructed flood defences. Level 4 is an extreme flood event and is rarer than a flood with an annual recurrence interval of 1 in 100 years.

A minimum floor level of 600 mm above the natural ground level as measured at any point of the building footprint is considered adequate. The building footprint includes any access manholes and vents to any associated on-site wastewater management system.

Minimum floor levels will be sufficient where land is subject to Level 4 flood risk, as this will mitigate any adverse effects by ensuring any house or other habitable structure is above flood waters and that people can still safely reside in the house/structure during and immediately after a flood event.

Our recommendation is that a Hybrid TC2/TC3 type foundation building platform is created with the removal of 400mm of soil within the proposed building platform area and forming a minimum 600mm high reinforced gravel raft. The use of geo-fabric and geo-grid will be required to be placed within the raft layers. A TC2 type waffle slab designed to 200kPa (ultimate) is recommended for construction on top of the platform.

An engineer should inspect the foundation cut prior to backfilling to confirm bearing and should observe the fill and reinforced gravel raft.

The conclusions and recommendations reported on have been on subsurface tests using hand-operated equipment. Although the opinions expressed in this report are based on the interpolation and extrapolation between the test locations, no guarantee as to the validity of this inference or the nature and continuity of the subsurface materials can be made, and the possibility that variation from the assumed conditions between the test locations may occur and cannot be ruled out. If substantial variation between the assumed conditions expressed in this report is encountered, then it is recommended that Smart Alliances be consulted in order to establish whether any revisions to the recommendations for the proposed development should be adopted.

5 Site Excavation and Fill

It is not anticipated that significant earthworks will be required for the proposed development. Additional earthworks to be undertaken on the property are expected to include:

- Excavation for the proposed dwelling and flat foundations,
- Trenching for general services
- Trenching of the stormwater disposal
- Trenching and excavation for the wastewater treatment and disposal system.

It is expected that only minor vegetation clearing will be conducted during the proposed development of the site. This is anticipated to be limited to grass and minor shrubs. It is recommended that, following the development of the site, planting be conducted to improve the vegetation cover on any exposed slopes to further reduced the potential for erosion and slope instability

While there are no specific recommendations for the site development, a number of general recommendations / measures should be incorporated into the development. These are outlined as follows:

- Structural fill areas should be designed by an engineer.
- Any exposed surfaces should be retained or planted as soon as possible after excavation.

Given the nature of the soil material on site, it is not recommended that the excavated material be utilised as structural fill. All excavated material should either be spoiled or utilised as non-structural fill.

General requirements for excavation and filling on site are outlined as follows:

- Areas of proposed fill should be cleared of vegetation and benched prior to filling to create a stable filling platform.
- All topsoil stripped from the development area shall be stockpiled on site to use for landscaping. The topsoil shall be screened prior to reuse and shall be lightly rolled following placement. All loose stones shall be removed from the topsoil surface.
- The contractor shall excavate to the extent and levels as required by the scope of works with the excavated soil being stockpiled on site and used as fill as directed.
- The excavated areas shall be kept free of excess moisture and traffic.
- Any area determined unsuitable due to damage shall be over excavated and backfilled at the contractor's expense.
- Following the completion of excavation to desired levels, the subgrade shall be rolled to the approval of the engineer.
- Engineered fill material shall be placed and compacted in uniform near horizontal layers not exceeding 150mm uncompact thicknesses. Fill material shall not be placed during or immediately following wet weather, or on saturated ground.
- Compaction of fill shall be carried out at water content appropriate to the compaction plant.
- Fill forming batter slopes must not be placed and compacted at slopes greater than 1V:1.5H
- Non-structural fill material excavated from site such as that of clay base known to be in the area can be used as fill as long it is placed and compacted with a padfoot roller in 150mm layers and is not within 1m of the proposed dwelling footprint.
- All earthworks on site shall be conducted in a manner as to control all stormwater discharge so that all sediment is contained on site and not be discharged to any drains or waterways.

Provided recommendations outlined above are adhered to then we consider the site suitable for the proposed excavation and filling.

6 Access

Access to the site is currently provided from the northern boundary via an unsealed driveway off the Wairau Bar Road. The driveway must be extended to provide adequate year-round access to both buildings. Regular maintenance of the driveway and roadside swale is expected.

7 Proposed Stormwater Management

No reticulated stormwater network is available in proximity to the property. Stormwater management will be via ground soakage. The stormwater from the roofed areas should be directed to a suitably sized soak pit.

The site investigation, as outlined in Section 4, indicated that the in-situ soils consisted of sandy CLAY loam/silty CLAY with fine sand, corresponding to a Category 4 soil (as per AS/NZS1547:2012).

The first soak pit calculation is based on a dwelling with a total roof area of 326m^2, incorporating the proposed new four-bedroom unit. One conventional rock-filled soak pit with the dimensions 3.1m x 3.1m x 1.8m (width-length-depth) will be required to service the stormwater discharge.

A second soak pit calculation is based on a flat with a total roof area of 176m^2, incorporating the proposed new two-bedroom unit. One conventional rock-filled soak pit with the dimensions 2.3m x 2.3m x 1.8m (width-length-depth) will be required to service the stormwater discharge.

The soak pits should maintain minimum setbacks of 3m from foundations and 2m from boundaries. A soak pit calculation sheet is attached as Appendix D.

8 Wastewater Assessment

8.1 Wastewater system

No reticulated wastewater system is available within the vicinity of the site. The site will require a suitable on-site wastewater disposal system to ensure the adequate treatment and disposal of the generated wastewater.

The site investigation identified that a primary treatment system with disposal by means of planted shallow beds would be appropriate. It is proposed to locate the Land Application Area (LAA) along the flat area to the west of the building platform. A Setback Distance Matrix was completed and the proposed LAA maintains all minimum setback distances identified (see Appendix F). See Drawing 9665-C01 in Appendix A.

8.1.1 Site and Soil Assessment

The site was assessed by means of a desktop review of the available site information, a visual assessment of the site and the intrusive investigation by means of machine-excavated pit tests. The site is generally flat and is well vegetated with various trees, shrubs, and grass.

A proposed Land Application Area (LAA) was identified along the flat area to the west of the building platform. The proposed LAA is well vegetated and is exposed to sun and wind to allow adequate evapotranspiration to occur. The LAA would be located away from frequented areas. Sufficient reserve area will also be available if required.

The Wairau River is located approximately 40m to the southwest of the investigation site. A stopbank is in place along the southern boundary of the property. Boreholes P28w/1616, P28w/2778 and P28w/0283 are located close to the east boundary of the property, in excess of 50m northeast of the LAA.

The water supply for the property will be sourced via Bore or Well supply.

The general soil profile for the site was assessed through the conducting of two machine excavated test pits. The general subsoil profile consisted of SILT loam / sandy CLAY loam. A copy of the auger logs and the exposed profiles are included in Appendix C. The soils correspond to conservative drainage categories of Category 4 as per the AS/NZS 1547:2012 classification. A category 4 soil is adopted for the design of the proposed on-site wastewater management system.

No mottling of the soil profile was noted, and no water table was encountered on the site.

8.1.2 Site Considerations and Constraints

Groundwater was not encountered within the subsurface investigation reported herein.

The Wairau River is located approximately 40m to the southwest of the investigation site. A stopbank is in place along the southern boundary of the property. Boreholes P28w/1616, P28w/2778 and P28w/0283 are located close to the east boundary of the property, in excess of 50m northeast of the LAA.

8.2 System Design

The on-site wastewater management system has been designed in accordance with AS/NZS 1547:2012 – on-site domestic wastewater management. The site assessment identified that on-site wastewater disposal by a primary treatment unit coupled with land application through planted shallow beds is considered appropriate, given the site constraints and the soil conditions.

See Drawing 9665-C01 for location outlining the proposed system attached as Appendix A.

8.2.1 Wastewater Design Criteria

In order to accommodate the total potential discharge on the site, on-site wastewater system discussed in the following sections has been designed for a four-bedroom dwelling and a two-bedroom flat. Allocating a potential for two persons to occupy each bedroom, the total discharge for the site is a maximum of 1,980 litres/day (12 persons at 165 litres/person/day – with standard water reduction fixtures in the house).

It has been assumed that the majority of fixtures to be utilised in the house will be standard water reduction fixtures such as dual flush water closets, shower-flow restrictors, aerator faucets and water-conserving automatic washing machines.

Table 4 below shows the design summary.

Table 4: Wastewater Design Summary

Number of proposed bedrooms	6
Number of Occupants (2 per bedroom)	12
Intended water supply	Bore or Well Supply
L/person/day	165 (Std water reduction fixtures)
Daily design flow (L/day)	1,980
Soil category	4
Design Loading Rate (DLR) (mm/day)	12.5mm

8.2.2 Treatment System

A minimum of 4,500L primary treatment unit is recommended for the site, the treated effluent quality will generally achieve or better the following results:

- BOD after 5 days (average) < 100 g/m3
- Suspended solids (average) < 60 g/m3

The construction and installation of the selected system must comply with all relevant New Zealand standards.

Suitable access to the treatment units must be maintained to allow for regular maintenance and servicing.

8.2.3 Disposal System

Based on the design daily loading rates, the following has been calculated:

Table 5: Disposal System Requirement

Number of Bedrooms	Number of Occupants	Design Flow (Litres/day)	Design Irrigation Rate (DIR) (mm/day)	Drip Line Area Requirement (m^2) (Areal Loading)
6	12	1,980 L/day	12.5mm	158.4m^2

A total areal loading of 158.4m^2 minimum will be required for the LAA (a wastewater calculation sheet is attached in Appendix E). Two 20.0m long by 4.0m wide planted shallow beds are proposed to be contracted and are to be placed a minimum of 1m apart from side wall to side wall.

The installation of the disposal beds is to be in accordance with the product installer guide supplied by the manufacturer.

The location for the proposed LAA is seen on Drawing 9665-C01 attached as Appendix A.

Given the nature of the site, the final layout will need to be confirmed on site with the selected drainlayer.

Stormwater discharge from the dwelling and any hardstand areas should be directed away from the proposed LAA. No additional stormwater controls were considered necessary.

As the wastewater system is in a flood hazard area level 4, the vents need to be above 600mm and the caps sealed to prevent flood water entering the system.

Prior to the proposed system becoming operational, the system installer must certify that the system has been constructed according to the design. This certification must then be forwarded to Council.

8.2.4 *Consideration of Alternative Systems*

The primary treatment system with planted shallow beds is considered appropriate on the nature of the receiving soils.

8.3 Environmental Assessment and Risk Mitigation

The risk to groundwater is minor as a good separation distance from the point of discharge (in excess of 1m) is provided. A functioning system provides little risk to water sources.

The Wairau River is located approximately 40m to the southwest of the investigation site. A stopbank is in place along the southern boundary of the property. Boreholes P28w/1616, P28w/2778 and P28w/0283 are located close to the east boundary of the property, in excess of 50m northeast of the LAA.

Based on the nature of the receiving soil, the presence of established vegetation, and the conservative loading rates utilised, the provided setback from the is considered adequate.

Cumulative effects are not considered to be a risk as there are good separation distances to other discharges in the area.

Risks to human health is considered to be less than minor as the LAA is not in an area frequented by the house occupants and the effluent will be assimilated within the disposal area.

There is a considerable reserve area should the system be underperforming and require extending. The daily loading rate is conservatively designed.

Provided the proposed system is installed, operated and maintained, any effects on the environment will be in accordance with the environmental outcome provided for by the Council guidelines. A maintenance schedule in line with the system provider's specifications should be engaged to an appropriate and qualified provider which will ensure the onsite wastewater system is operating to a suitable standard.

An assessment against the Setback Distance Matrix extracted from AS/NZS 1547:2012 Appendix R is presented in Appendix F.

9 Limitations

This report has been prepared for Ryan MacDonald (our Client) with respect to geotechnical investigations/environmental site assessments in support of their application for Resource Consent, Building Consent or other to Marlborough District Council relating to the construction of a residential dwelling and a flat at 318 Wairau Bar Road, Lower Wairau (LOT 1 DP 571054). The report is valid for a period of five years from the date of issue. The reliance by other parties on the information or opinions in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

The recommendations expressed herein have been prepared with respect to the construction of a residential dwelling and a flat at the site and should not be taken out of context.

This report may not be read or reproduced except in its entirety

References

1. NZS 1547:2012 On-site Domestic Wastewater Management.
2. Marlborough District Council Liquefaction Assessment Guidelines. September 2021
3. Crites, R.W. and Tchobanoglous. Small and Decentralised Wastewater Management Systems. WCB/McGraw-Hill, 02/04/1998
4. Liping Pang (ESR Christchurch). Microbial removal rates in subsurface media estimated from published studies of field experiments and large intact soil cores. J.of Environmental Quality. Vol 38. July-Aug 2009. pp 1531-1559.
5. The Proposed Marlborough Environment Plan.

SMART ALLIANCES LTD

Diego Rafael Zapata
Geotechnical Engineer

Richard Evans
Chartered Professional Engineer

Appendix A: Drawings

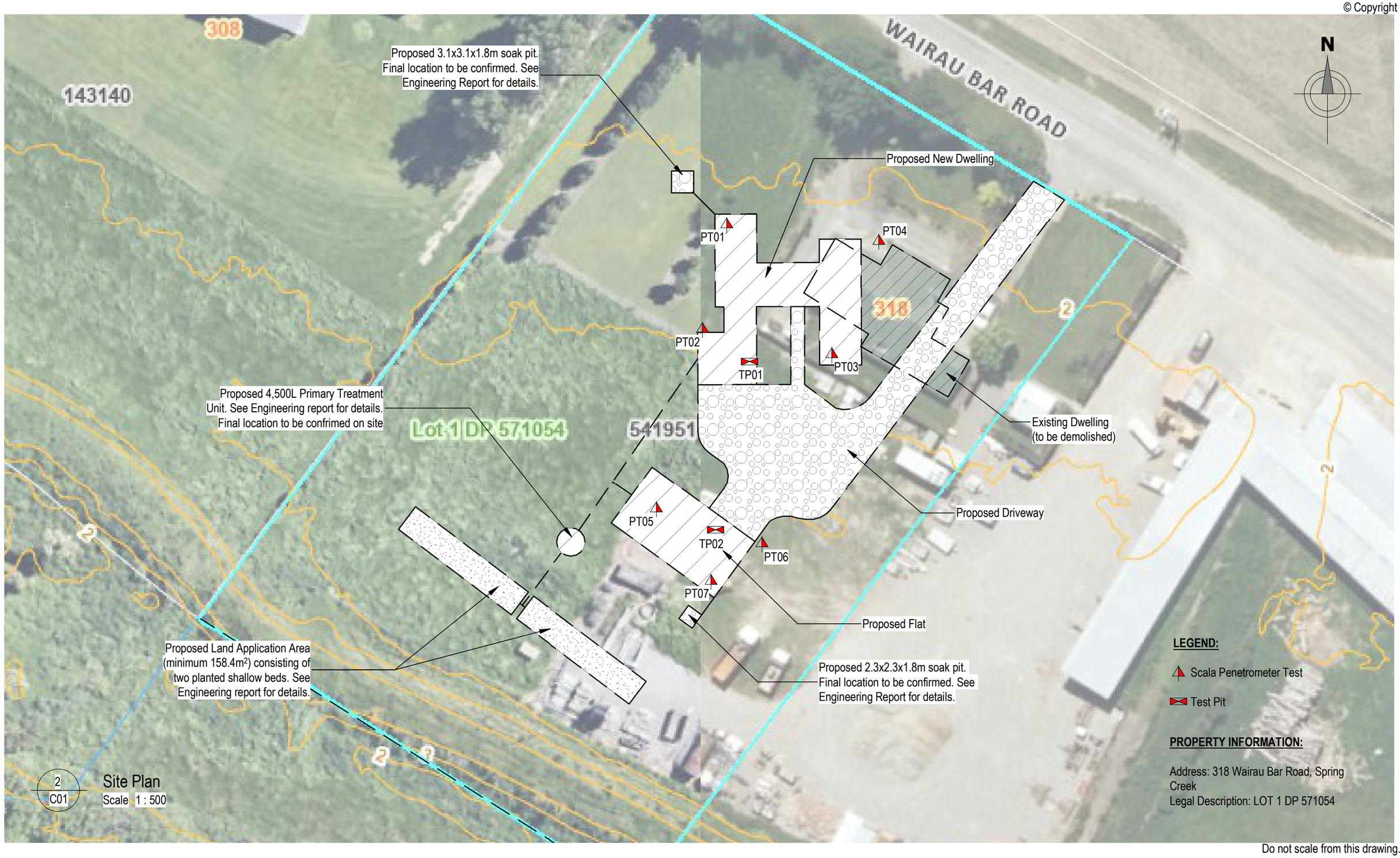
- MEP Flood Hazard Areas 1:1,000
- Site Plan / Test Locations 1:500
- Wastewater Details
- Soak Pits Details
- Proposed Dwelling Floor Plan 1:100
- Proposed Flat Floor Plan 1:100

Smart Maps Pro Print

1:1,000

14/10/2024

MARLBOROUGH DISTRICT COUNCIL SMART MAPS



Do not scale from this drawing.
Verify all dimensions on site prior to construction.

REV	DATE	DESCRIPTION
0	24/01/24	Building Consent
1	06/12/24	Revision 2

smartalliances ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTURE LTD
1st Floor, Riverview House, 10 High Street, Blenheim, New Zealand
Website - www.smartalliances.co.nz
Phone - 03 579 6211

PROJECT
MACDONALD DWELLIN
318 WAIRAU BAR ROAD, LOWER WAIRAU

CLIENT
RYAN MACDONALD

DRAWING
SITE PLAN

ORIGIN DATE
24/01/24

PROJECT STATUS
REPORT

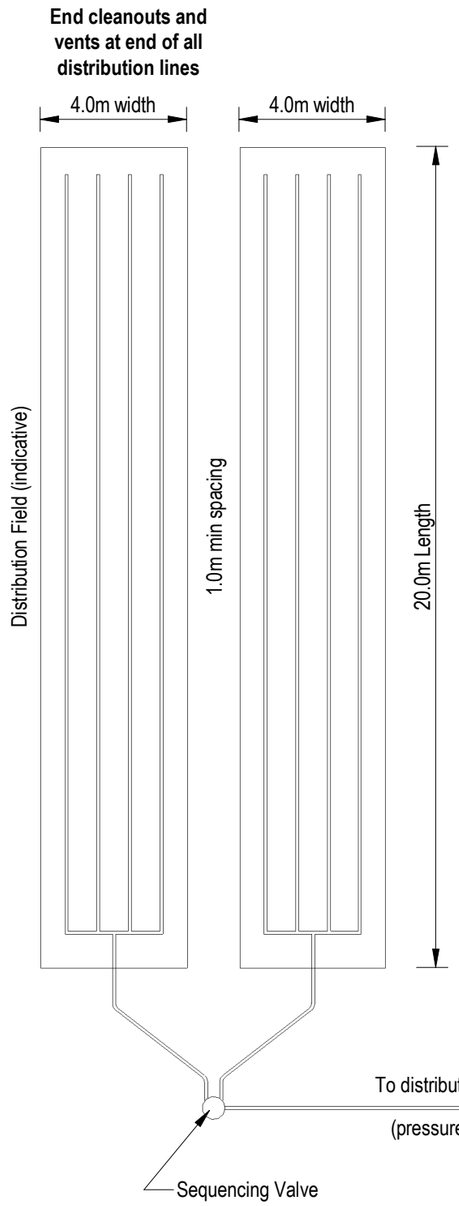
SCALE (A3)
As indicated

REVISION DATE
06/12/24

DWG NO.
9665-C01

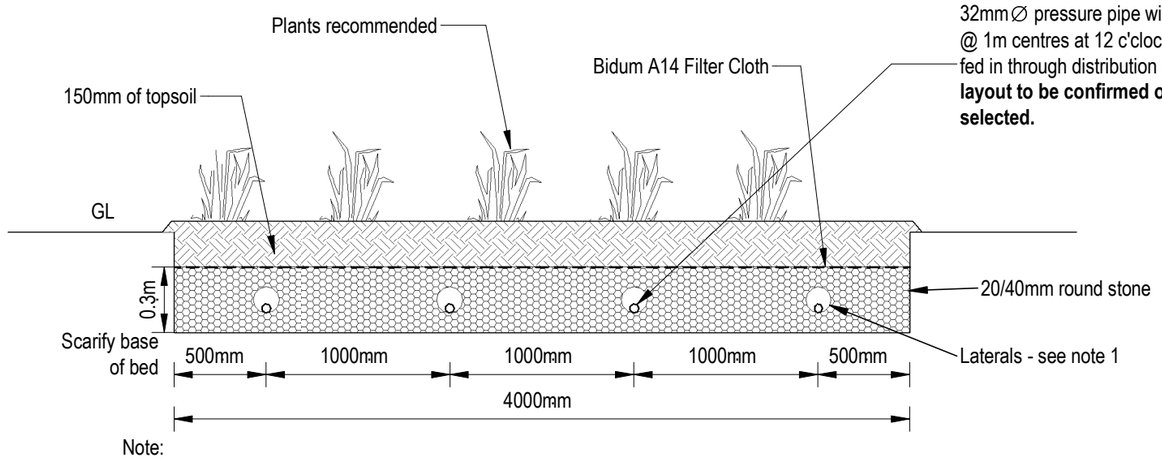
REVISION
1

P:\9665-MacDonald Dwelling, 318 Wairau Bar Road, Spring Creek\06-Drawings (Smart Alliances)\01-Working Drawings (DWG Files)\9665-DWG-CIVIL-01.rvt



Proposed 4,500L minimum size septic tank with filter on outlet (pump chamber may be separate from primary unit).
Lid to be sealed with vents and breathers to be set at house FFL.

1/C02 TYPICAL BED LAYOUT
NTScale



Note:
1. Distribution drains to be U-PVC 90mm∅ perforated pipe laid flat with 25mm∅ holes at 100mm centres drilled at 6 o'clock positions with nested 32mm∅ pipe as detailed

2/C02 TYPICAL BED CONSTRUCTION
NTScale

SYSTEM USE & MAINTENANCE

The household sewage should not contain anything other than human waste and toilet paper, and food material such as may go down a kitchen sink drain.

Garbage grinders are not recommended, although they need not be forbidden. More frequent de-sludging of the system may be needed if a garbage grinder is used.

Normal use in the house of soaps, detergents, bleaches, plumbing fixture cleaners, drain cleaners and disinfectants will not harm the functioning of the system or the soil absorption system.

Prohibited discharge to the system
* Oil/grease from a deep frier (for example).
* Stormwater or any drainage other than sewerage generated in the house.
* Petrol, oil or other flammable/explosive substances
* Garden, garage, and workshop chemicals (e.g. pesticides, paint cleaners,photographic chemicals, motor oil or trade waste.
* Disposable nappies & sanitary napkins.

It is an MDC requirement that any wastewater treatment system be regularly serviced and maintained by a contractor experienced in this field.

Do not scale from this drawing.
Verify all dimensions on site prior to construction.

REV	DATE	DESCRIPTION

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ENGINEERING / RESOURCE MANAGEMENT / ARCHITECTURE
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Website - www.smartalliances.co.nz
Phone - 03 579 6211

PROJECT
MACDONALD DWELLIN
318 WAIRAU BAR ROAD, LOWER WAIRAU
CLIENT
RYAN MACDONALD

DRAWING
DETAILS

ORIGIN DATE
24/01/24

PROJECT STATUS
REPORT

SCALE (A3)
As indicated

REVISION DATE

DWG NO.
9665-C02

REVISION

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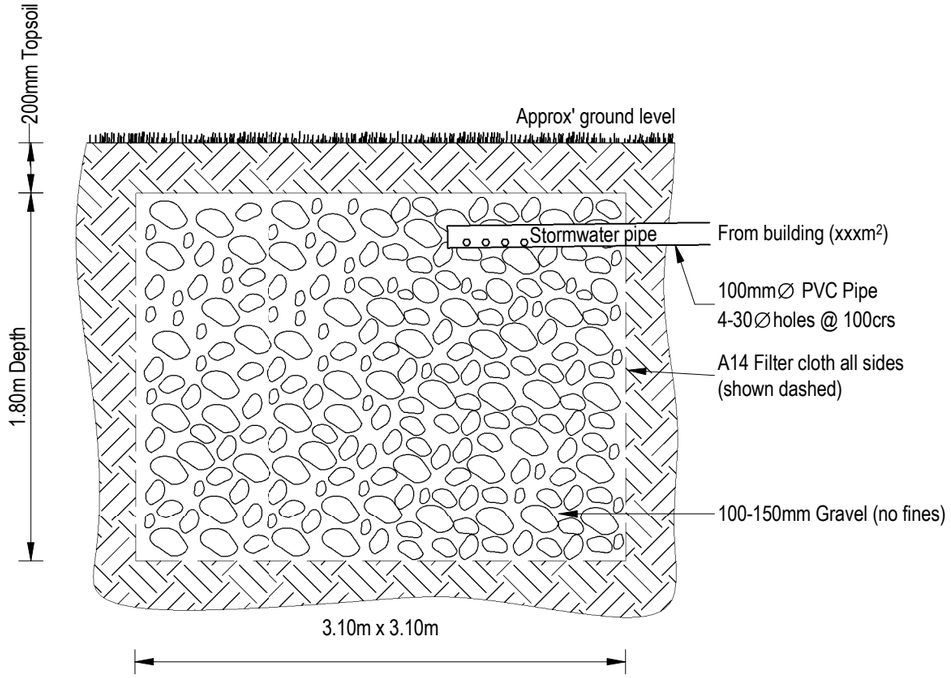
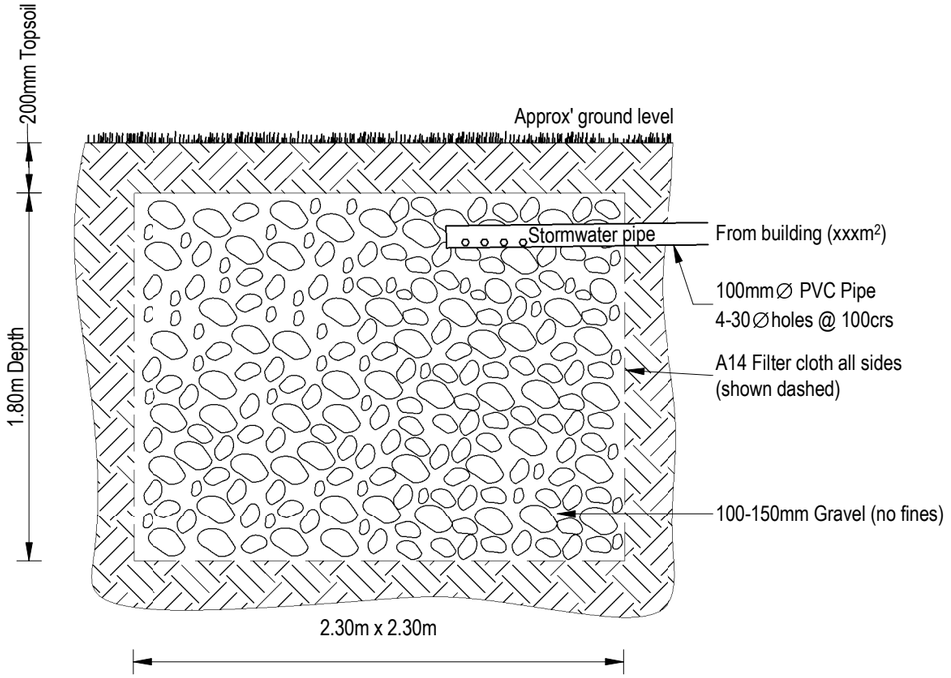


NOTE:
The soak pit should maintain minimum setbacks of 3m from foundations and 2m from boundaries.

1/C03 DWELLING SOAK PIT
NTScale



NOTE:
The soak pit should maintain minimum setbacks of 3m from foundations and 2m from boundaries.

2/C03 FLAT SOAK PIT
NTScale

Do not scale from this drawing.
Verify all dimensions on site prior to construction.

REV	DATE	DESCRIPTION

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Phone - 03 579 6211

PROJECT
MACDONALD DWELLIN
318 WAIRAU BAR ROAD, LOWER WAIRAU

CLIENT
RYAN MACDONALD

DRAWING
SOAK PITS

ORIGIN DATE
24/01/24

PROJECT STATUS
REPORT

SCALE (A3)
1 : 25

REVISION DATE

DWG NO.
9665-C03

REVISION

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designSR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Floor Plan

SCALE

1:100

DATE

03.08.2024

JOB #

DESIGNER

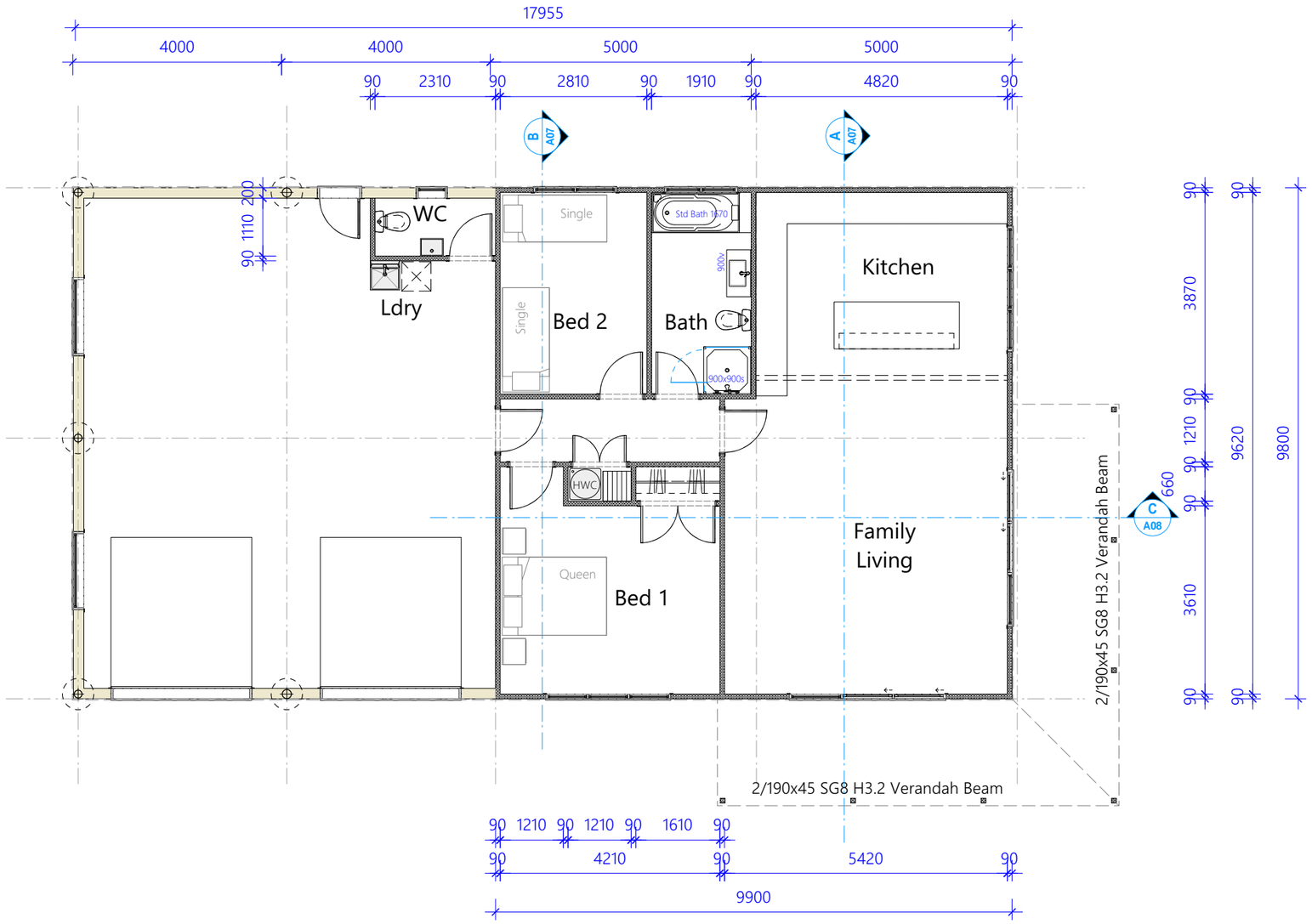
Simon Reeve

SHEET

A03

REVISION

PLOT DATE:



design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT
McDONALD - CONCEPT

PROJECT
Proposed Shed and Flat

ADDRESS
Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING
Dimension Plan

SCALE
1:100

DATE
11.05.2024

JOB #

DESIGNER
Simon Reeve

SHEET
A04

REVISION

Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:

Appendix B: Scala Penetrometer Test Results

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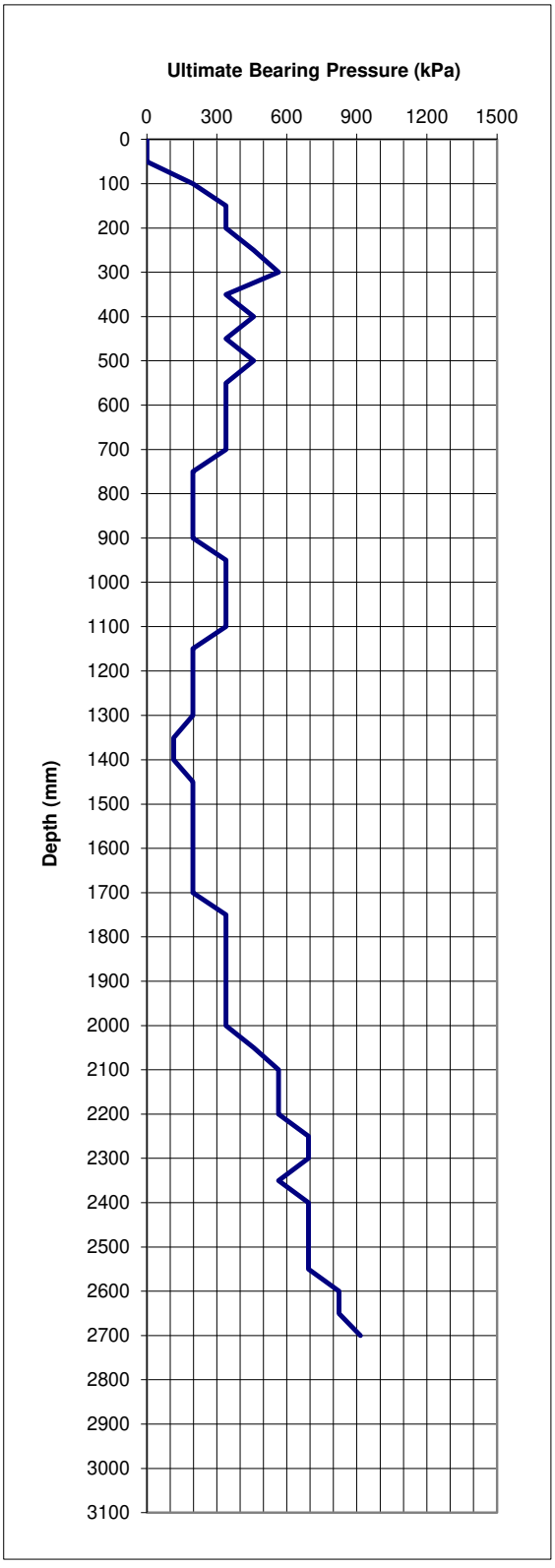
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT01**
Date:	**24/01/2024**	**Sheet:**	**1 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
0	0	**0**	50
1	50	**198**	100
2	25	**339**	150
2	25	**339**	200
3	17	**458**	250
4	13	**565**	300
2	25	**339**	350
3	17	**458**	400
2	25	**339**	450
3	17	**458**	500
2	25	**339**	550
2	25	**339**	600
2	25	**339**	650
2	25	**339**	700
1	50	**198**	750
1	50	**198**	800
1	50	**198**	850
1	50	**198**	900
2	25	**339**	950
2	25	**339**	1000
2	25	**339**	1050
2	25	**339**	1100
1	50	**198**	1150
1	50	**198**	1200
1	50	**198**	1250
1	50	**198**	1300
0.5	100	**115**	1350
0.5	100	**115**	1400
1	50	**198**	1450
1	50	**198**	1500
1	50	**198**	1550
1	50	**198**	1600
1	50	**198**	1650
1	50	**198**	1700
2	25	**339**	1750
2	25	**339**	1800
2	25	**339**	1850
2	25	**339**	1900
2	25	**339**	1950
2	25	**339**	2000
3	17	**458**	2050
4	13	**565**	2100
4	13	**565**	2150
4	13	**565**	2200
5	10	**693**	2250
5	10	**693**	2300
4	13	**565**	2350
5	10	**693**	2400
5	10	**693**	2450
5	10	**693**	2500
5	10	**693**	2550
6	8	**824**	2600
6	8	**824**	2650
7	7	**915**	2700



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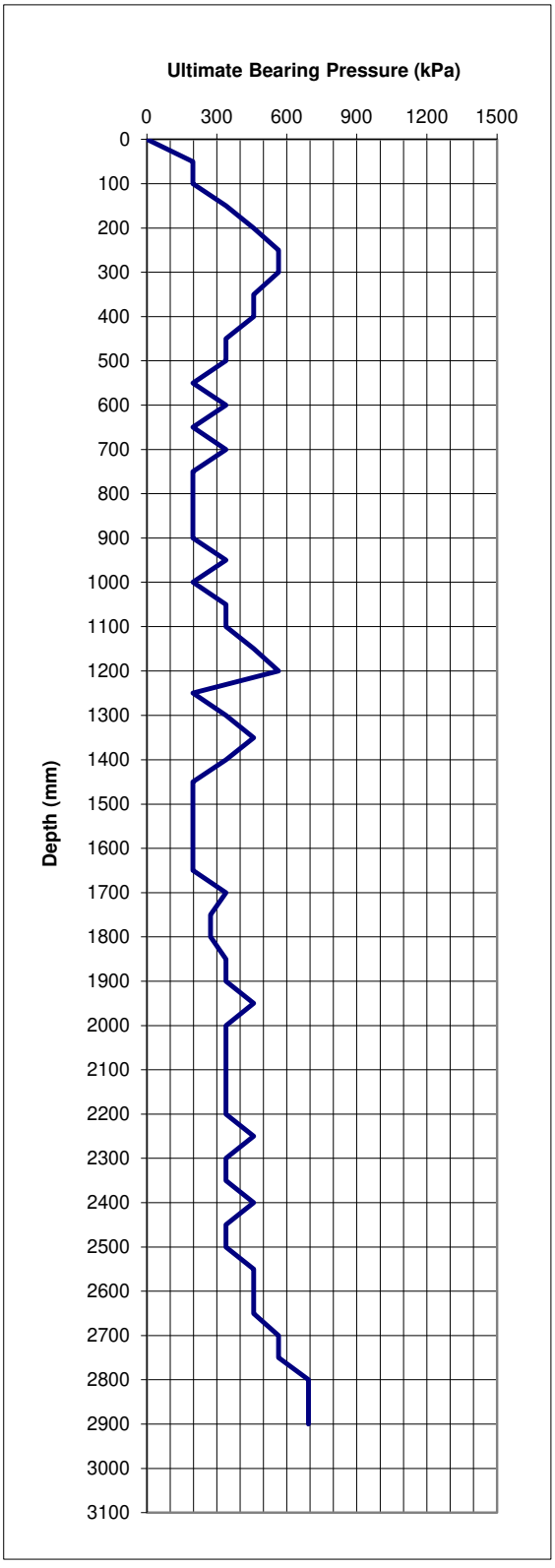
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT02**
Date:	**24/01/2024**	**Sheet:**	**2 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
1	50	**198**	50
1	50	**198**	100
2	25	**339**	150
3	17	**458**	200
4	13	**565**	250
4	13	**565**	300
3	17	**458**	350
3	17	**458**	400
2	25	**339**	450
2	25	**339**	500
1	50	**198**	550
2	25	**339**	600
1	50	**198**	650
2	25	**339**	700
1	50	**198**	750
1	50	**198**	800
1	50	**198**	850
1	50	**198**	900
2	25	**339**	950
1	50	**198**	1000
2	25	**339**	1050
2	25	**339**	1100
3	17	**458**	1150
4	13	**565**	1200
1	50	**198**	1250
2	25	**339**	1300
3	17	**458**	1350
2	25	**339**	1400
1	50	**198**	1450
1	50	**198**	1500
1	50	**198**	1550
1	50	**198**	1600
1	50	**198**	1650
2	25	**339**	1700
1.5	33	**273**	1750
1.5	33	**273**	1800
2	25	**339**	1850
2	25	**339**	1900
3	17	**458**	1950
2	25	**339**	2000
2	25	**339**	2050
2	25	**339**	2100
2	25	**339**	2150
2	25	**339**	2200
3	17	**458**	2250
2	25	**339**	2300
2	25	**339**	2350
3	17	**458**	2400
2	25	**339**	2450
2	25	**339**	2500
3	17	**458**	2550
3	17	**458**	2600
3	17	**458**	2650
4	13	**565**	2700
4	13	**565**	2750
5	10	**693**	2800
5	10	**693**	2850
5	10	**693**	2900



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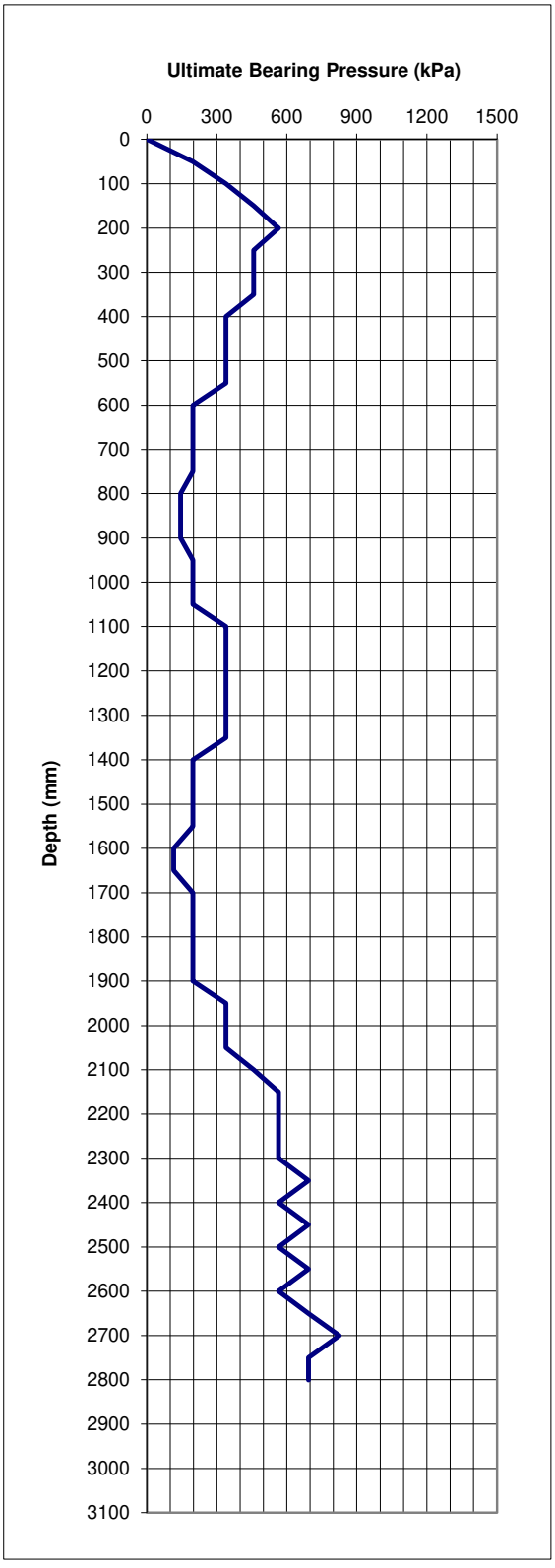
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT03**
Date:	**24/01/2024**	**Sheet:**	**3 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
1	50	**198**	50
2	25	**339**	100
3	17	**458**	150
4	13	**565**	200
3	17	**458**	250
3	17	**458**	300
3	17	**458**	350
2	25	**339**	400
2	25	**339**	450
2	25	**339**	500
2	25	**339**	550
1	50	**198**	600
1	50	**198**	650
1	50	**198**	700
1	50	**198**	750
0.66667	75	**144**	800
0.66667	75	**144**	850
0.66667	75	**144**	900
1	50	**198**	950
1	50	**198**	1000
1	50	**198**	1050
2	25	**339**	1100
2	25	**339**	1150
2	25	**339**	1200
2	25	**339**	1250
2	25	**339**	1300
2	25	**339**	1350
1	50	**198**	1400
1	50	**198**	1450
1	50	**198**	1500
1	50	**198**	1550
0.5	100	**115**	1600
0.5	100	**115**	1650
1	50	**198**	1700
1	50	**198**	1750
1	50	**198**	1800
1	50	**198**	1850
1	50	**198**	1900
2	25	**339**	1950
2	25	**339**	2000
2	25	**339**	2050
3	17	**458**	2100
4	13	**565**	2150
4	13	**565**	2200
4	13	**565**	2250
4	13	**565**	2300
5	10	**693**	2350
4	13	**565**	2400
5	10	**693**	2450
4	13	**565**	2500
5	10	**693**	2550
4	13	**565**	2600
5	10	**693**	2650
6	8	**824**	2700
5	10	**693**	2750
5	10	**693**	2800



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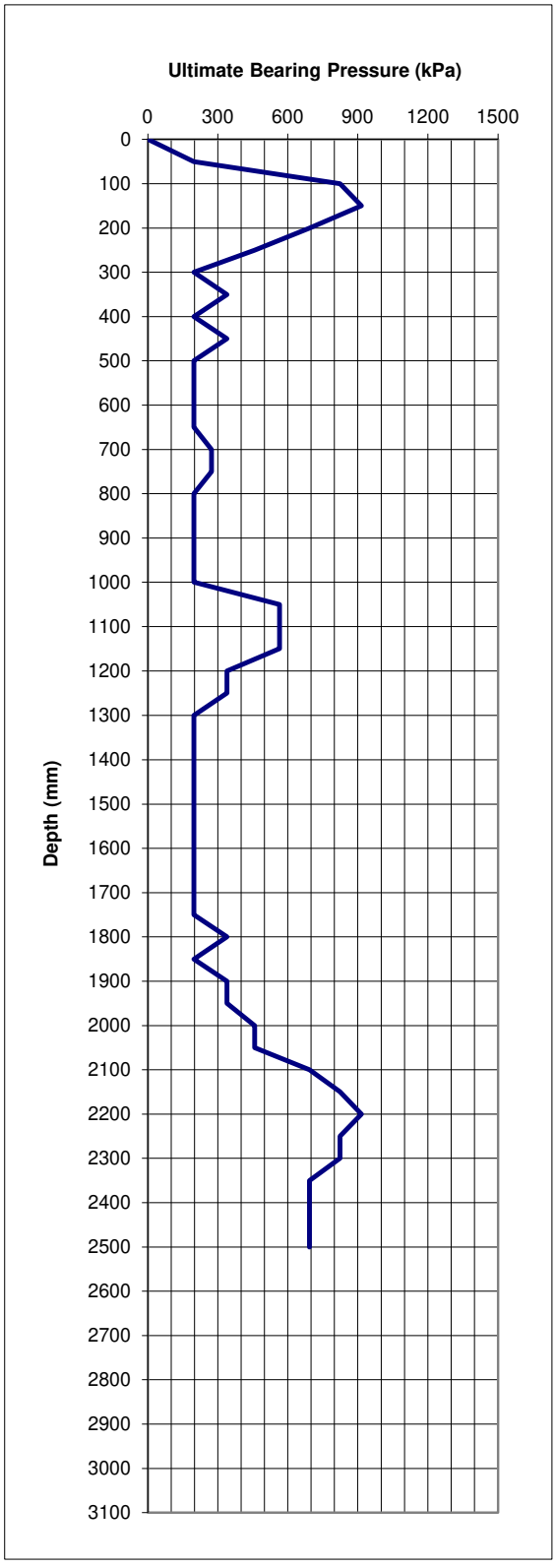
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT04**
Date:	**24/01/2024**	**Sheet:**	**4 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
1	50	**198**	50
6	8	**824**	100
7	7	**915**	150
5	10	**693**	200
3	17	**458**	250
1	50	**198**	300
2	25	**339**	350
1	50	**198**	400
2	25	**339**	450
1	50	**198**	500
1	50	**198**	550
1	50	**198**	600
1	50	**198**	650
1.5	33	**273**	700
1.5	33	**273**	750
1	50	**198**	800
1	50	**198**	850
1	50	**198**	900
1	50	**198**	950
1	50	**198**	1000
4	13	**565**	1050
4	13	**565**	1100
4	13	**565**	1150
2	25	**339**	1200
2	25	**339**	1250
1	50	**198**	1300
1	50	**198**	1350
1	50	**198**	1400
1	50	**198**	1450
1	50	**198**	1500
1	50	**198**	1550
1	50	**198**	1600
1	50	**198**	1650
1	50	**198**	1700
1	50	**198**	1750
2	25	**339**	1800
1	50	**198**	1850
2	25	**339**	1900
2	25	**339**	1950
3	17	**458**	2000
3	17	**458**	2050
5	10	**693**	2100
6	8	**824**	2150
7	7	**915**	2200
6	8	**824**	2250
6	8	**824**	2300
5	10	**693**	2350
5	10	**693**	2400
5	10	**693**	2450
5	10	**693**	2500



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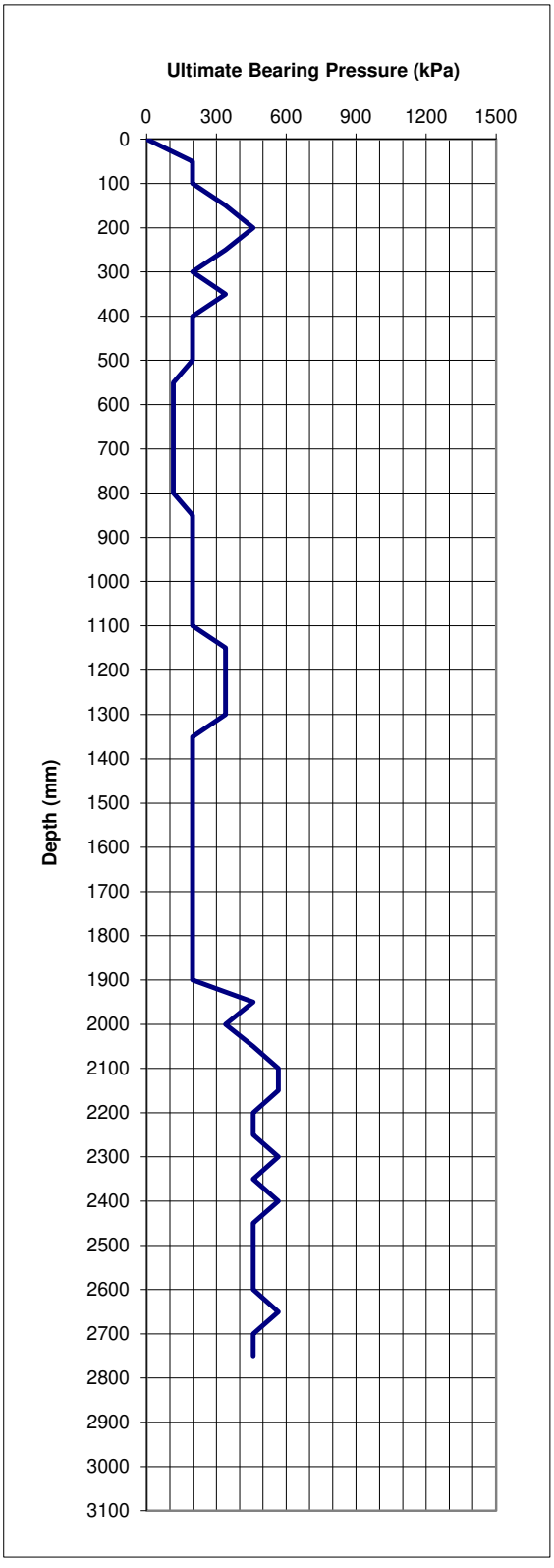
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT05**
Date:	**24/01/2024**	**Sheet:**	**5 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
1	50	**198**	50
1	50	**198**	100
2	25	**339**	150
3	17	**458**	200
2	25	**339**	250
1	50	**198**	300
2	25	**339**	350
1	50	**198**	400
1	50	**198**	450
1	50	**198**	500
0.5	100	**115**	550
0.5	100	**115**	600
0.5	100	**115**	650
0.5	100	**115**	700
0.5	100	**115**	750
0.5	100	**115**	800
1	50	**198**	850
1	50	**198**	900
1	50	**198**	950
1	50	**198**	1000
1	50	**198**	1050
1	50	**198**	1100
2	25	**339**	1150
2	25	**339**	1200
2	25	**339**	1250
2	25	**339**	1300
1	50	**198**	1350
1	50	**198**	1400
1	50	**198**	1450
1	50	**198**	1500
1	50	**198**	1550
1	50	**198**	1600
1	50	**198**	1650
1	50	**198**	1700
1	50	**198**	1750
1	50	**198**	1800
1	50	**198**	1850
1	50	**198**	1900
3	17	**458**	1950
2	25	**339**	2000
3	17	**458**	2050
4	13	**565**	2100
4	13	**565**	2150
3	17	**458**	2200
3	17	**458**	2250
4	13	**565**	2300
3	17	**458**	2350
4	13	**565**	2400
3	17	**458**	2450
3	17	**458**	2500
3	17	**458**	2550
3	17	**458**	2600
4	13	**565**	2650
3	17	**458**	2700
3	17	**458**	2750



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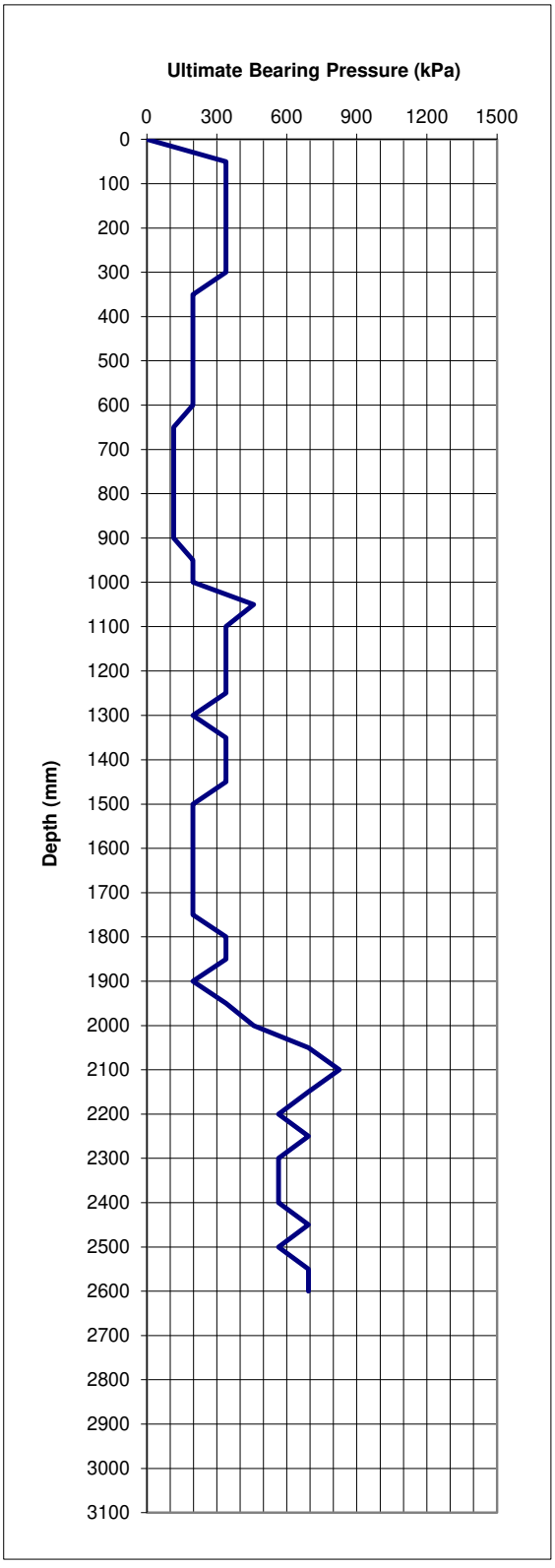
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT06**
Date:	**24/01/2024**	**Sheet:**	**6 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
2	25	**339**	50
2	25	**339**	100
2	25	**339**	150
2	25	**339**	200
2	25	**339**	250
2	25	**339**	300
1	50	**198**	350
1	50	**198**	400
1	50	**198**	450
1	50	**198**	500
1	50	**198**	550
1	50	**198**	600
0.5	100	**115**	650
0.5	100	**115**	700
0.5	100	**115**	750
0.5	100	**115**	800
0.5	100	**115**	850
0.5	100	**115**	900
1	50	**198**	950
1	50	**198**	1000
3	17	**458**	1050
2	25	**339**	1100
2	25	**339**	1150
2	25	**339**	1200
2	25	**339**	1250
1	50	**198**	1300
2	25	**339**	1350
2	25	**339**	1400
2	25	**339**	1450
1	50	**198**	1500
1	50	**198**	1550
1	50	**198**	1600
1	50	**198**	1650
1	50	**198**	1700
1	50	**198**	1750
2	25	**339**	1800
2	25	**339**	1850
1	50	**198**	1900
2	25	**339**	1950
3	17	**458**	2000
5	10	**693**	2050
6	8	**824**	2100
5	10	**693**	2150
4	13	**565**	2200
5	10	**693**	2250
4	13	**565**	2300
4	13	**565**	2350
4	13	**565**	2400
5	10	**693**	2450
4	13	**565**	2500
5	10	**693**	2550
5	10	**693**	2600



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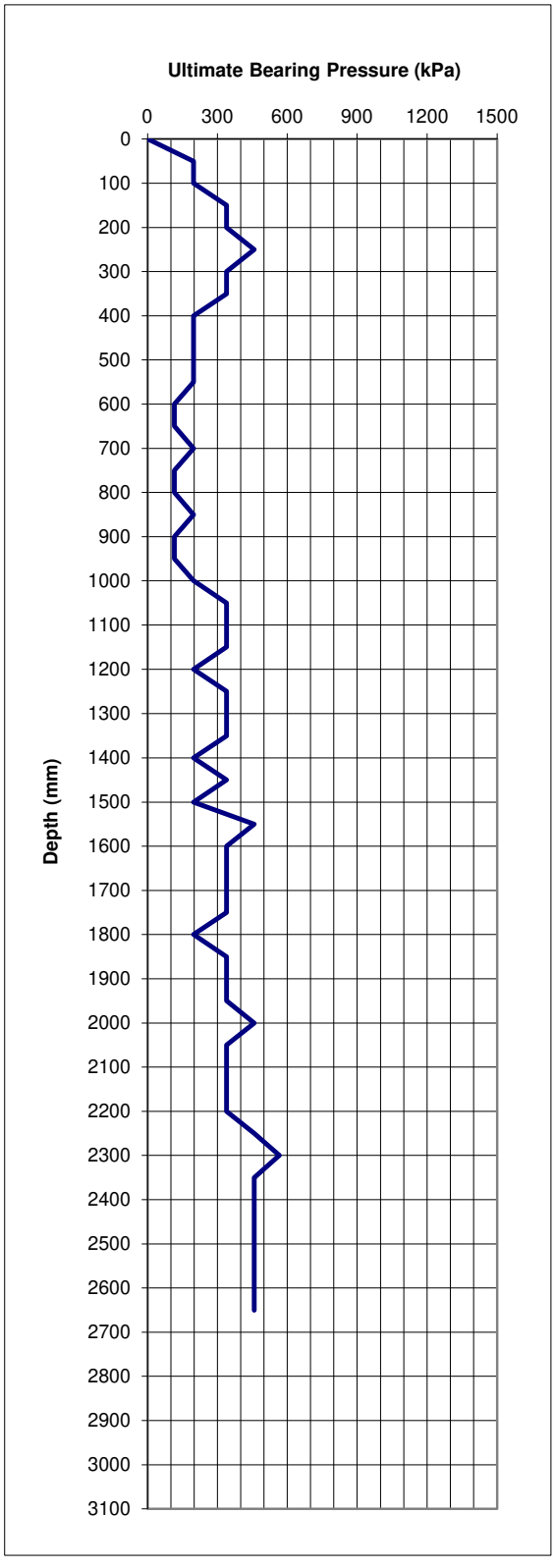
Project:	**MacDonald Dwelling**		
Client:	**Ryan MacDonald**		
Ref:	**9665**	**Eng:**	**DR / LC**
Penetrometer Test Number:			**PT07**
Date:	**24/01/2024**	**Sheet:**	**7 of 7**

PENETROMETER TEST RESULTS

Notes: No groundwater encountered. Stockwell Method 1977 used to determine Ultimate Bearing Capacity - Allowable Bearing Capacity with a factor of safety of 3 applied.

No. of Blows	e (mm/blow)	Soil bearing resistance (kPa)	Depth (mm)
0	0	**0**	0
1	50	**198**	50
1	50	**198**	100
2	25	**339**	150
2	25	**339**	200
3	17	**458**	250
2	25	**339**	300
2	25	**339**	350
1	50	**198**	400
1	50	**198**	450
1	50	**198**	500
1	50	**198**	550
0.5	100	**115**	600
0.5	100	**115**	650
1	50	**198**	700
0.5	100	**115**	750
0.5	100	**115**	800
1	50	**198**	850
0.5	100	**115**	900
0.5	100	**115**	950
1	50	**198**	1000
2	25	**339**	1050
2	25	**339**	1100
2	25	**339**	1150
1	50	**198**	1200
2	25	**339**	1250
2	25	**339**	1300
2	25	**339**	1350
1	50	**198**	1400
2	25	**339**	1450
1	50	**198**	1500
3	17	**458**	1550
2	25	**339**	1600
2	25	**339**	1650
2	25	**339**	1700
2	25	**339**	1750
1	50	**198**	1800
2	25	**339**	1850
2	25	**339**	1900
2	25	**339**	1950
3	17	**458**	2000
2	25	**339**	2050
2	25	**339**	2100
2	25	**339**	2150
2	25	**339**	2200
3	17	**458**	2250
4	13	**565**	2300
3	17	**458**	2350
3	17	**458**	2400
3	17	**458**	2450
3	17	**458**	2500
3	17	**458**	2550
3	17	**458**	2600
3	17	**458**	2650



Appendix C: Profile Logs

SmartAlliances Ltd
PO Box 546
Blenheim, 7240

T: 03 579 6211
E: info@smartalliances.co.nz
W: www.smartalliances.co.nz

Client: Ryan MacDonald
Project: MacDonald Dwelling
Location: 318 Wairau Bar Road, Spring Creek
Job Number:
Test Pit: AG1
Date: 24/01/2024
Logged by: DR / LC
Page: 1 of 1

Legend:
- CLAY
- GRAVEL
- TOPSOIL

DEPTH (mm)	GRAPHIC LOG	DESCRIPTION	PHOTOGRAPH
0 – 300		Light Brown silty loam TOPSOIL. Moist. Low Plasticity. Compacted.	
300 – 700		Brown SILT loam. Moist. Low Plasticity. Compacted.	
700 – 1500		Blue Gray sandy CLAY loam. Moist. Medium Plasticity. Compacted.	

NOTES:
No water seepage encountered

SmartAlliances Ltd
PO Box 546
Blenheim, 7240

T: 03 579 6211
E: info@smartalliances.co.nz
W: www.smartalliances.co.nz

Client: Ryan MacDonald
Project: MacDonald Dwelling
Location: 318 Wairau Bar Road, Spring Creek
Job Number:
Test Pit: AG2
Date: 24/01/2024
Logged by: DR / LC
Page: 1 of 1

Legend:
- CLAY
- TOPSOIL
- SILT

DEPTH (mm)	GRAPHIC LOG	DESCRIPTION	PHOTOGRAPH
0 – 300		Dark Brown silty loam TOPSOIL. Moist. Low Plasticity. Compacted.	
300 – 700		Brown SILT loam. Moist. Low Plasticity. Compacted.	
700 – 1600		Brown silty CLAY with fine sand. Moist. Medium Plasticity. Compacted.	

NOTES:
No water seepage encountered

Appendix D: Soakpit Calculation Sheet

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P.O. Box 546, Blenheim, NZ. TEL: +64 (03) 579 6211 FAX: +64 (03) 579 6233

SOAKPIT CALCULATION SHEET

Project:	MacDonald Dwelling		
Client:	Ryan MacDonald		
Date:	15-Oct-24	**Project No:**	9665
Sheet:		**Engineer:**	DR

ROOF DISPOSAL - DWELLING

DESIGN IN ACCORDANCE WITH NZBC E1/VM1

C	**0.9**	*run-off coefficient*
I_{10} (mm/hr)	**49.4**	*rainfall intensity having 10% probability of occurring annually, 10 minute duration,*
I_{60} (mm/hr)	**19.7**	*rainfall intensity having 10% probability of occurring annually, 60 minute duration,*
A (m2)	**326.0**	*Area of the catchment discharging to the soak-pit*
R_{c10} (m^3)	**2.42**	*Run-off discharged from catchment to soak pit in 10 mins*
R_{c60} (m^3)	**5.77998**	*Run-off discharged from catchment to soak pit in 1 hour*
	Cat 4	*Soil Category as determined by ASNZ1547*
S_r mm/hr	**33**	*Soakage rate determined by field observation and Soil Category (see below)*
Pit Coeficient	**0.38**	*ROCKFILLED - 0.38 / VERSITANK - 0.95*
W_{sp} (m)	**3.1**	***Width of the base of the soakpit***
L_{sp} (m)	**3.1**	***Length of the base of the soakpit***
A_{sp} (m^2)	**9.61**	***area of the base of the soakpit***
$V_{soak\ 60}$ (m^3)	**0.32**	*volume soaked in 60 mins*
$V_{soak\ 10}$ (m^3)	**0.05**	*volume soaked in 10 mins*
$V_{stor\ 60}$ (m^3)	**5.46**	*storage required for 60 min storm*
$V_{stor\ 10}$ (m^3)	**2.36**	*storage required for 10 min storm*
Min Depth Required	**1.50**	*m*
Depth Provided	**1.80**	*m*
Factor of Saftey	**1.20**	*FOS (>1.2)*

Recommendation:	
Soakpit Width	3.1m
Soakpit Length	3.1m
Soakpit Depth	1.8m

Notes: Assumed Cat 4 and Moderate structure due to sandy CLAY loam/silty CLAY with fine sand . Soakpit to service 326m2 of roof each. Total of one rockfilled soakpits, with dimensions 3.1mx3.1mx1.8m

Soakage Rates (Alternative Solution - from NZS1547)

Soil	Texture	Structure	Ksat m/day	Sr mm/hr	Suitability
Category 1	Gravels and Sands	Massive	5	208	Suitable for Soak Pits
Category 2	Sandy Loams	Weak	3	125	
		Massive	2	83	
Category 3	Loams	Moderate	2	83	
		Massive	0.8	33	
Category 4	Clay Loams	Moderate	0.8	33	
		Weak	0.25	10	
		Massive	0.09	4	
Category 5	Light Clays	Strong	0.25	10	NOTE: Dispersive Soils are Not Suitable for Soak Pits
		Moderate	0.09	4	
		Massive	0.06	3	
Category 6	Meduim to Heavy Clays	Strong	0.06	3	
		Massive	0.06	3	

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SOAKPIT CALCULATION SHEET

Project:	MacDonald Dwelling		
Client:	Ryan MacDonald		
Date:	15-Oct-24	**Project No:**	9665
Sheet:		**Engineer:**	DR

ROOF DISPOSAL - FLAT

DESIGN IN ACCORDANCE WITH NZBC E1/VM1

C	**0.9**	*run-off coefficient*
I_{10} (mm/hr)	**49.4**	*rainfall intensity having 10% probability of occurring annually, 10 minute duration,*
I_{60} (mm/hr)	**19.7**	*rainfall intensity having 10% probability of occurring annually, 60 minute duration,*
A (m2)	**176.0**	*Area of the catchment discharging to the soak-pit*
R_{c10} (m^3)	**1.30**	*Run-off discharged from catchment to soak pit in 10 mins*
R_{c60} (m^3)	**3.11975307**	*Run-off discharged from catchment to soak pit in 1 hour*
	Cat 4	*Soil Category as determined by ASNZ1547*
S_r mm/hr	**33**	*Soakage rate determined by field observation and Soil Category (see below)*
Pit Coeficient	**0.38**	*ROCKFILLED - 0.38 / VERSITANK - 0.95*
W_{sp} (m)	**2.3**	***Width of the base of the soakpit***
L_{sp} (m)	**2.3**	***Length of the base of the soakpit***
A_{sp} (m^2)	**5.29**	***area of the base of the soakpit***
$V_{soak\ 60}$ (m^3)	**0.17**	*volume soaked in 60 mins*
$V_{soak\ 10}$ (m^3)	**0.03**	*volume soaked in 10 mins*
$V_{stor\ 60}$ (m^3)	**2.95**	*storage required for 60 min storm*
$V_{stor\ 10}$ (m^3)	**1.27**	*storage required for 10 min storm*
Min Depth Required	**1.47**	*m*
Depth Provided	**1.80**	*m*
Factor of Saftey	**1.23**	*FOS (>1.2)*

Recommendation:

Soakpit Width	2.3m
Soakpit Length	2.3m
Soakpit Depth	1.8m

Notes: Assumed Cat 4 and Moderate structure due to sandy CLAY loam/silty CLAY with fine sand . Soakpit to service 176m2 of roof each. Total of one rockfilled soakpits, with dimensions 2.3mx2.3mx1.8m

Soakage Rates (Alternative Solution - from NZS1547)

Soil	Texture	Structure	Ksat m/day	Sr mm/hr	Suitability
Category 1	Gravels and Sands	Massive	5	208	Suitable for Soak Pits
Category 2	Sandy Loams	Weak	3	125	
		Massive	2	83	
Category 3	Loams	Moderate	2	83	
		Massive	0.8	33	
Category 4	Clay Loams	Moderate	0.8	33	
		Weak	0.25	10	
		Massive	0.09	4	
Category 5	Light Clays	Strong	0.25	10	NOTE: Dispersive Soils are Not Suitable for Soak Pits
		Moderate	0.09	4	
		Massive	0.06	3	
Category 6	Meduim to Heavy Clays	Strong	0.06	3	
		Massive	0.06	3	

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Rainfall Intensities

Client: Ryan MacDonald
Project: MacDonald Dwelling
Site: 318 Wairau Bar Road, Spring Creek

Date: 15/10/2024
Engineer: DR
Project No: 9665

Lattitude: -41.47789558
Longitude: 173.9948964

Rainfall intensities (mm/h)

		Duration									
ARI(y)	**aep**	**10min**	**20min**	**30min**	**60min**	**2h**	**6h**	**12h**	**24h**	**48h**	**72h**
1.58	0.633	27.4	19	15.5	11.1	8.06	4.73	3.27	2.18	1.37	1.02
2	0.5	30.4	21	17.2	12.3	8.89	5.21	3.6	2.39	1.51	1.12
5	0.2	41.1	28.3	23.1	16.5	11.8	6.89	4.75	3.14	1.97	1.45
10	0.1	49.4	34	27.6	19.7	14.1	8.18	5.62	3.71	2.32	1.71
20	0.05	58.4	40	32.5	23.1	16.5	9.54	6.54	4.3	2.68	1.98
30	0.033	64	43.8	35.6	25.2	18	10.4	7.1	4.66	2.9	2.14
40	0.025	68.2	46.6	37.8	26.8	19.1	11	7.51	4.93	3.07	2.25
50	0.02	71.4	48.8	39.5	28	20	11.5	7.83	5.13	3.19	2.35
60	0.017	74.2	50.6	41	29	20.7	11.9	8.09	5.3	3.3	2.42
80	0.013	78.6	53.6	43.4	30.7	21.8	12.5	8.52	5.58	3.46	2.54
100	0.01	82.1	55.9	45.3	32	22.8	13	8.86	5.79	3.59	2.64

Information sourced from NIWA High Intensity Rainfall System V4
Coordinate system: NZMG

Appendix E: Wastewater Calculations

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Project: MacDonald Dwelling
Client: Ryan MacDonald
Location: 318 Wairau Bar Road
Date: 15/10/2024

WASTEWATER SYSTEM DESIGN SHEET
To AS/NZS 1547:2012

Number of Bedrooms: 6

Intended water Supply: Bore or Well Supply

Soil Category Determined on Site Category 4

Recommendation for this site: *Primary Treated Effluent to shallow beds*

DRAINAGE CONTROLS:
Need for surface water collector / cut-off drains? *No*

AVAILABILITY OR RESERVE / SETBACK AREAS
Reserve area available for extensions, % of design area: *100%*
Setback distance? (between development and disposal system):

DESIGN
Daily Loading Rate: *12.5* mm/day

Occupancy: 12 *Persons*

L/person/day: 165 L/p/d = 1980 L/day from Appendix H AS/NZS 1547:2012

DESIGN DAILY FLOW: 1980 L/day

AREA REQUIRED: 158.4 m²

LENGTH REQUIRED: 39.6 m with 4 metre wide beds

RESERVE AREA REQUIRED: 100% of specified

BED LENGTH: 19.8 m

NUMBER OF BEDS: 2

RECOMMENDED LAA = 2 x 20.0m by 4.0m beds

Appendix F: Setback Distance Matrix from AS/NZS 1547 Appendix R

Project: MacDonald Dwelling
Client: Ryan MacDonald
Ref: 9665
Date: Oct-24

Setback Distance Matrix AS/NZ 1547:2012 Appendix R

Note - Refer to Table R1 and R2 and relevant NOTES

Site Feature	**Constraint Scale**			**Notes:**
Horizontal Setback Distance	Low	Medium	High	
Property Boundary				
Distance Range	1.5m ----------50m			
A - Microbial Quality		•		Primary treatment for wastewater
D - Slope	•			Flat to Gentle
J - Application Method	•			Planted Shallow Beds
Weighted Setback Selected	*1.5m*			
Actual Setback Provided	**10m+**			
Buildings/ houses				
Distance Range	2m ---------- > 6m			
A - Microbial Quality	•			Primary treatment for wastewater
D - Slope	•			Flat to Gentle
J - Application Method	•			Planted Shallow Beds
Weighted Setback Selected	*2m*			
Actual Setback Provided	**6m+**			
Surface Water				
Distance Range	15m ----------100m			
A - Microbial Quality		•		Primary treatment for wastewater
B - Surface Water (Soil effect)		•		Cat 4 - Conservative approach
B - Surface Water (Water)		•		
B - Surface Water (Rainfall)	•			
D - Slope	•			Flat to Gentle
E - Position of LAA	•			Planted Shallow Beds
F - Drainage	•			Subsurface application
G - Flood Potential		•		Flood Zone Level 4
J - Application Method	•			Planted Shallow Beds
Weighted Setback Selected	*100m*			
Actual Setback Provided	**40m+**			
Bore, well				
Distance Range	15m ---------- > 50m			
A - Microbial Quality	•			Primary treatment for wastewater
C - Groundwater	•			Greater than 1m
H - Geology and Soils	•			Cat 4 - Conservative approach
J - Application Method	•			Planted Shallow Beds
Weighted Setback Selected	15m			
Actual Setback Provided	**50m+**			
Vertical Setback Distance				
Groundwater				
Distance Range	0.6m ----------1.5m			
A - Microbial Quality	•			Primary treatment for wastewater
C - Groundwater	•			Cat 4 - Conservative approach
F - Drainage		•		Cat 4 - Conservative approach
H - Geology and Soils	•			Cat 4 - Conservative approach
I - Landform	•			
J - Application Method	•			Planted Shallow Beds
Weighted Setback Selected	*1.5*			
Actual Setback Provided	**1.5m+**			

Appendix G: Resource consent rules objectives and policies

Marlborough Environment Plan – Chapter 3. Rural Environment Zone
Assessment against rules
3.3.30 Discharge of human effluent into or onto land

Rule	**Analysis**
3.3.30.1. The human effluent must be treated via an on-site wastewater management system which must be maintained in an efficient operating condition at all times.	**Compliant:** The onsite wastewater management system has been designed in accordance with NZS1547:2012 – on-site domestic wastewater management.
3.3.30.2. There must be no increase in the rate of discharge due to an increased occupancy of the building(s).	**Compliant:** The design is based on a 6-bedroom (with 12 occupants).
3.3.30.3. There must be: (a) no ponding of effluent; (b) no run-off or infiltration of effluent beyond the property boundary or into a river, lake, Significant Wetland, drainage channel, Drainage Channel Network, groundwater or coastal water.	**Compliant:** (a) Conservative rates used means application rate over a large area with effluent assimilated in soil layers and through evapotranspiration so no ponding of effluent. (b) Setback distances from watercourses are considered allowable under the Setback Distance Matrix presented in the engineering report. Contamination is considered to be low risk as septic tank is of good size and application beds are heavily planted.
3.3.30.4. The discharge rate must not exceed 2000 litres per day, averaged over any 7-day period.	**Compliant:** Discharge rate does **not** exceed 2000 litres per day, averaged over any 7-day period. (Discharge rate = 1980 litres/day maximum).
3.3.30.5. Effluent must be able to: (a) infiltrate through at least 600mm of unsaturated soil following primary treatment, or (b) infiltrate through at least 300mm of unsaturated soil following secondary treatment.	**Compliant:** Primary Treated Effluent: (a) Effluent will be able to infiltrate through at least 600mm of unsaturated soil.
3.3.30.6. The discharge must not occur within a Groundwater Protection Area.	**Compliant:** Not within a Ground Water Protection Area.
3.3.30.7. The discharge must not occur within 50m of a bore unless the bore intercepts the confined layer of Riverlands FMU or the confined layer of the Wairau Aquifer FMU.	**Compliant:** LAA is in excess 50m from wells.
3.3.30.8. The discharge must not be within a Level 2 or 3 Flood Hazard Area.	**Non-Compliant:** The discharge is not within a Level 2 or 3 Flood Hazard Area. System and application area elevated. Full design details described in report.
3.3.30.9. For a new discharge of human effluent to land commencing after 9 June 2016, the discharge must not occur into or onto a Soil Sensitive Area.	**Non-Compliant**: On site intrusive test holes provided soil drainage category 4 soils.

Marlborough Environment Plan – Assessment against relevant objectives and policies - Chapter 16, Waste Policy

Wastewater system is constructed in accordance with AS/NZS 1547:2012. For further information refer to the Engineering Report.

Policy 16.3.3 – Approve discharge permit applications and discharge contaminants onto or into land where:	
(a) The discharge is within the ability of the land to treat and/or contain contaminants present in the liquid waste, taking into account: i. The rate of discharge (including variability in the rate of discharge) ii. The nature and concentration of contaminates within the liquid waste iii. The hydraulic properties of the soil within the land application area and any relevant physical, chemical or biological soil properties iv. Any other discharge of contaminants to the same land or to land in close proximity to the discharge	**Compliant:** (i) The rate of discharge has been designed for 6 bedrooms with 12 occupants. (ii) Primary treated effluent treating standard wastewater. (iii) System has sufficient capacity and conservative rates used. Evapotranspiration provided from the bed being planted. (iv) There is no existing LAA in proximity.
(b) The discharge does not adversely affect the drinking water quality of groundwater adjacent to or down gradient of the discharge, either alone or in combination with any other discharge;	**Compliant:** Primary treatment system to irrigation bed application within excess of 600mm of percolation.
(c) The land application area is located as far as practicable from any surface waterbody or coastal water;	**Compliant:** Land application area is located as practically far as possible.
(d) It is inappropriate (due to the potential impact on the performance of treatment plants and associated infrastructure) or impracticable to discharge the liquid waste into reticulated sewerage system;	**Compliant:** There are no reticulated wastewater systems in the area.
(e) the discharge will not initiate instability or make existing instability worse;	**Compliant:** Flat application area.
(f) the treatment unit and land application area are accessible for servicing.	**Compliant:** Both the treatment unit and the land application area are available for servicing.

Policy 16.3.4 – When considering discharge permit applications to discharge contaminants onto or into land, have regard to:	
(a) The extent of treatment prior to discharge	Primary treatment unit (4,500 litre septic tank). BOD after 5 days (average) < 100 g/m^3 Suspended solids (average) < 60 g/m^3
(b) The method of distribution to and within the land application area following treatment	Effluent is pumped to an application bed.
(c) Alternative options for managing the contaminants, including discharge to an alternative location or to a reticulated community sewerage system;	The land application location is considered the best area considering land constraints. There are no reticulated systems in the area.
(d) The need for reserve land application areas;	Reserve area is available if wastewater field is found underperforming.
(e) site constraints, including geology, topography, slope, climate, the presence of waterbodies or structures;	The existing system is appropriately designed to manage each of these aspects.
(f) relevant guidelines and standards; and	Designed in accordance with AS/NZS 1547:2012.
(g) potential cumulative effects.	All effects considered. Low risk of any contamination or environmental impact.

Policies 16.3.5 to 16.3.9 are not applicable to the wastewater assessment.

Appendix H: Liquefaction Analysis

SMART ALLIANCES LTD
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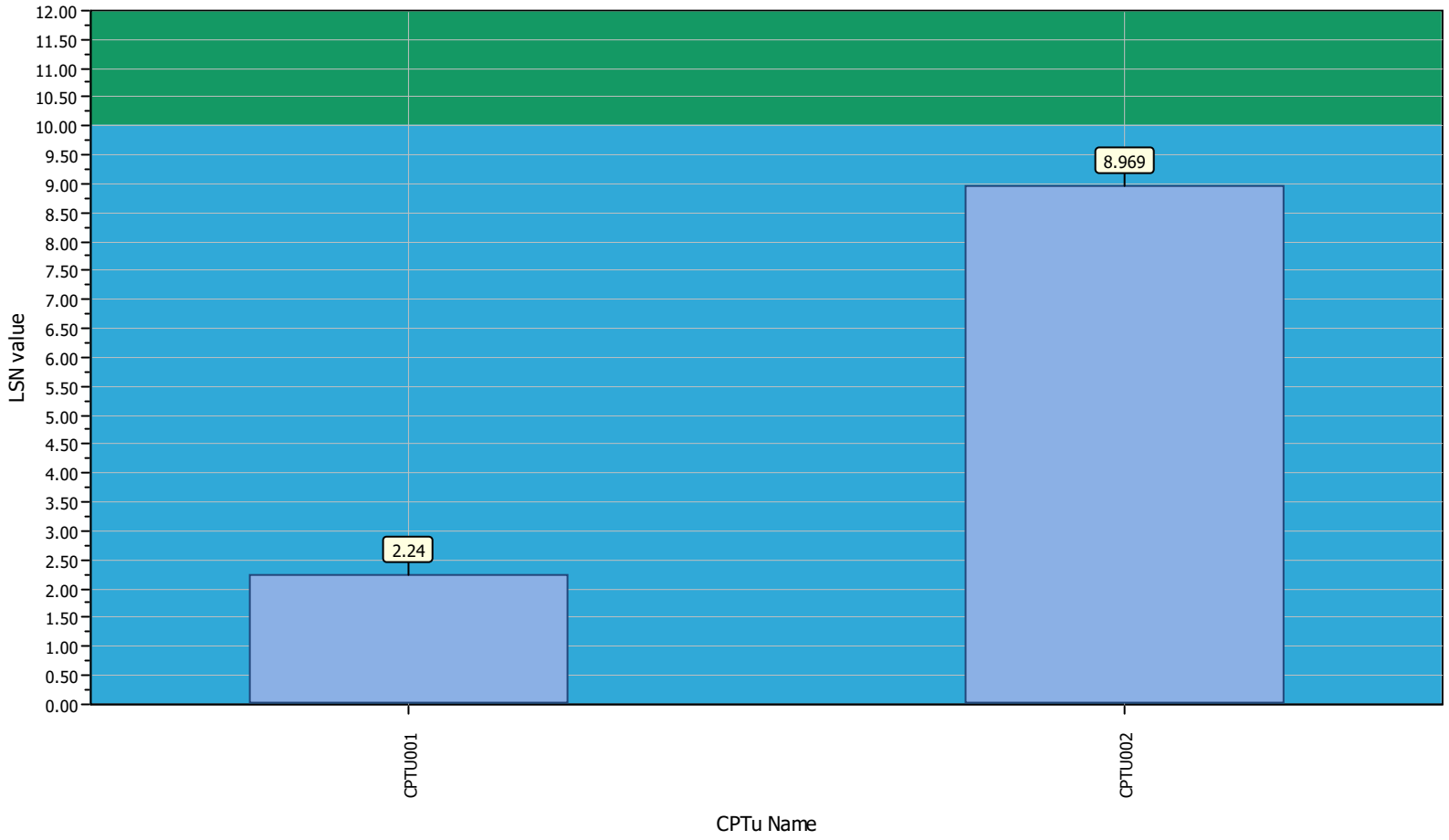
BLENHEIM 7240
http://www.smartalliances.co.nz

Project title :

Location :

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: 2

100% little liquefaction

0% minor liquefaction

0% moderate liquefaction

0% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

SMART ALLIANCES LTD
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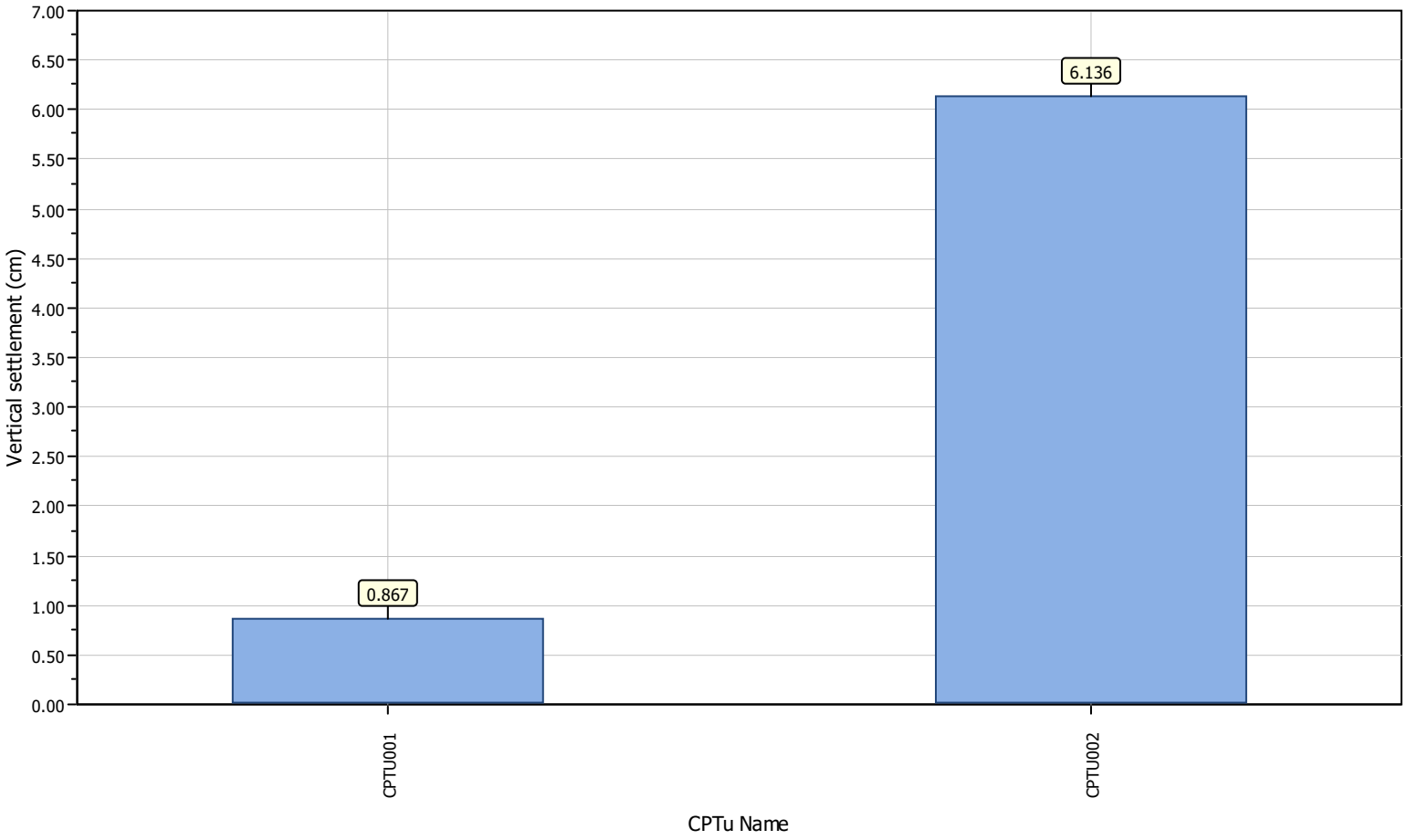
BLENHEIM 7240
http://www.smartalliances.co.nz

Project title :

Location :

Overall vertical settlements report



SMART ALLIANCES LTD
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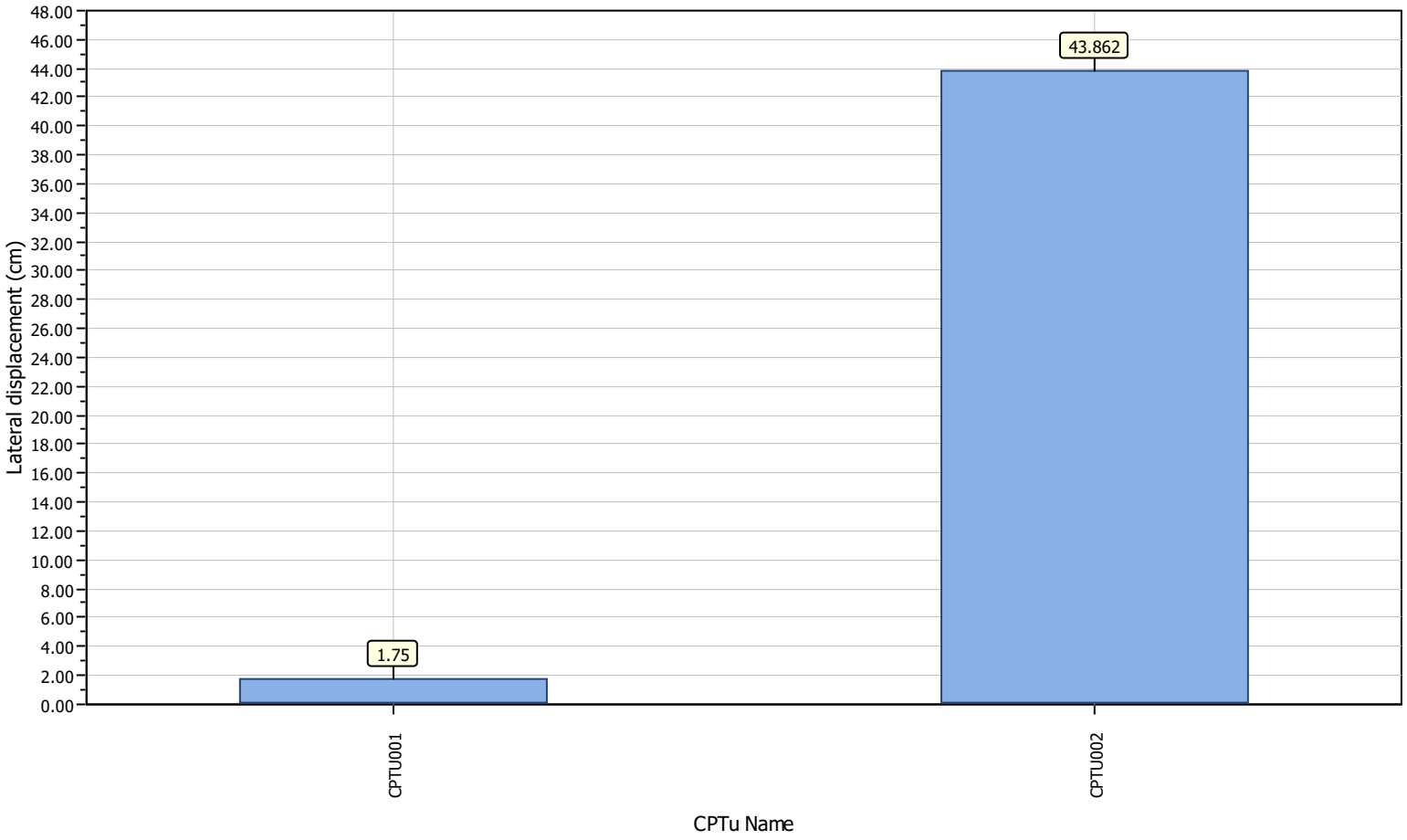
Project title :

Location :

Overall lateral displacements report



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BLENHEIM 7240
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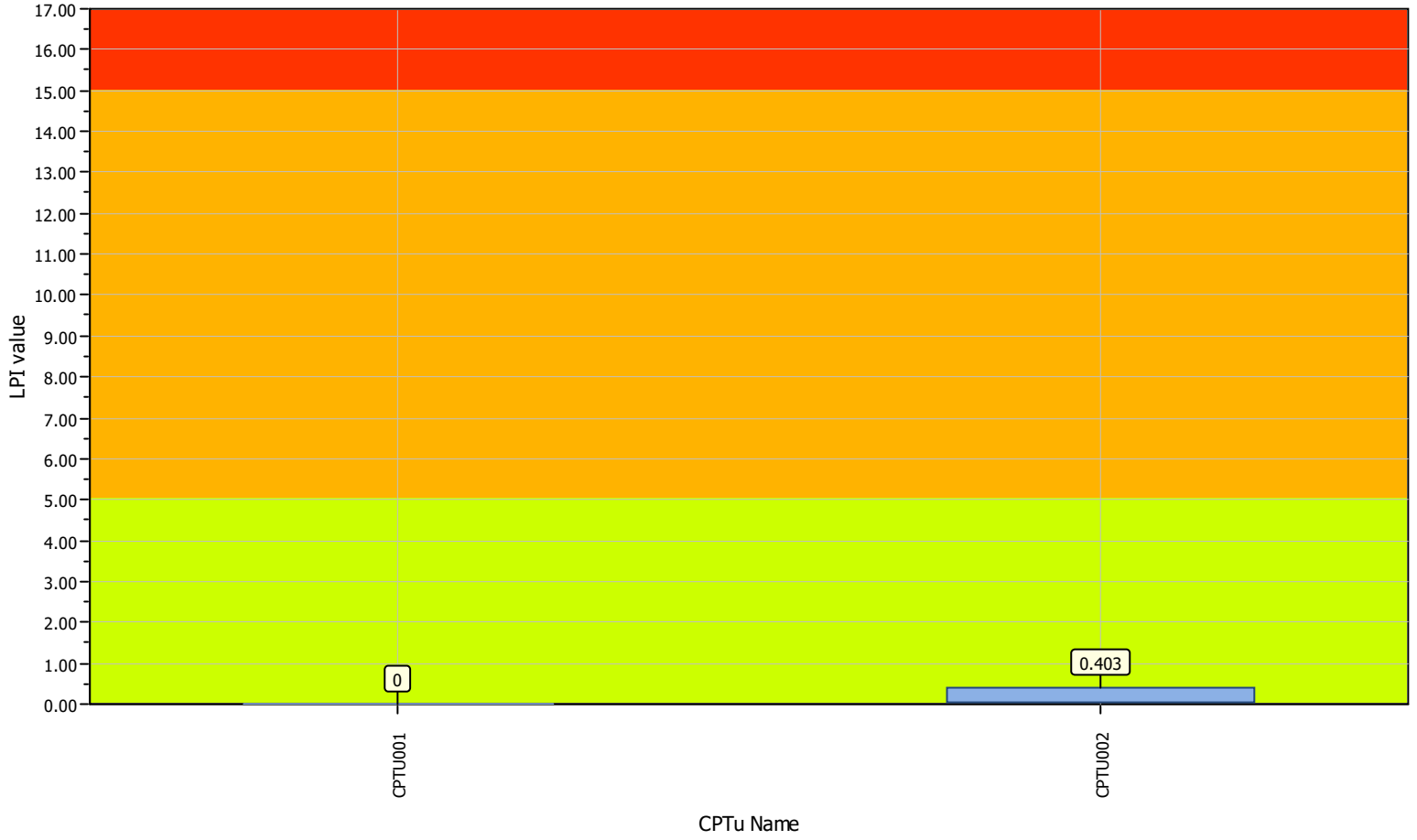
Project title :

Location :

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 2
100% low risk
0% high risk
0% very high risk

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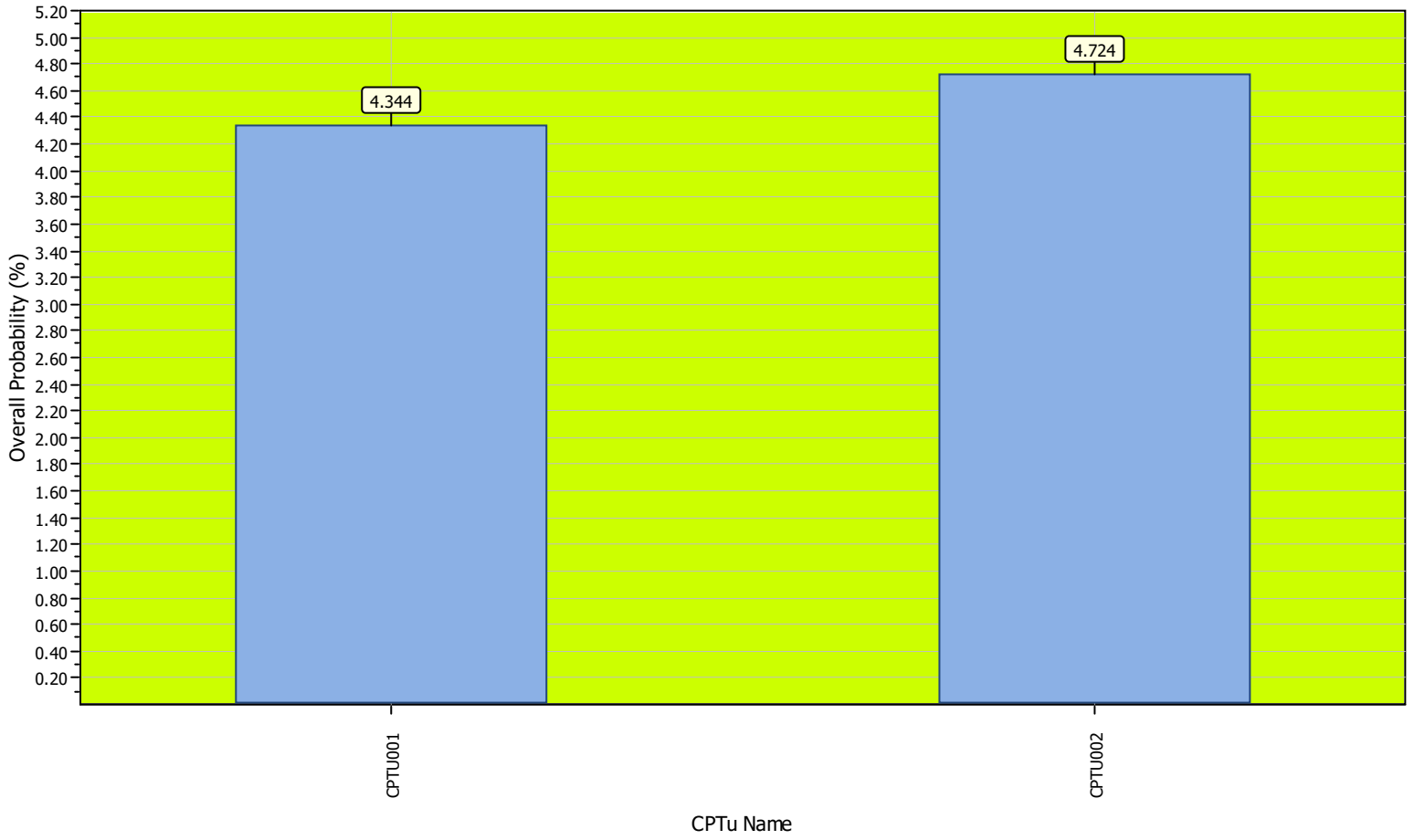
http://www.smartalliances.co.nz

Project title :

Location :

Overall Probability for Liquefaction report



Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 2
100% low probability
0% high probability
0% very high probability

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BLENHEIM 7240
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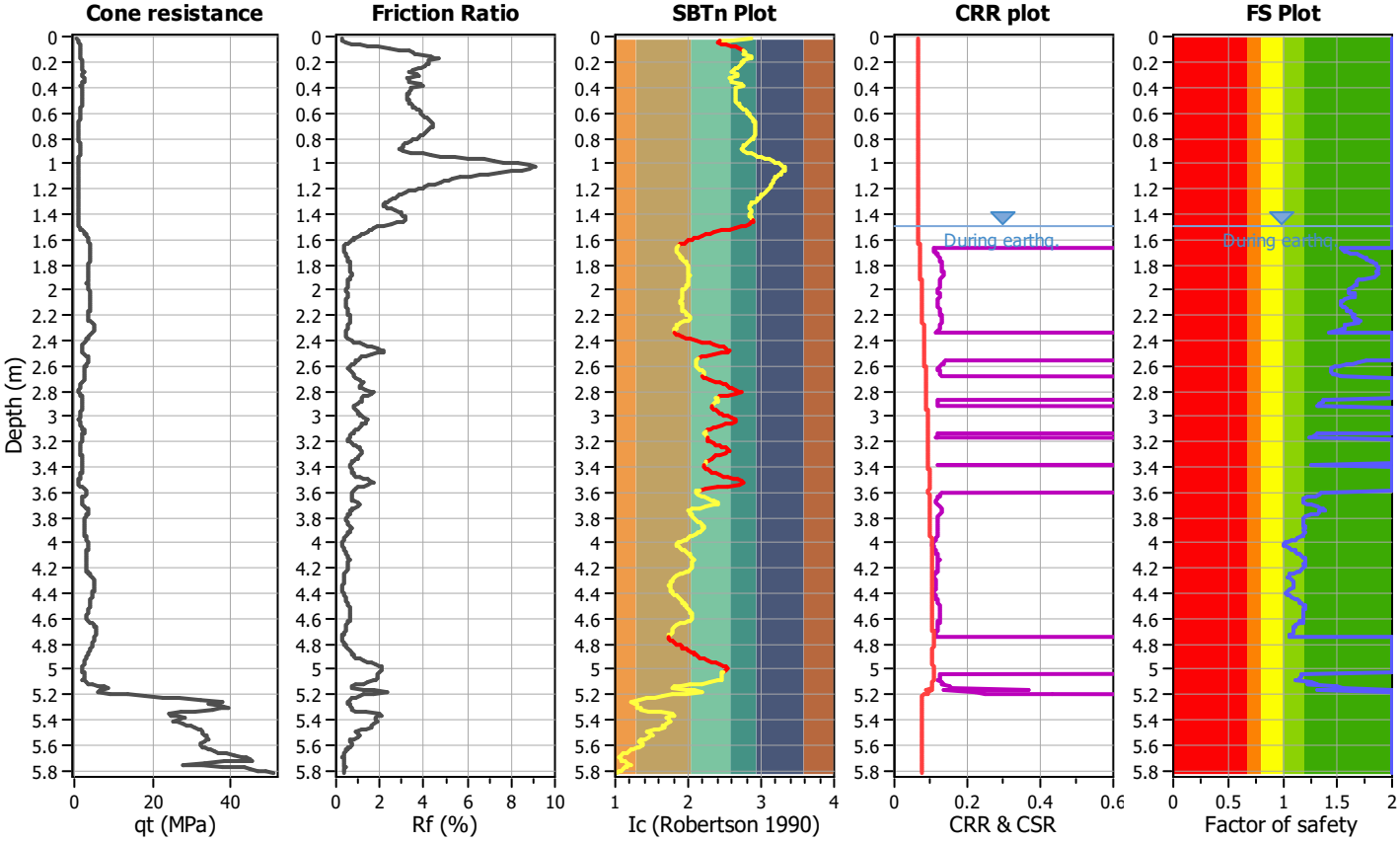
LIQUEFACTION ANALYSIS REPORT

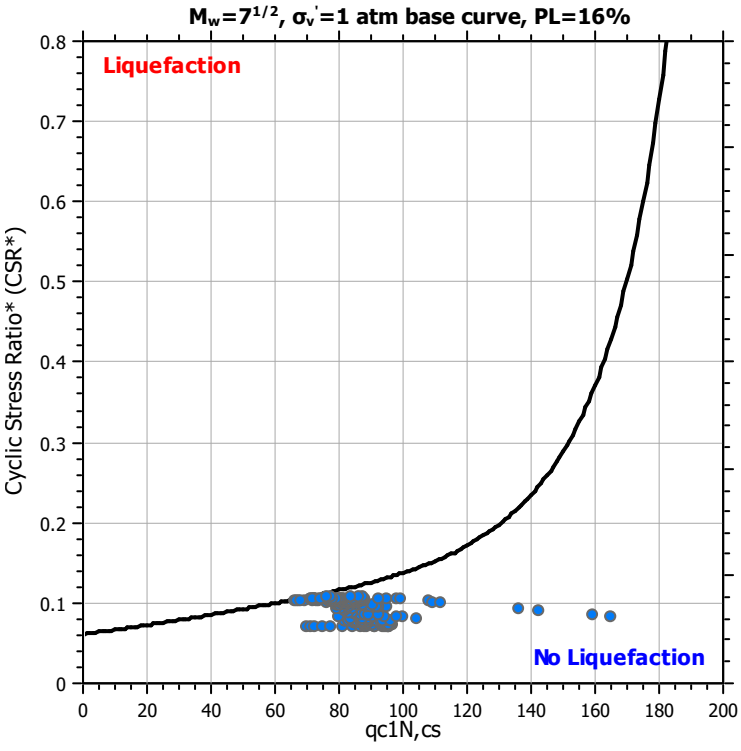
Project title : **Location :**

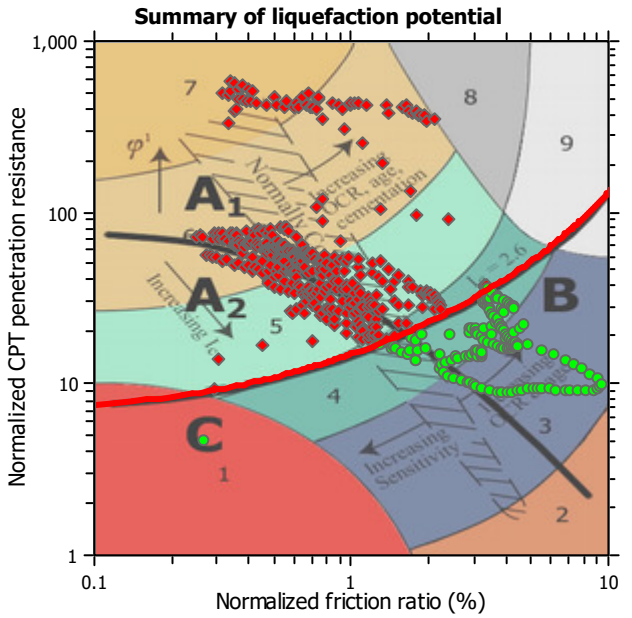
CPT file : CPTU001

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	6.40	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.12	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

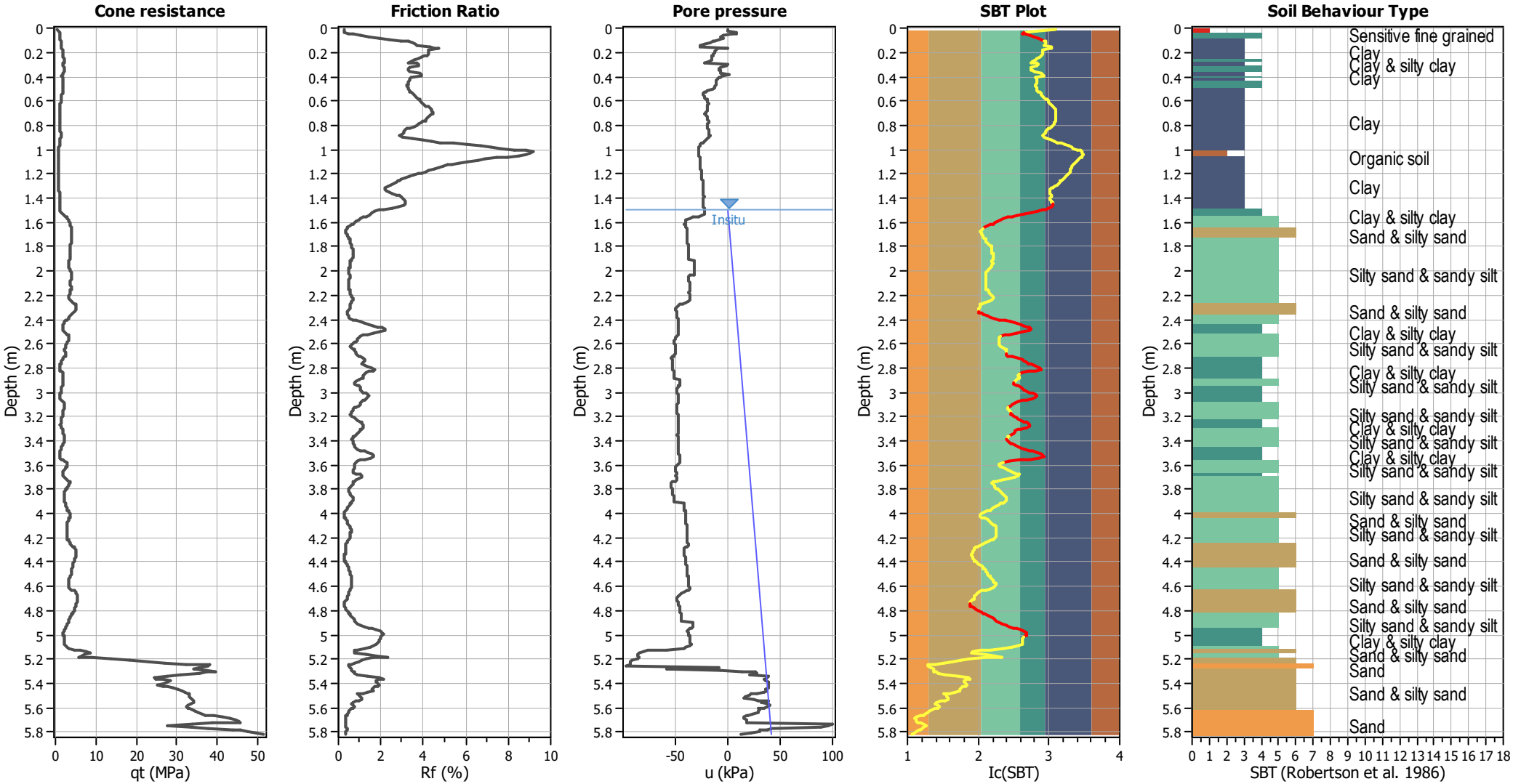






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



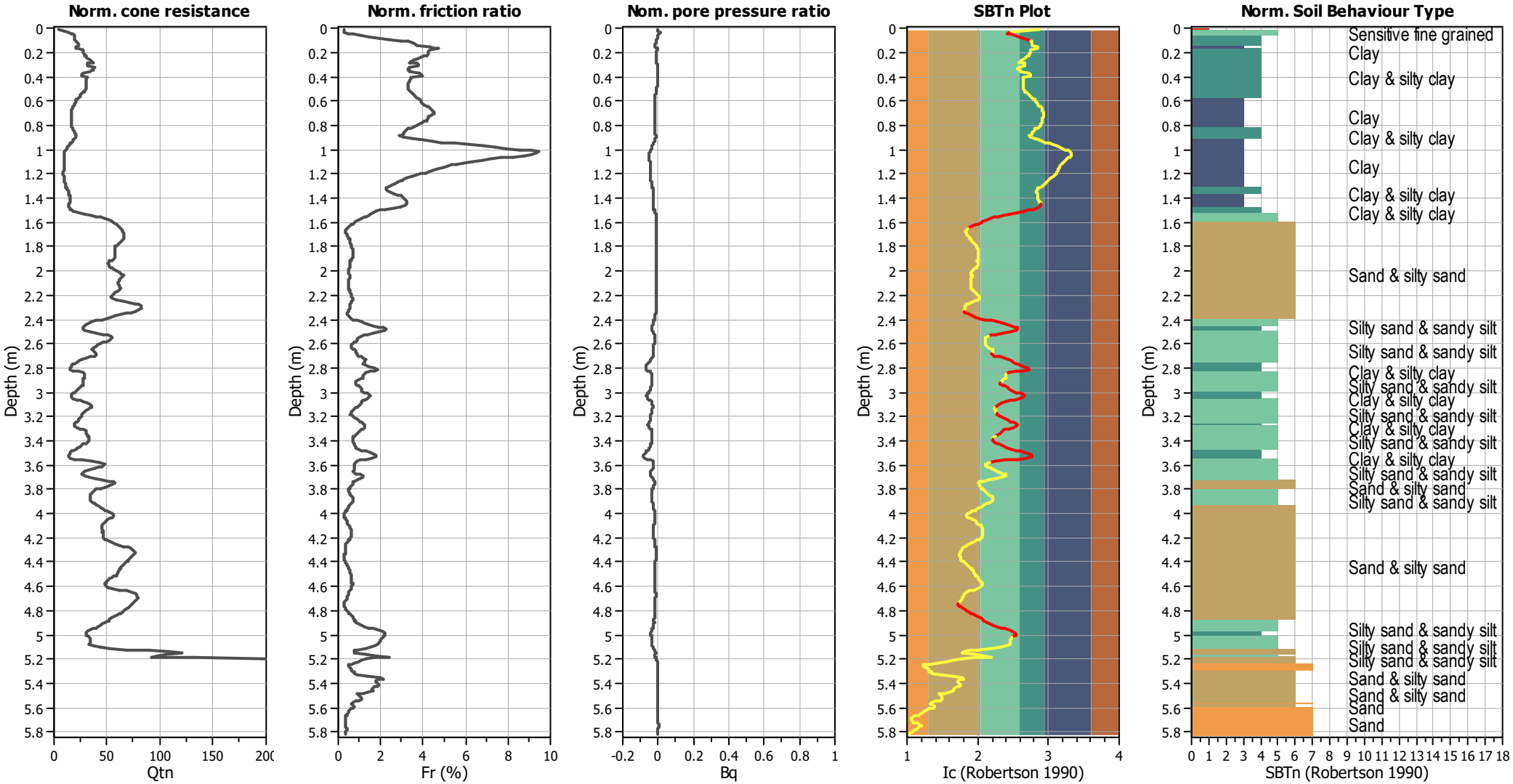
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



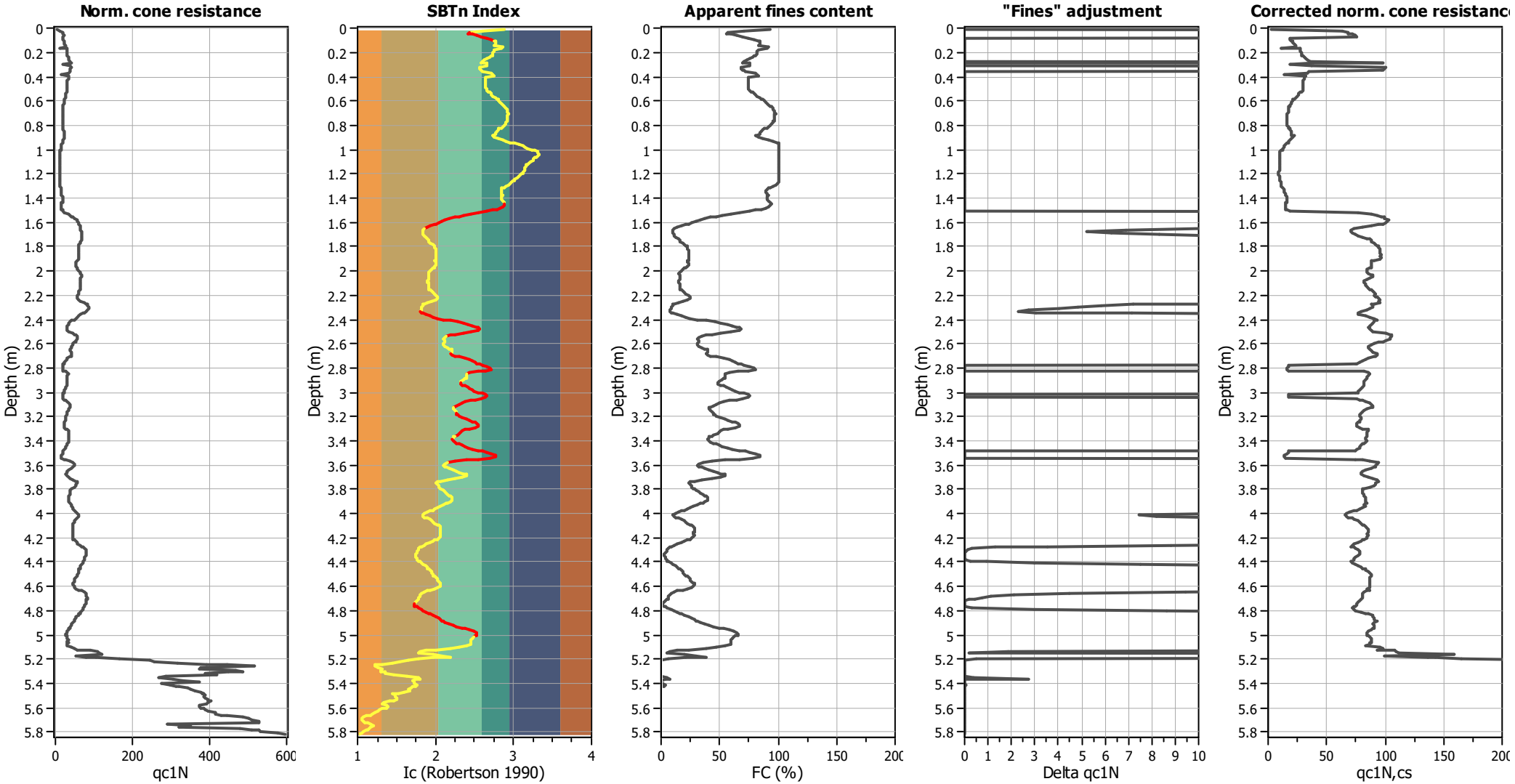
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

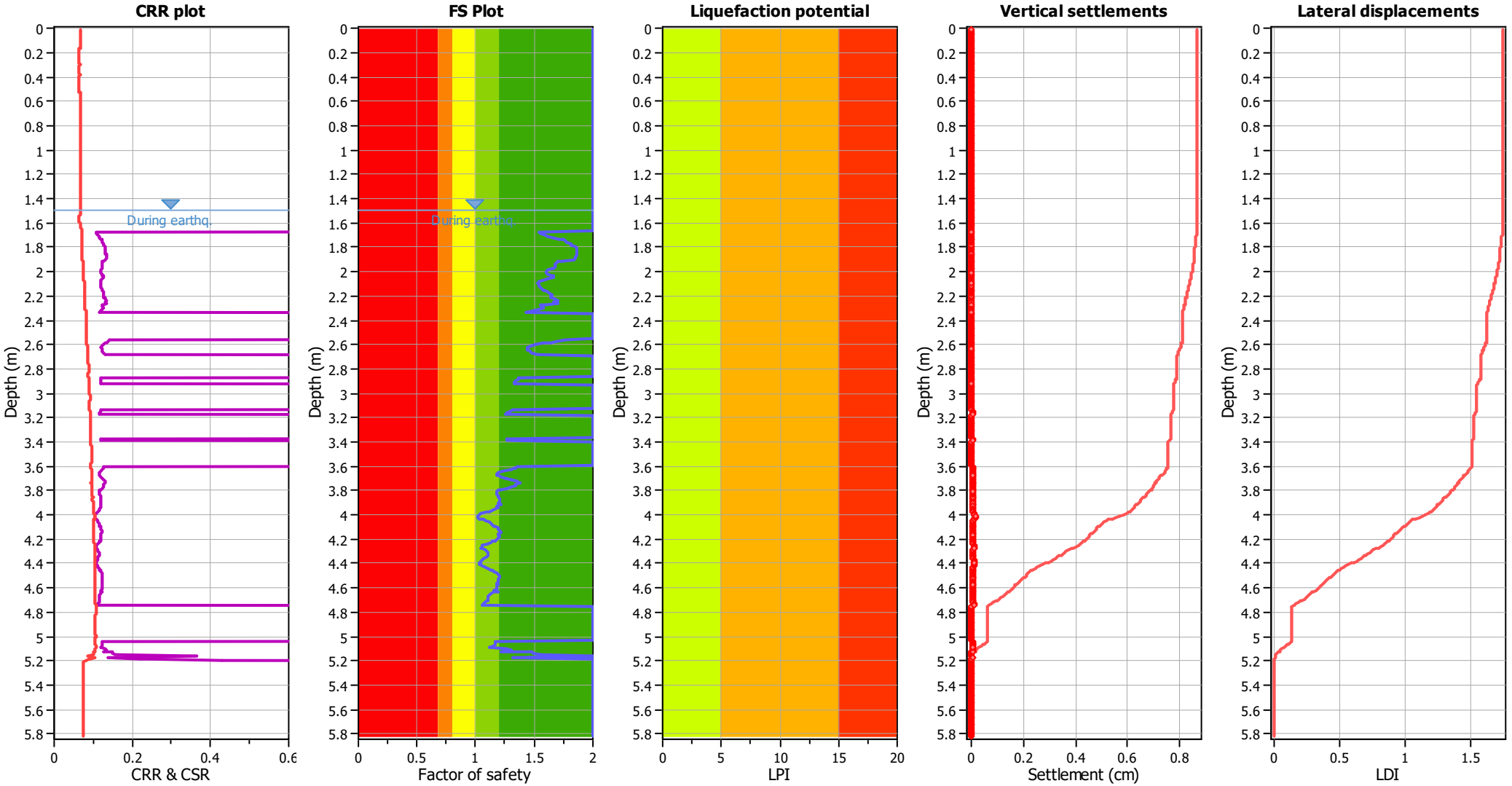
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

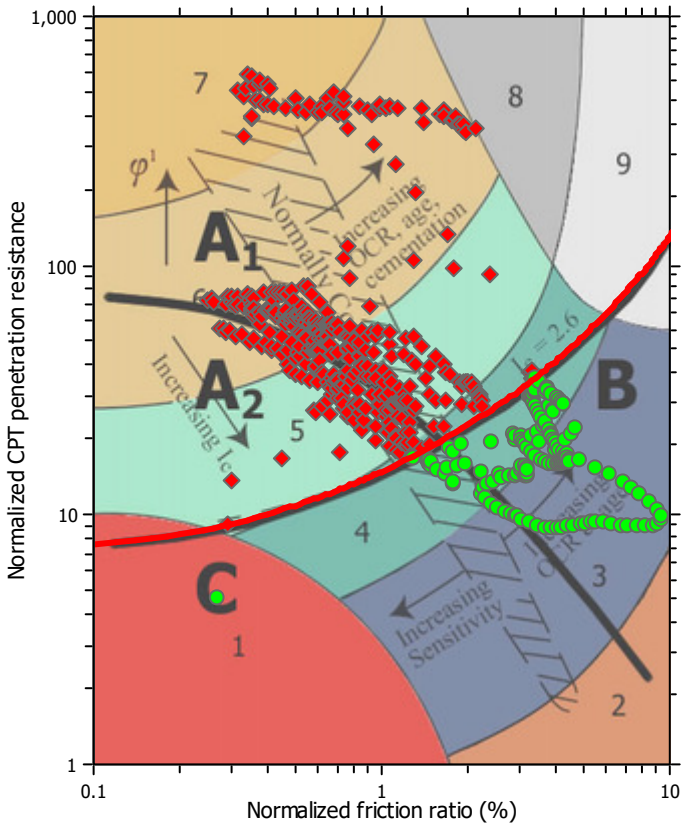
F.S. color scheme

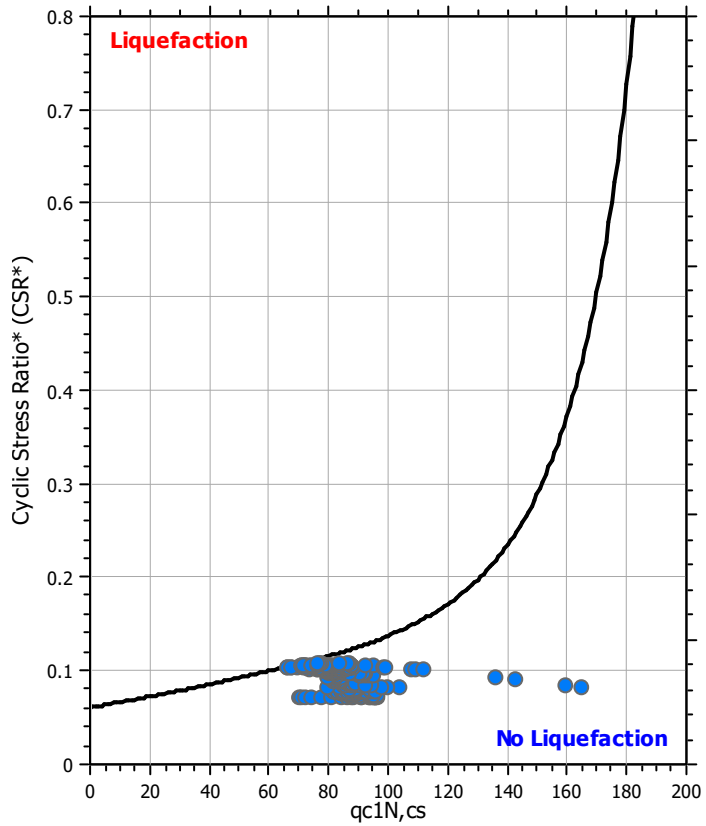
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

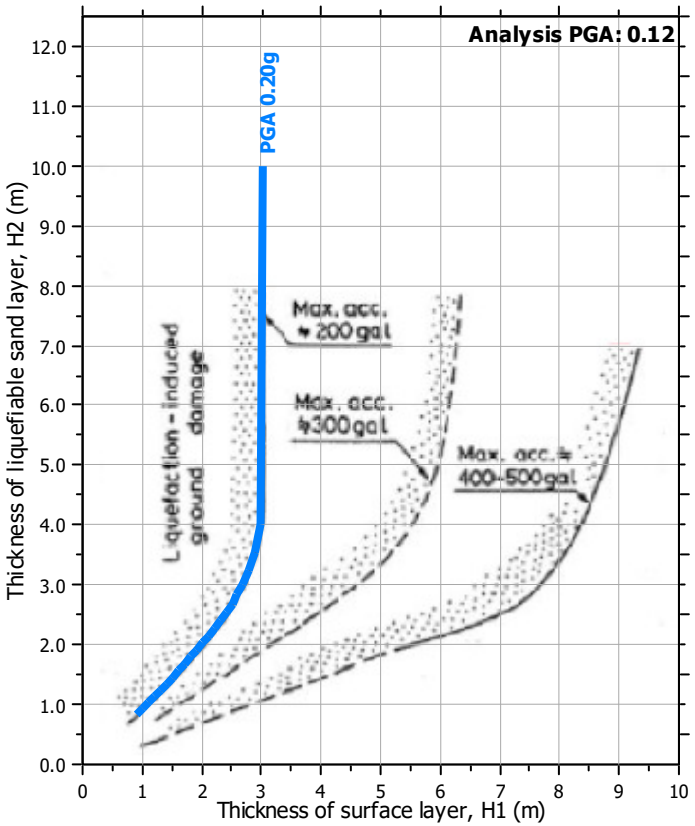
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



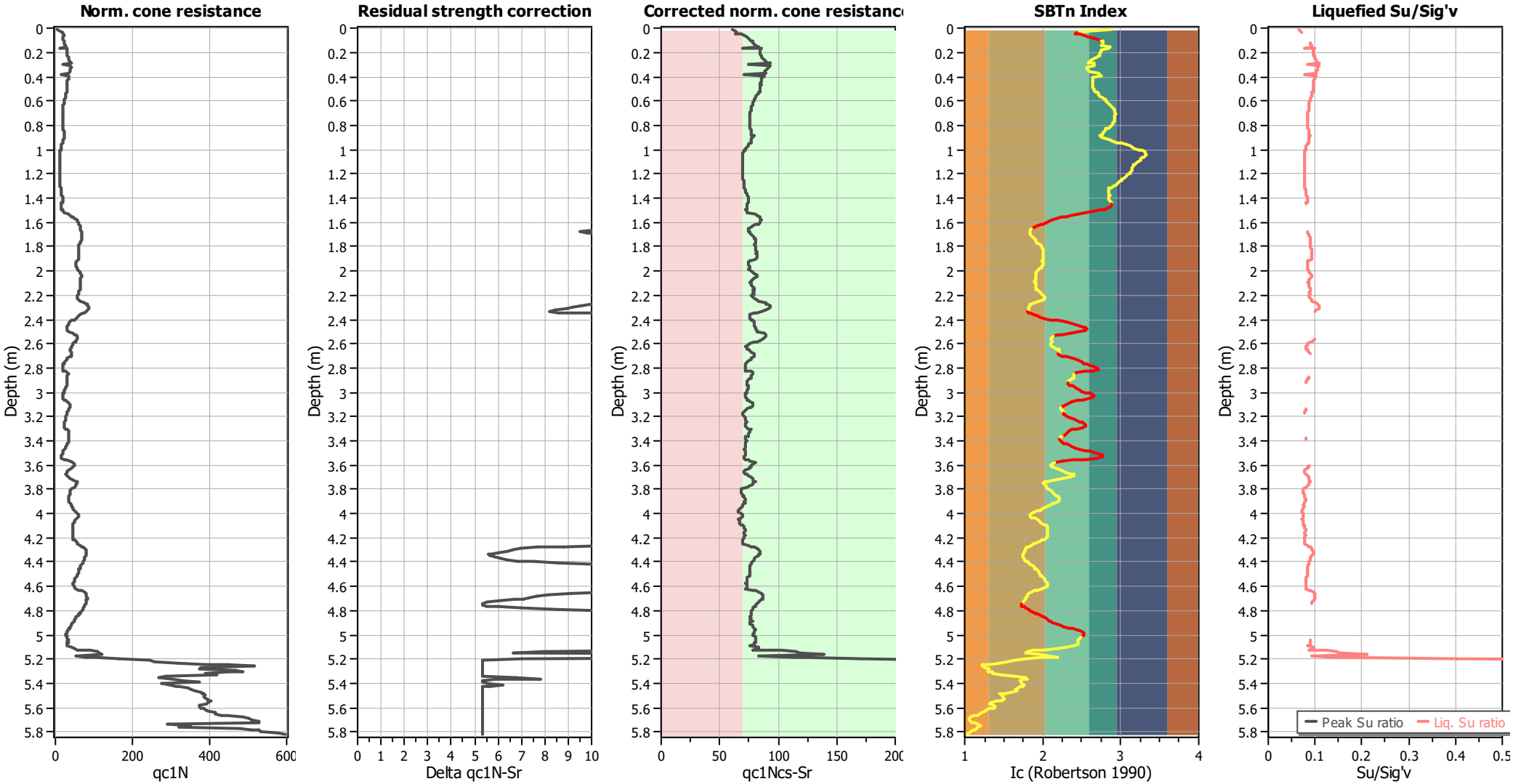




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

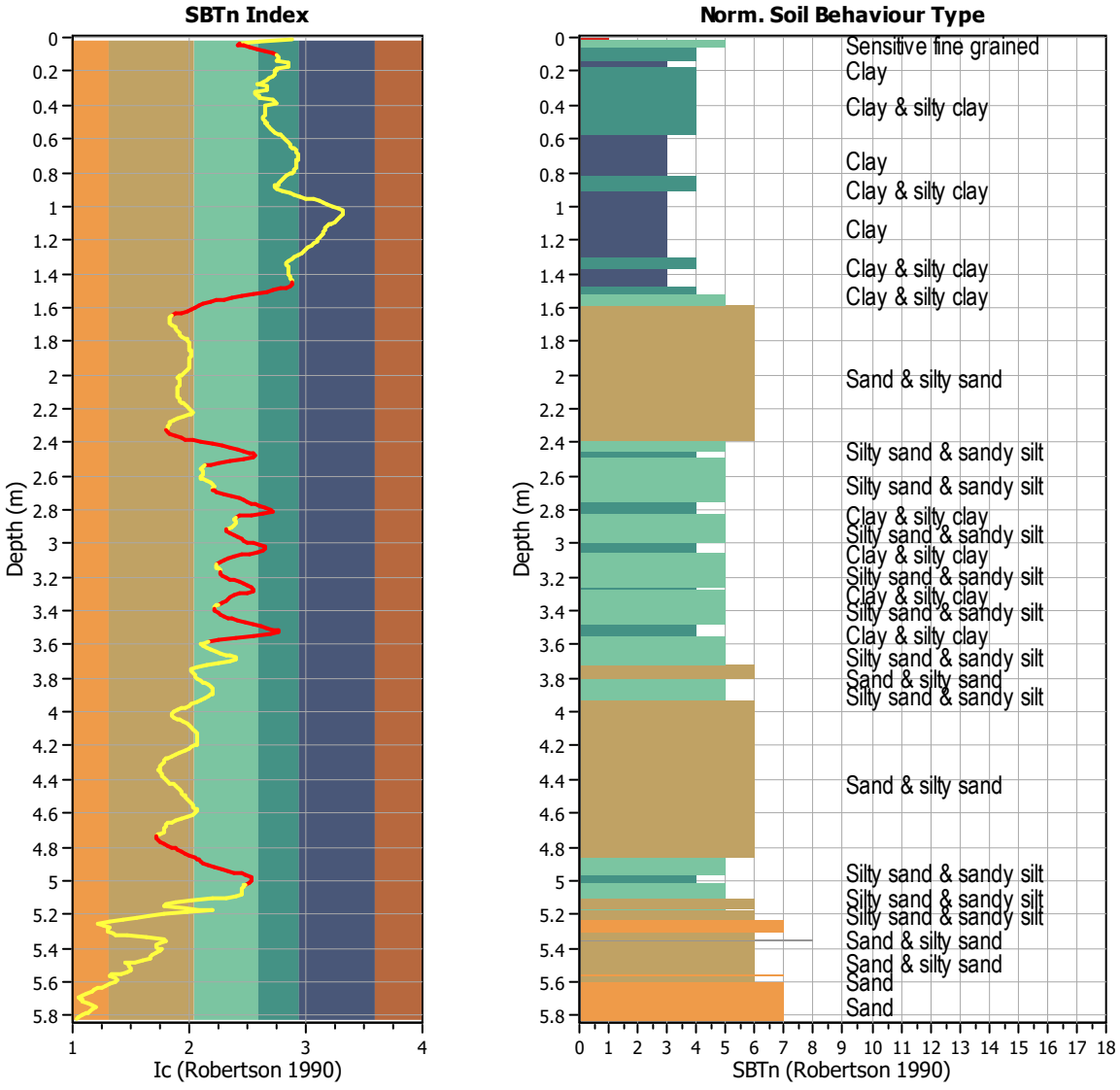
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

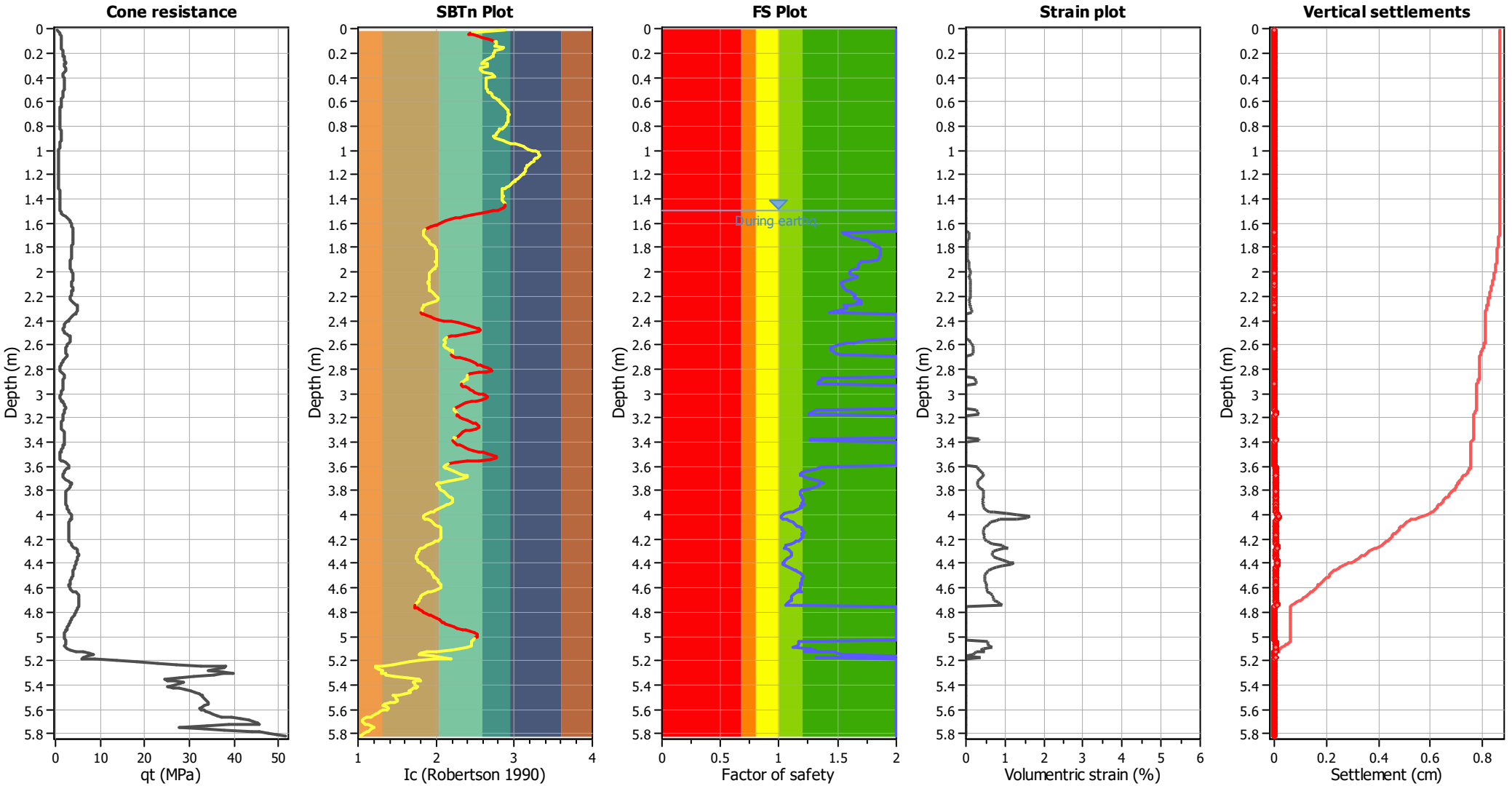
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	582
I_c maximum check value:	3.00	Total points excluded:	163
I_c change ratio value:	0.0100	Exclusion percentage:	28.01%
Minimum number of points in layer:	4	Number of layers detected:	14

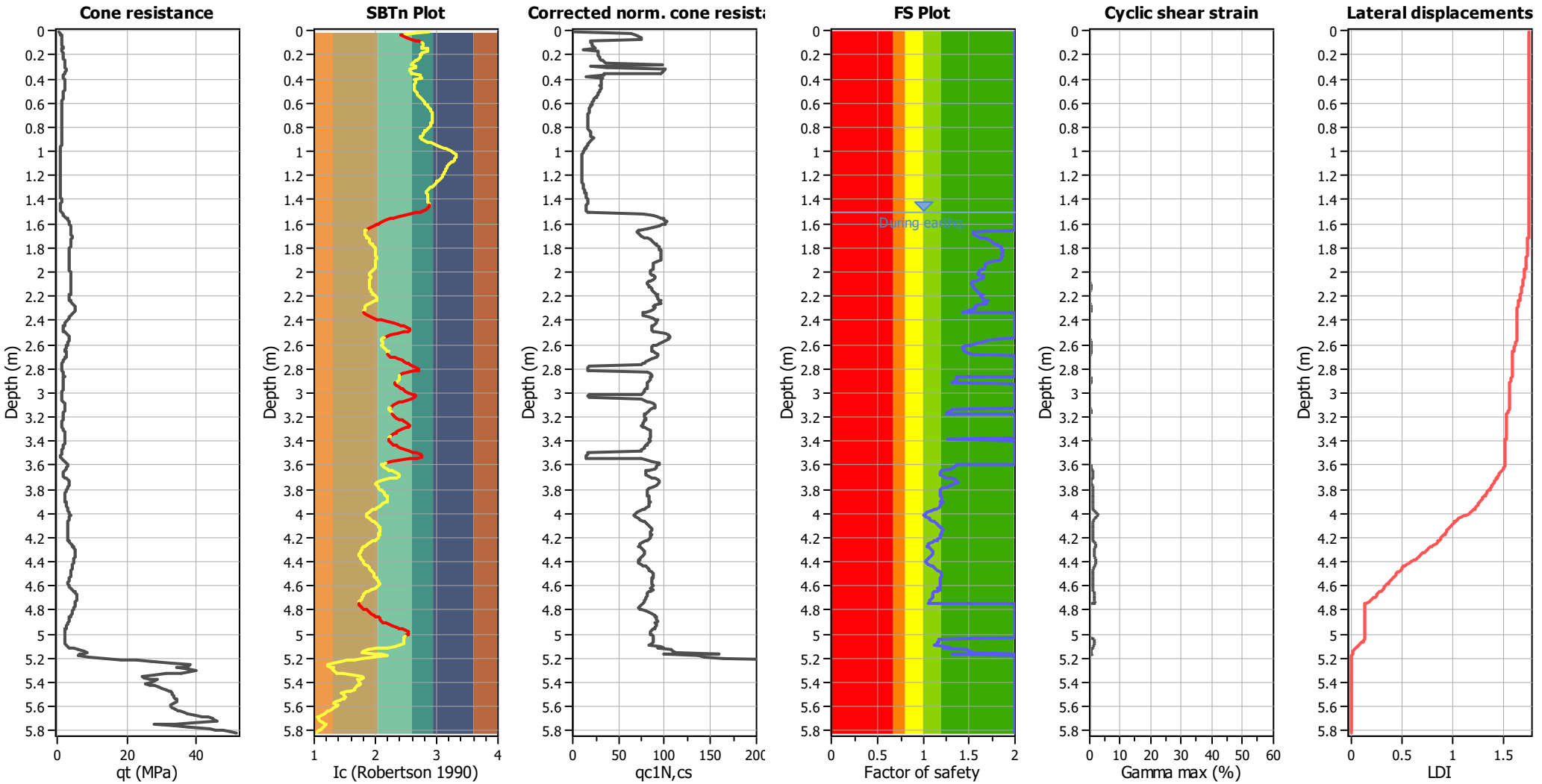
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

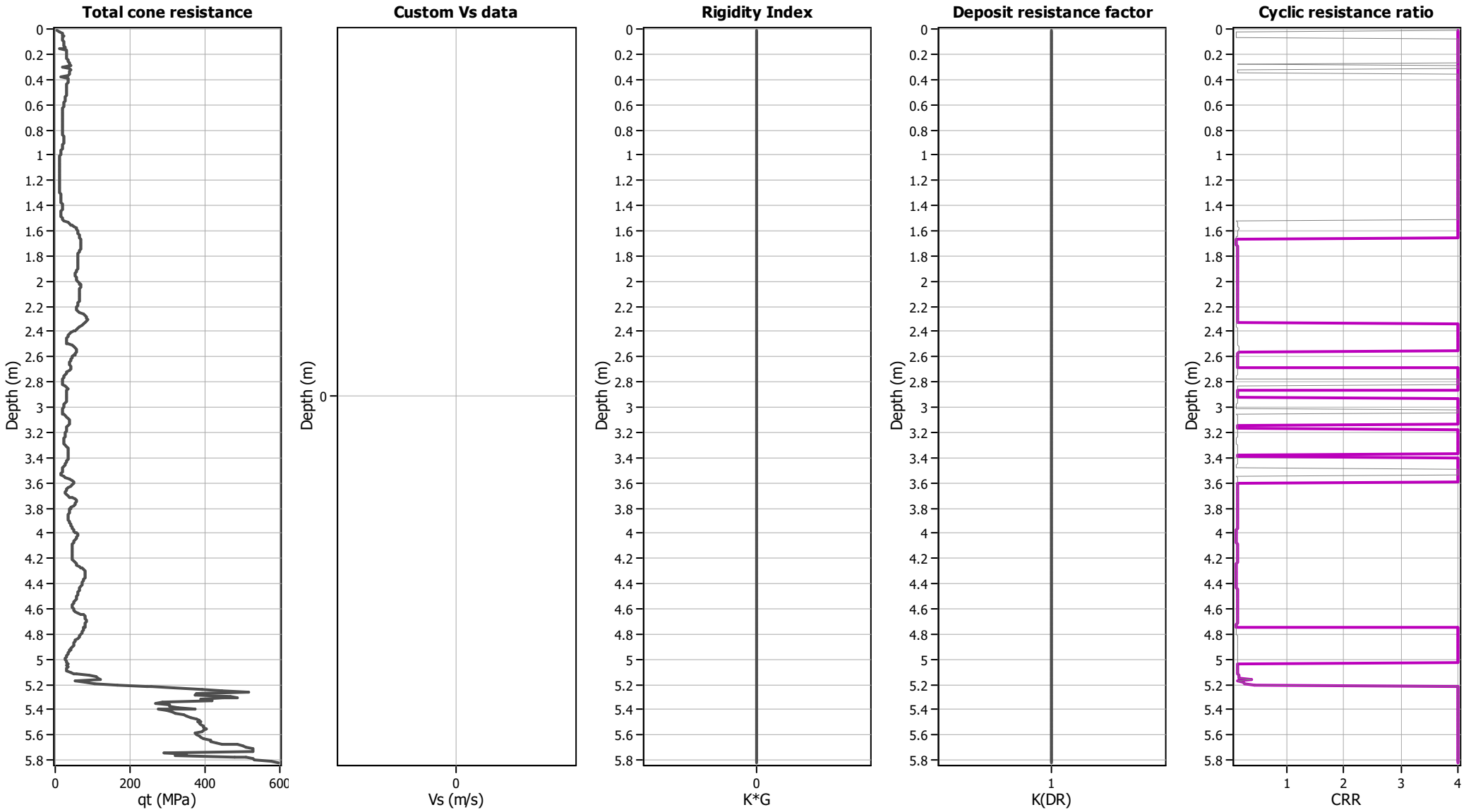
Estimation of post-earthquake lateral Displacements



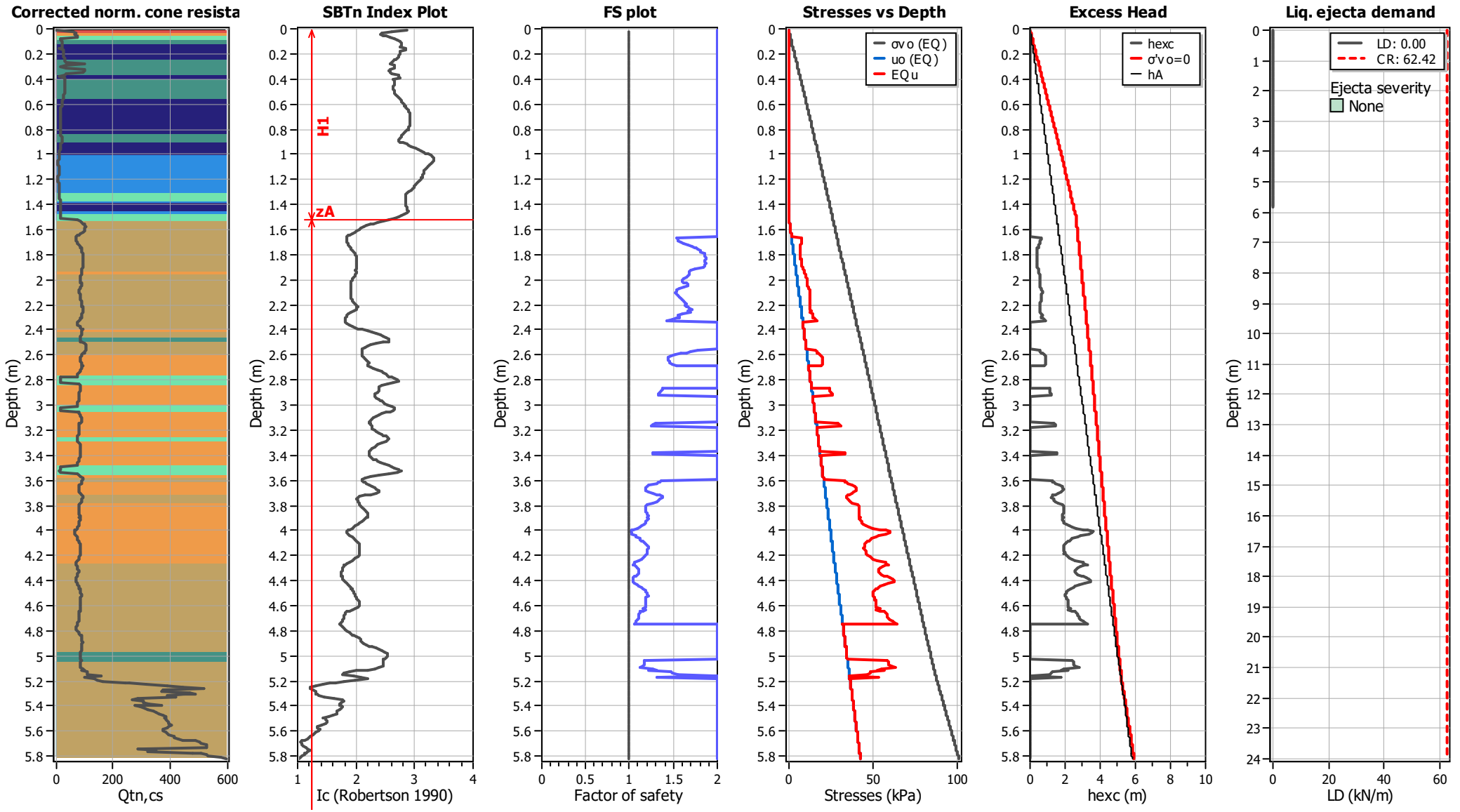
Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Aging Calculation Estimation



Ejecta Severity Estimation



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http://www.smartalliances.co.nz

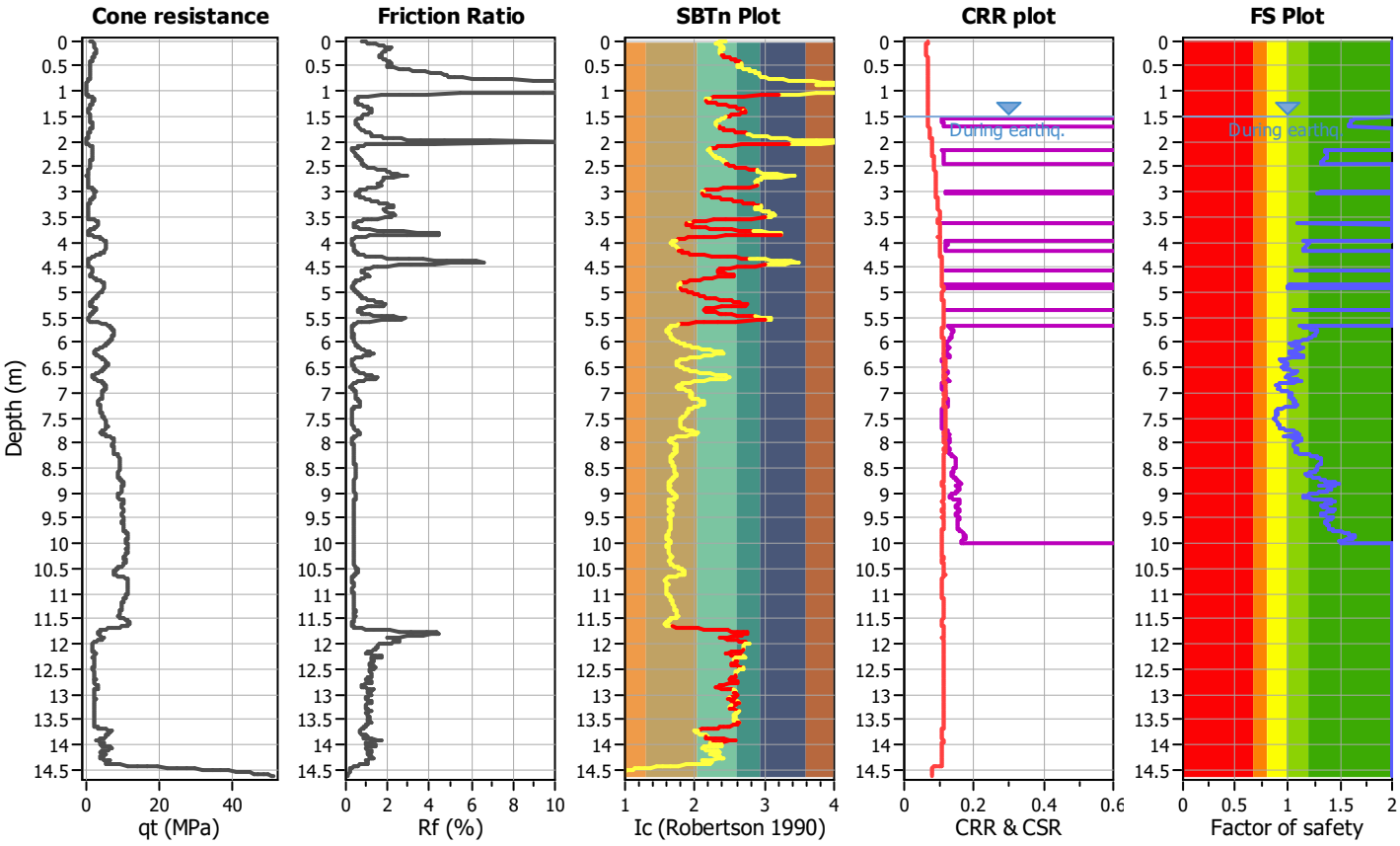
LIQUEFACTION ANALYSIS REPORT

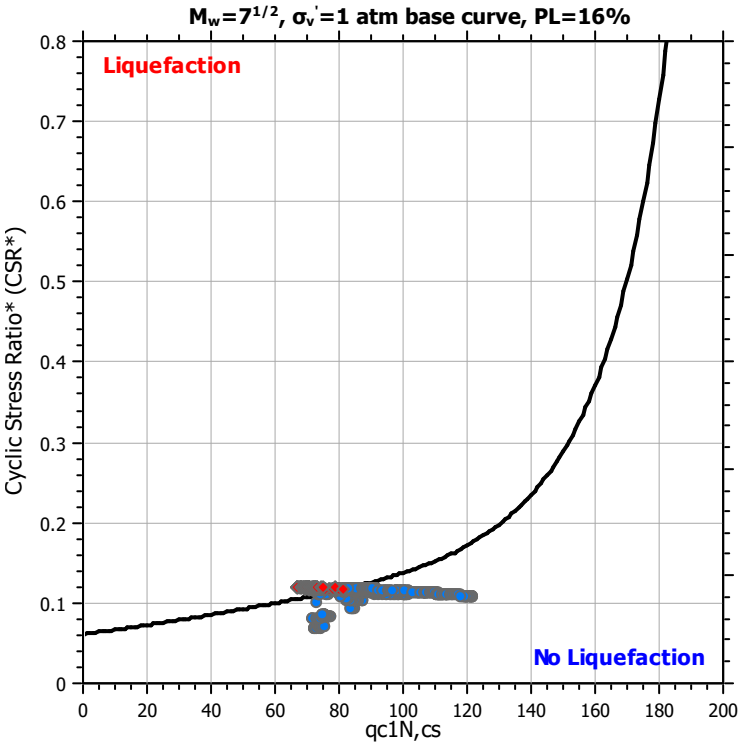
Project title : **Location :**

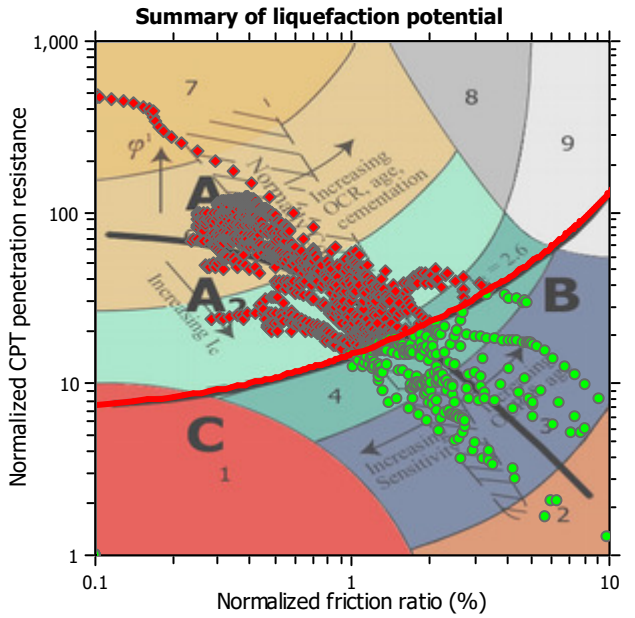
CPT file : CPTU002

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	6.40	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.12	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

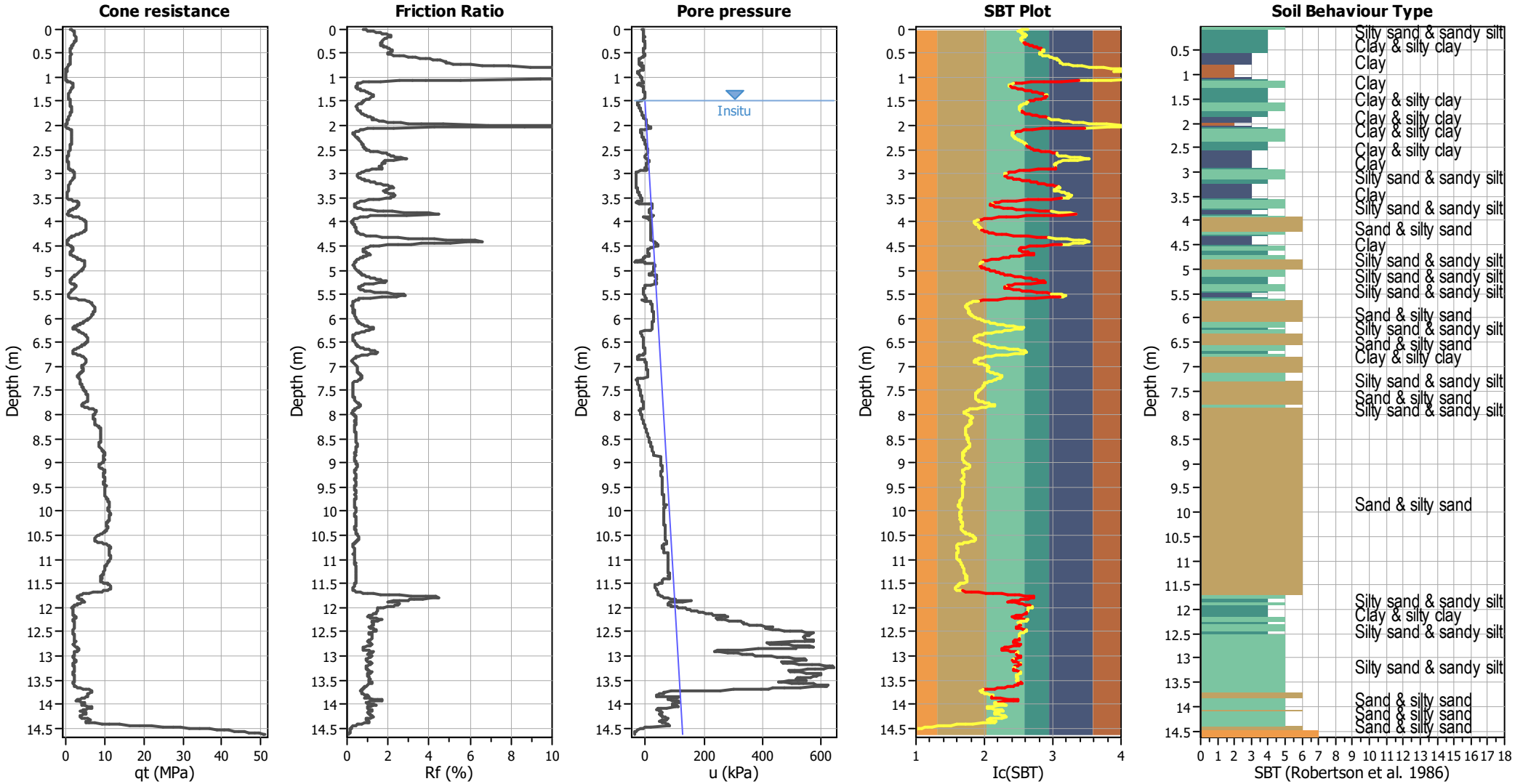






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



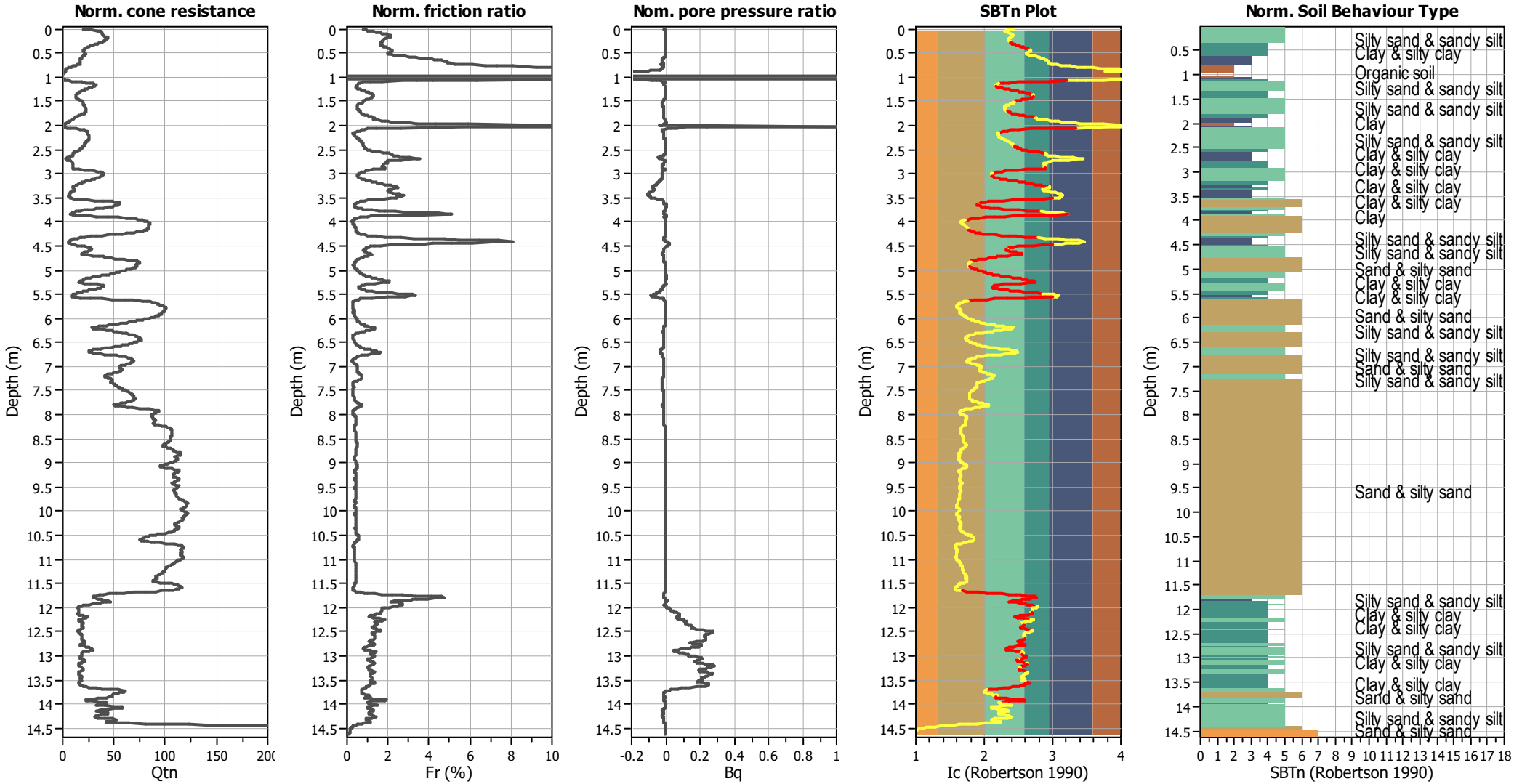
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



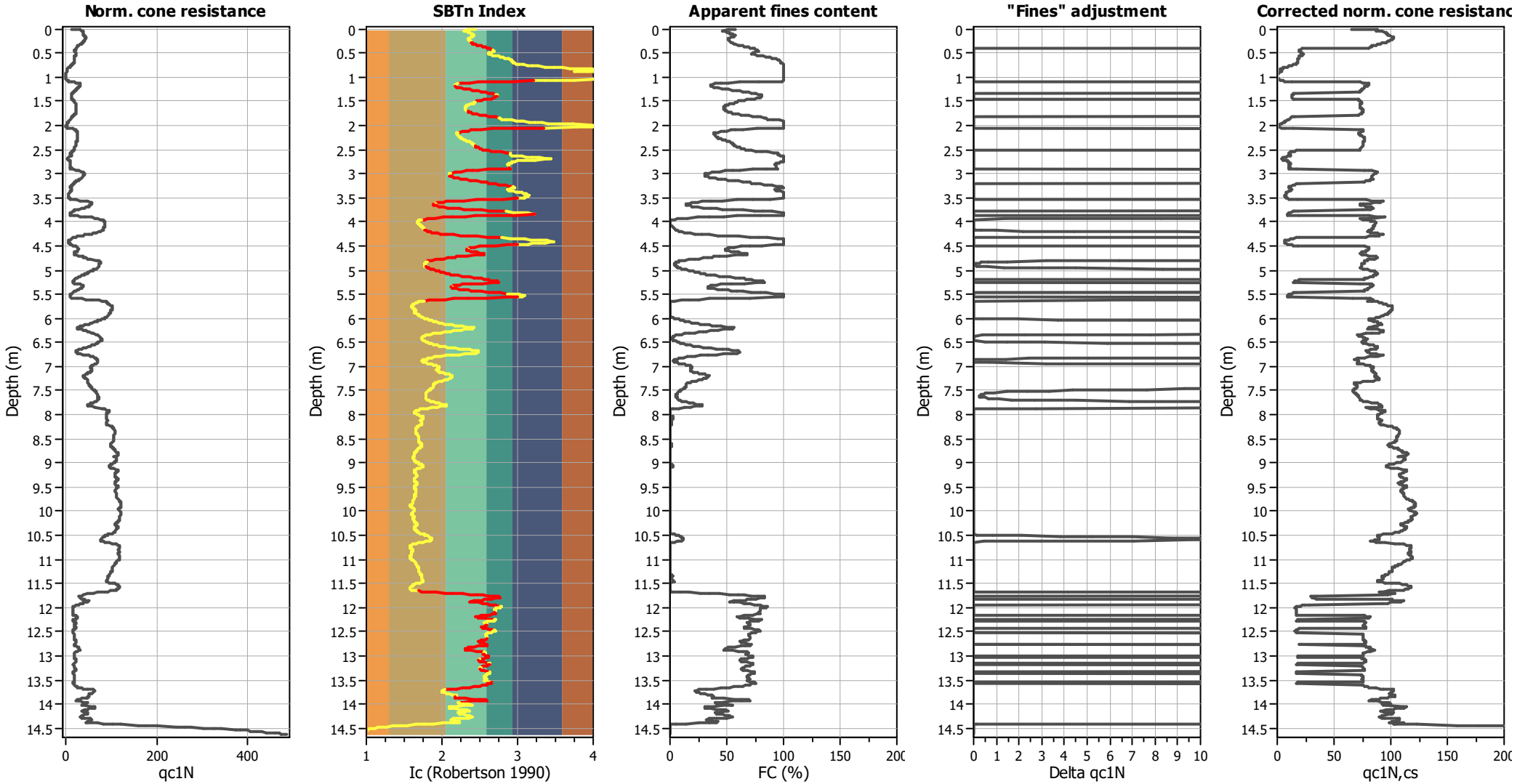
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

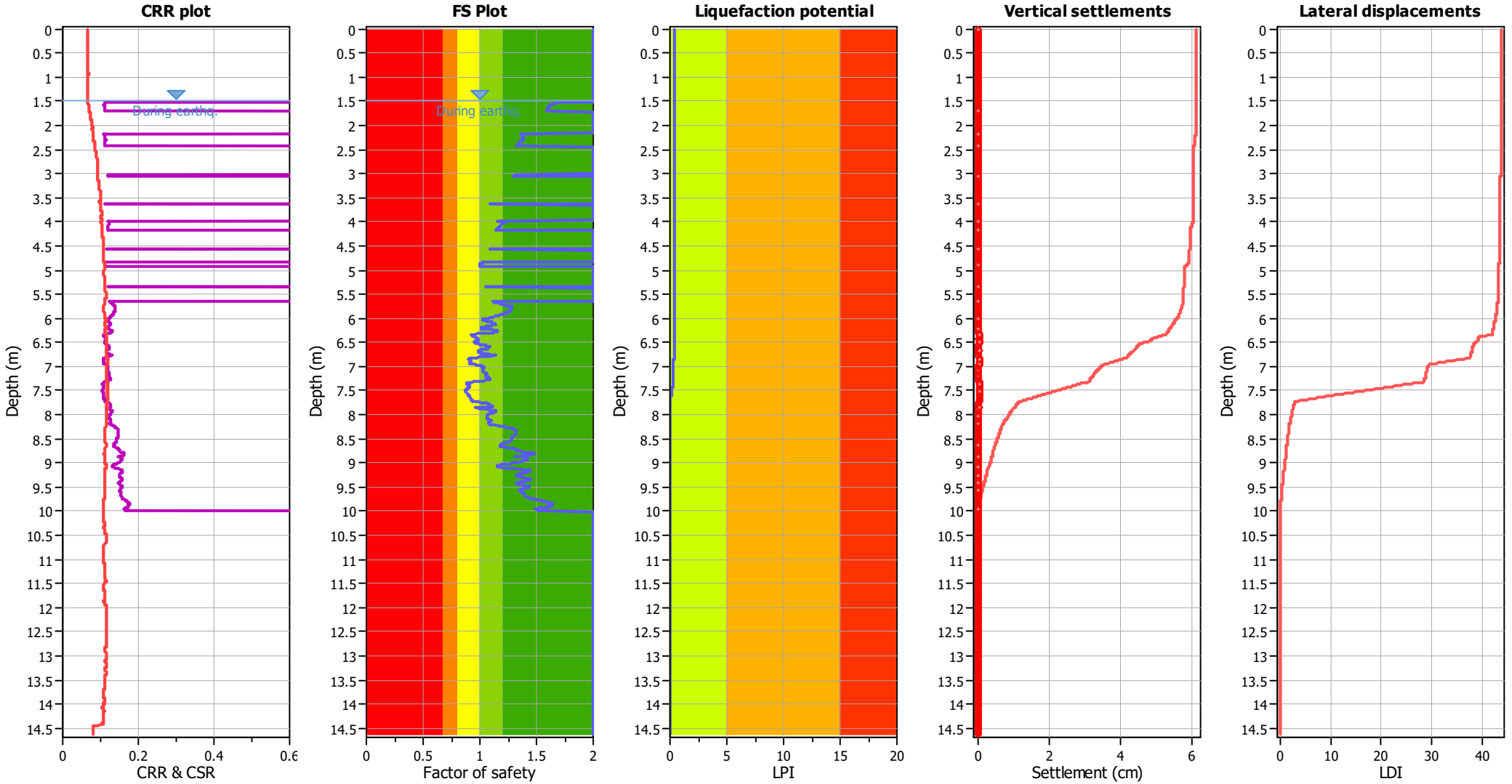
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

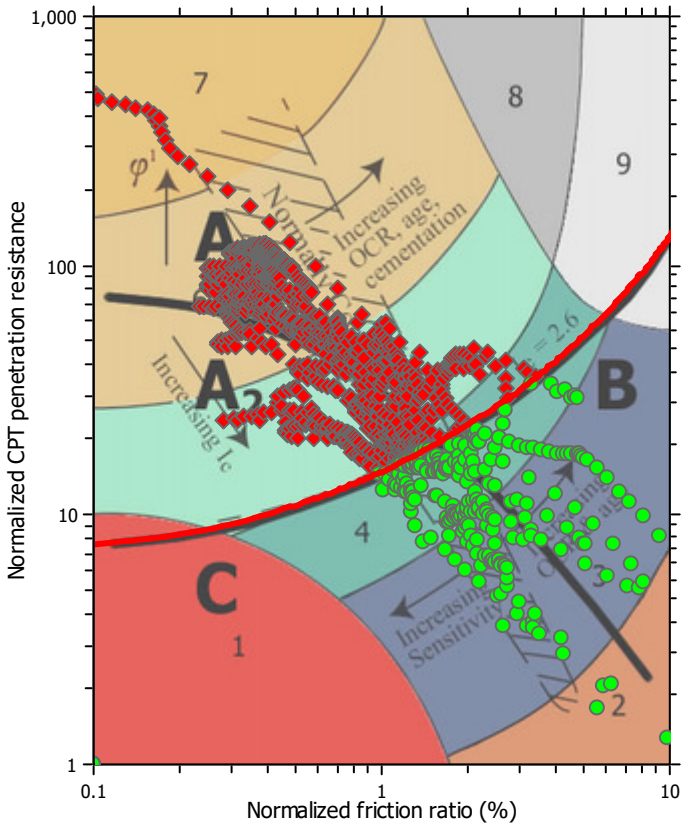
F.S. color scheme

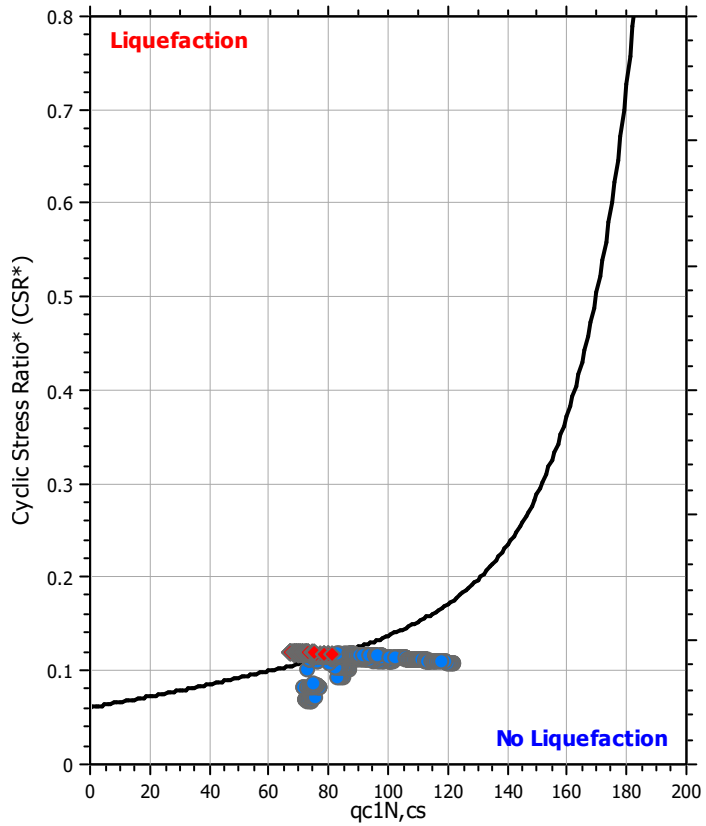
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

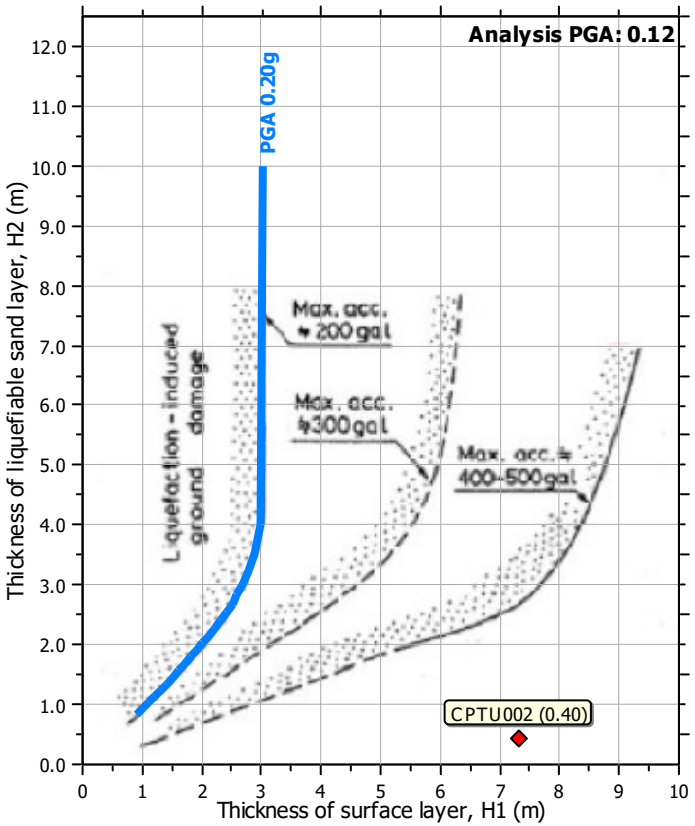
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



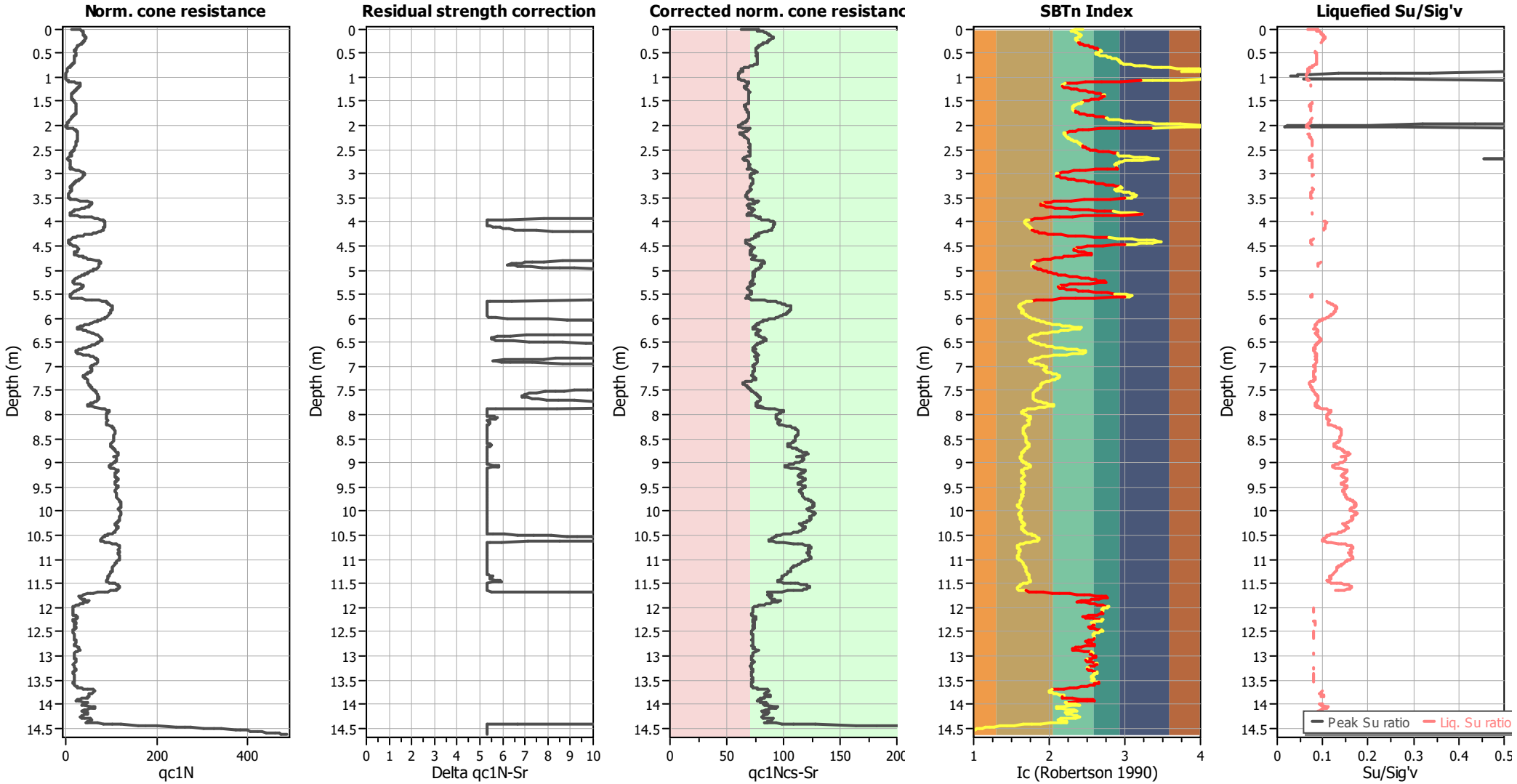




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

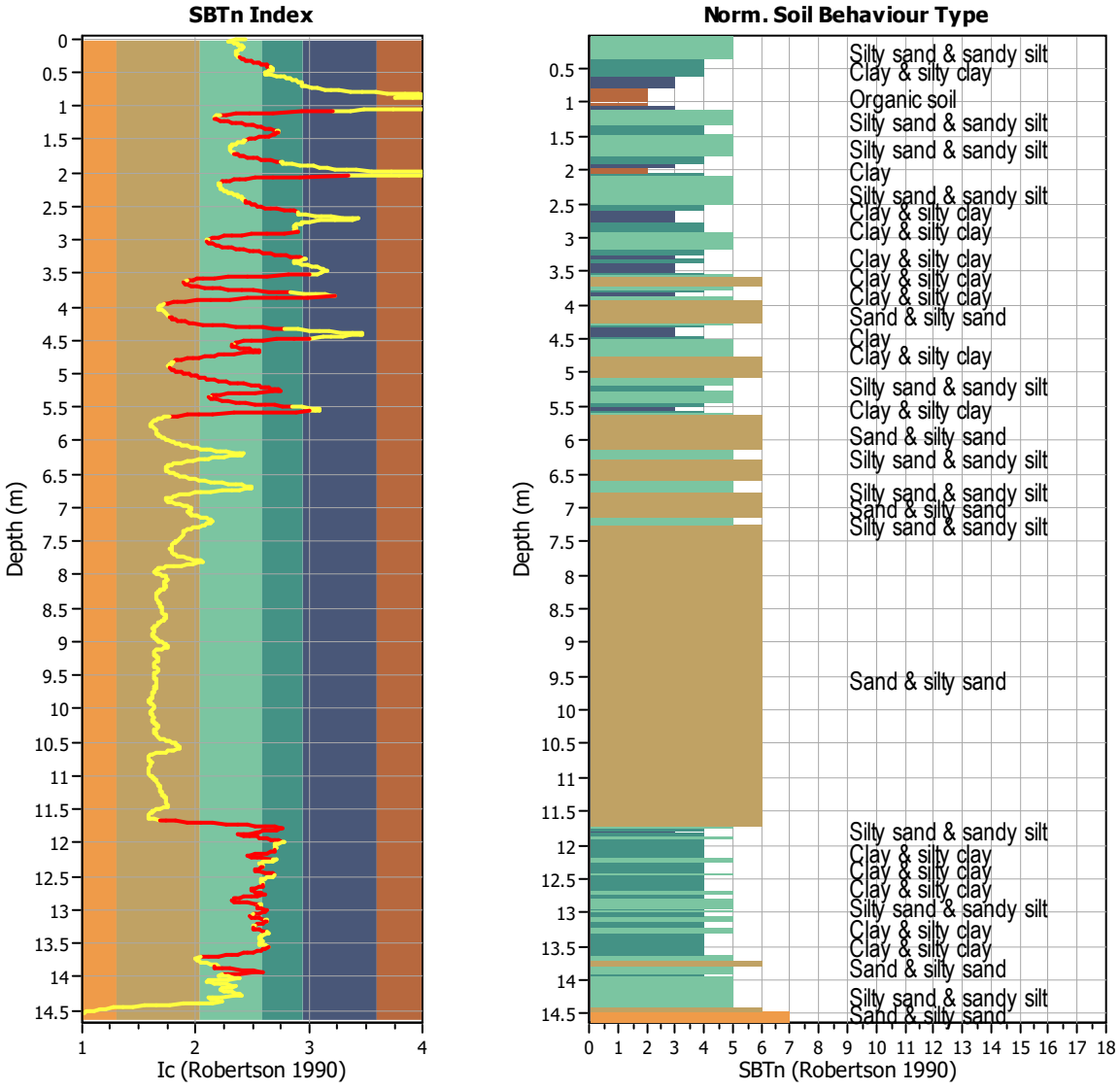
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.40	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



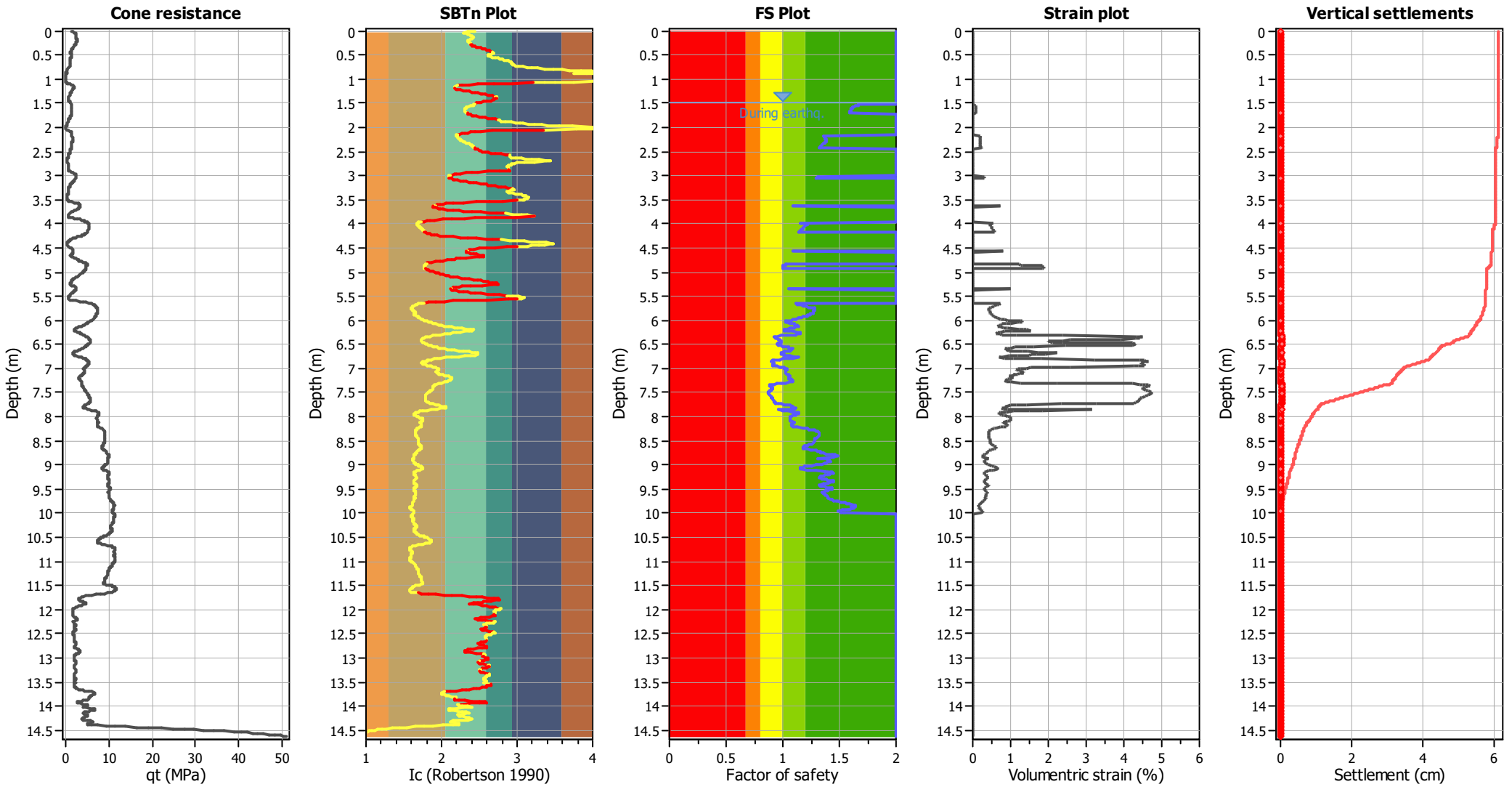
Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	1463
Total points excluded:	444
Exclusion percentage:	30.35%
Number of layers detected:	39

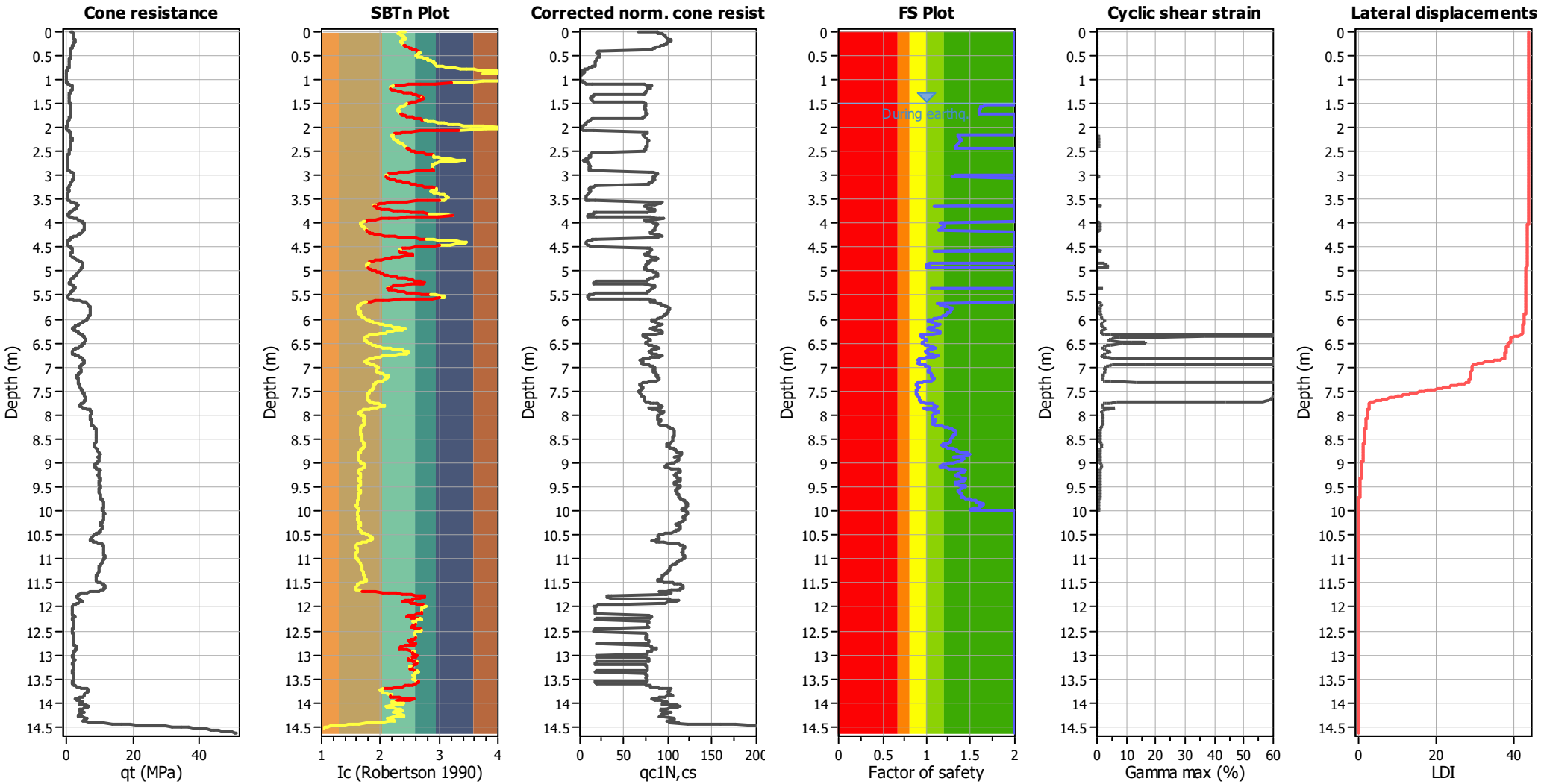
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

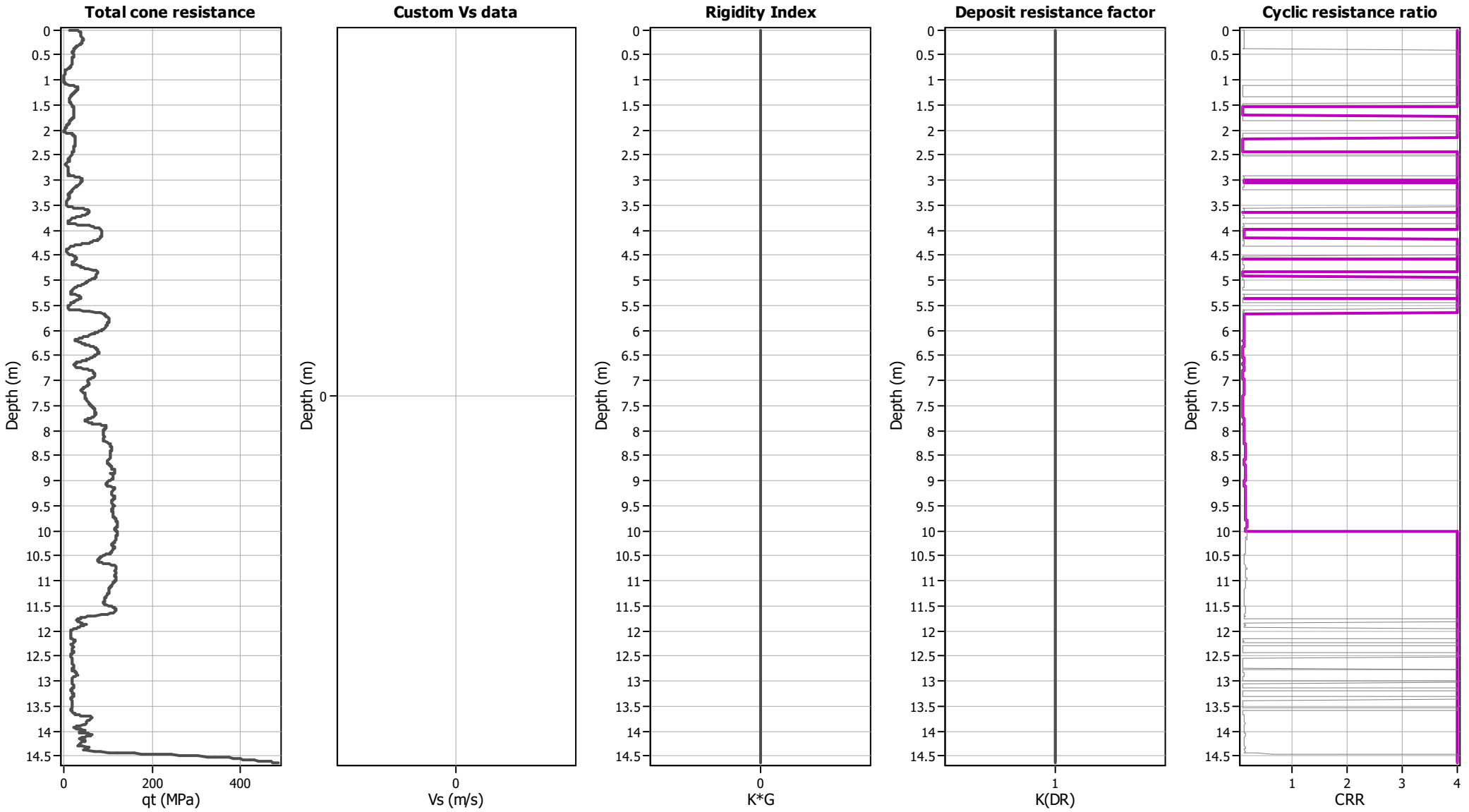
Estimation of post-earthquake lateral Displacements



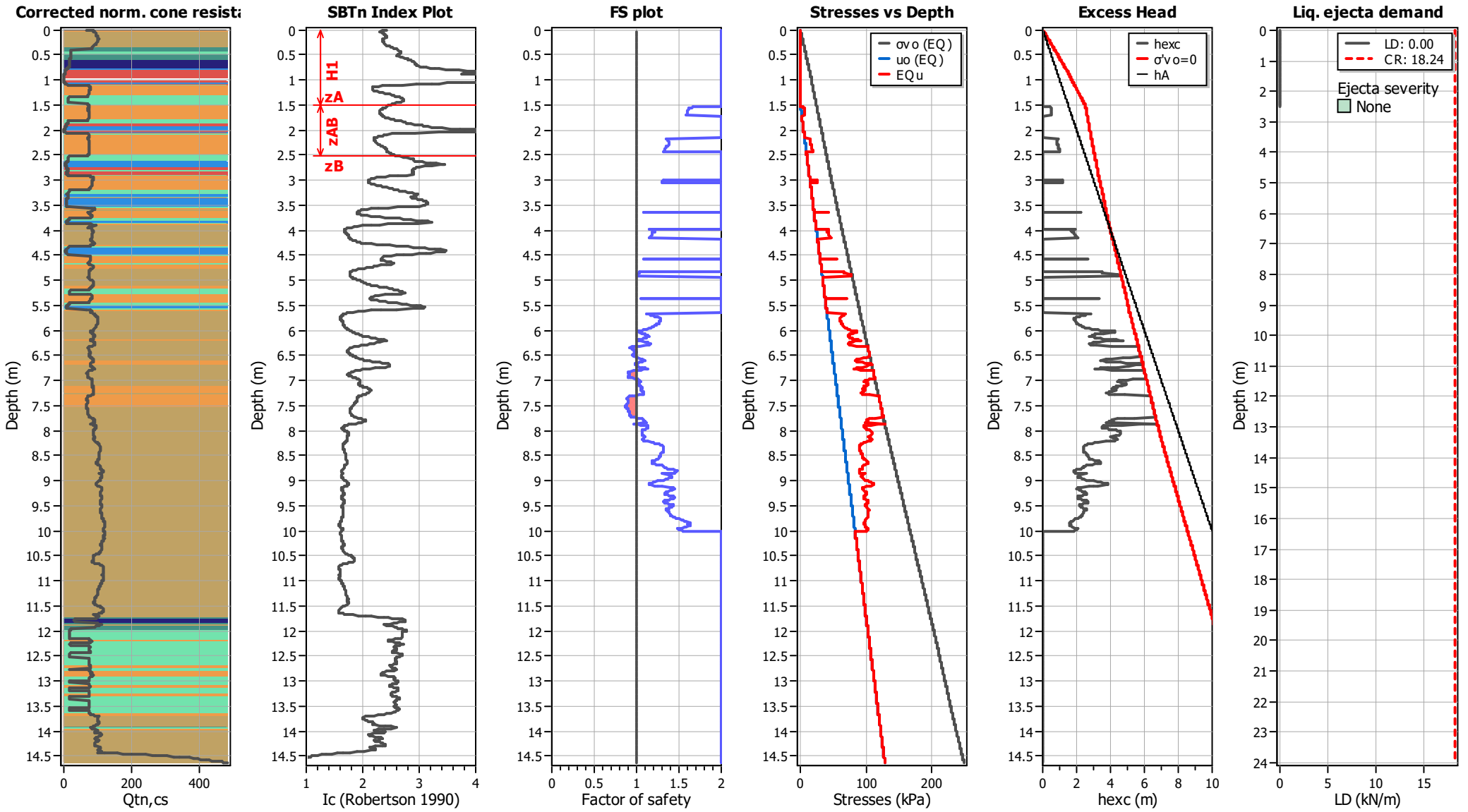
Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Aging Calculation Estimation



Ejecta Severity Estimation



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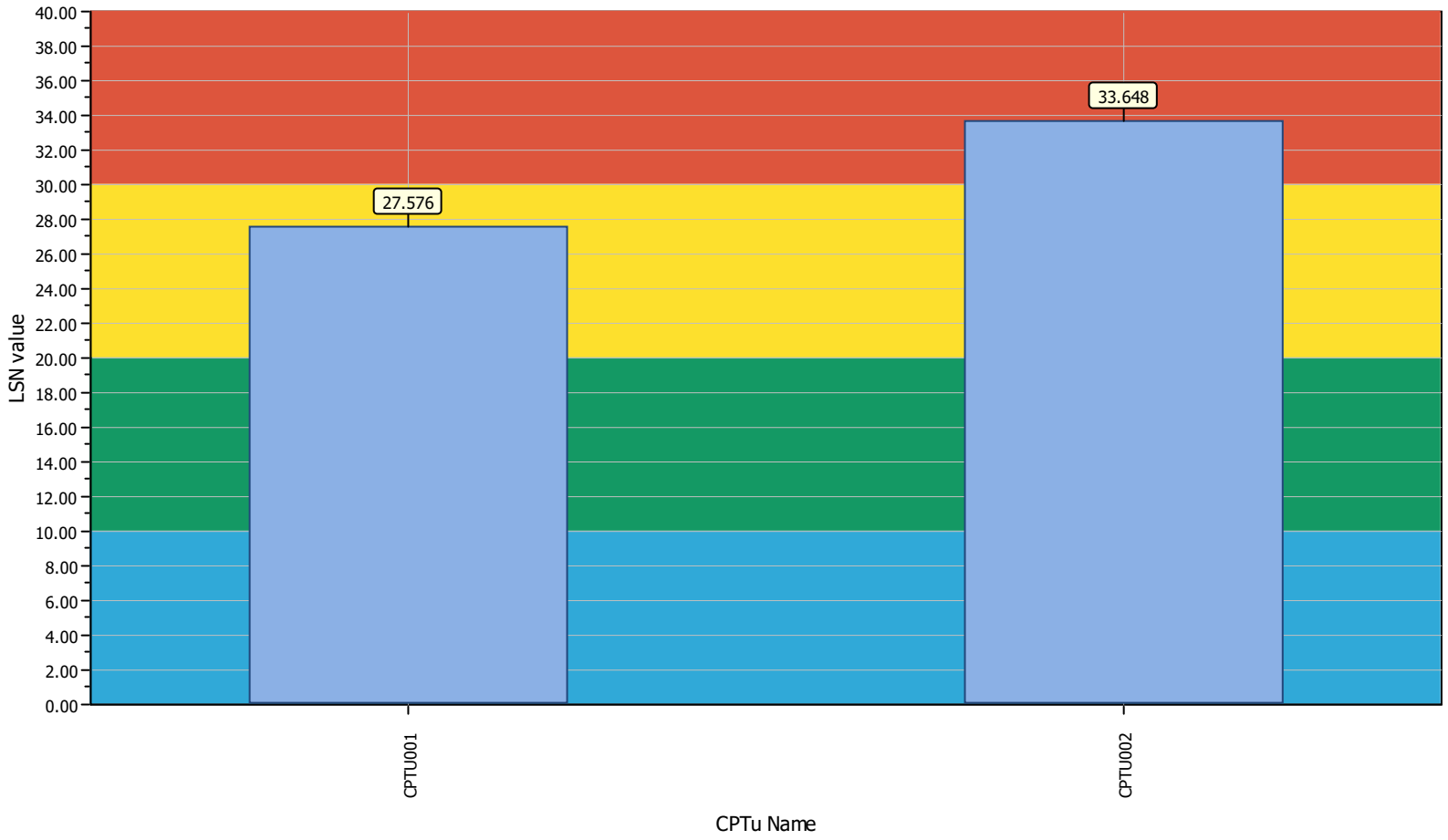
BLENHEIM 7240
http://www.smartalliances.co.nz

Project title :

Location :

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: 2

0% little liquefaction

0% minor liquefaction

50% moderate liquefaction

50% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

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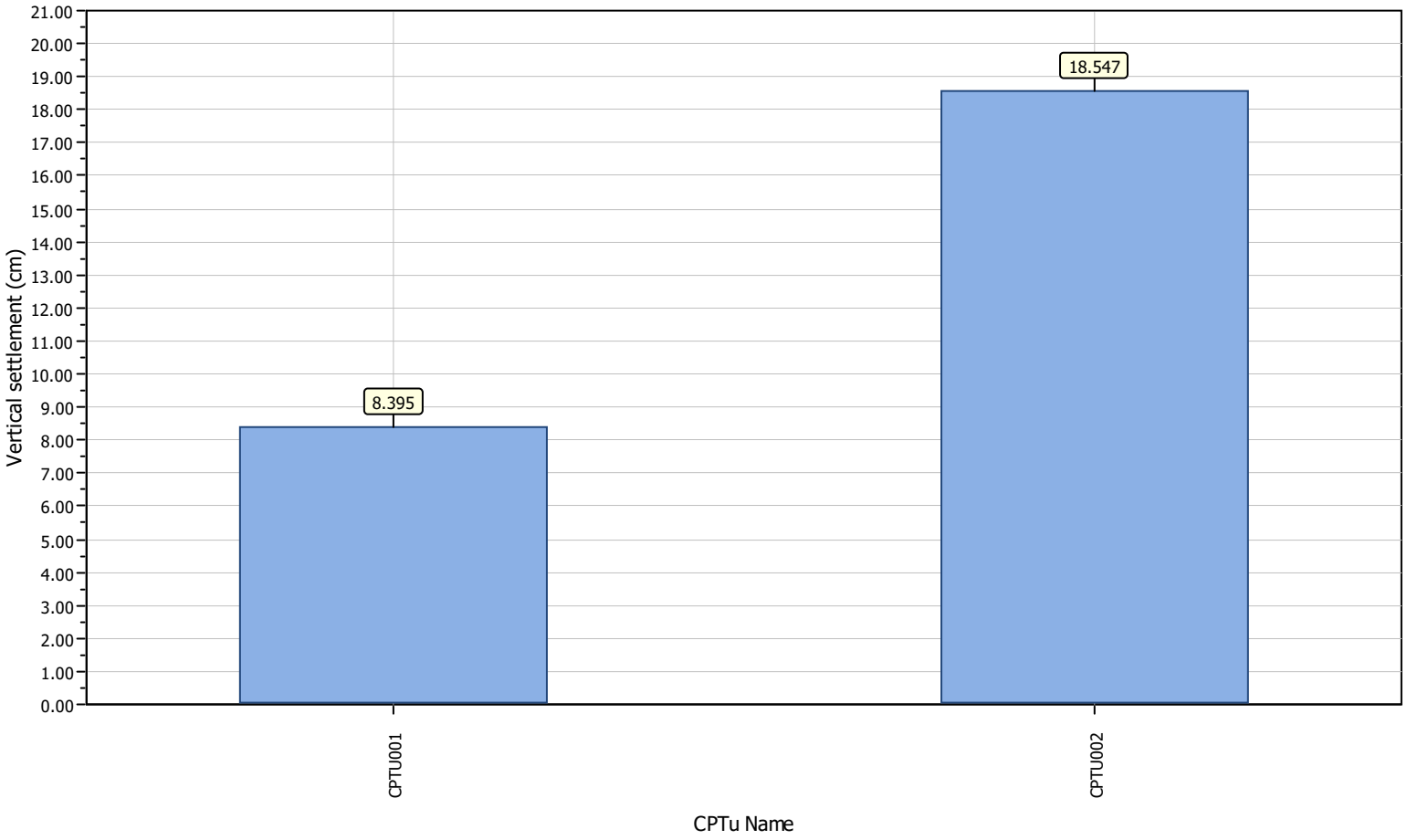
Project title :

Location :

Overall vertical settlements report



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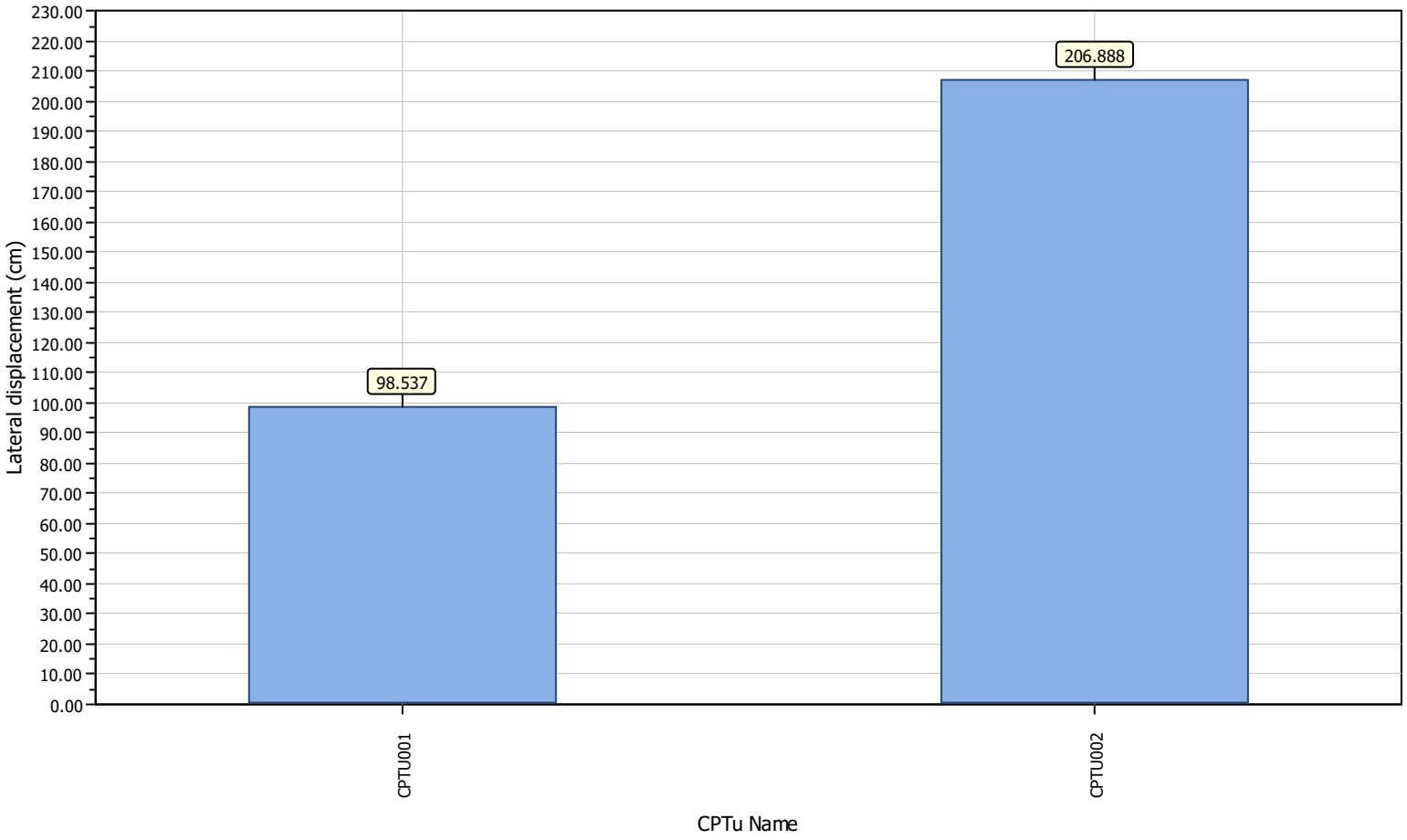
Project title :

Location :

Overall lateral displacements report



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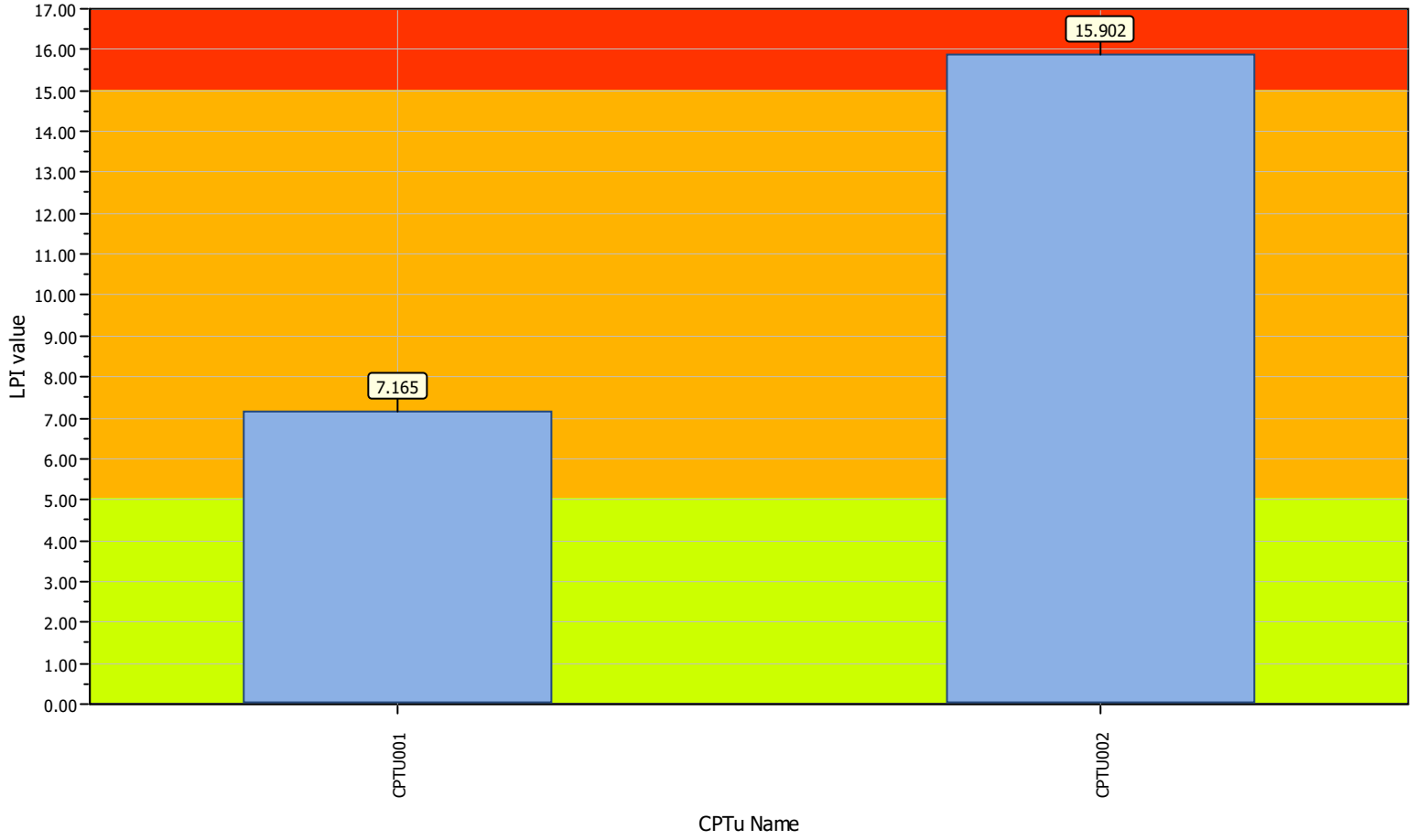
Project title :

Location :

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 2
0% low risk
50% high risk
50% very high risk

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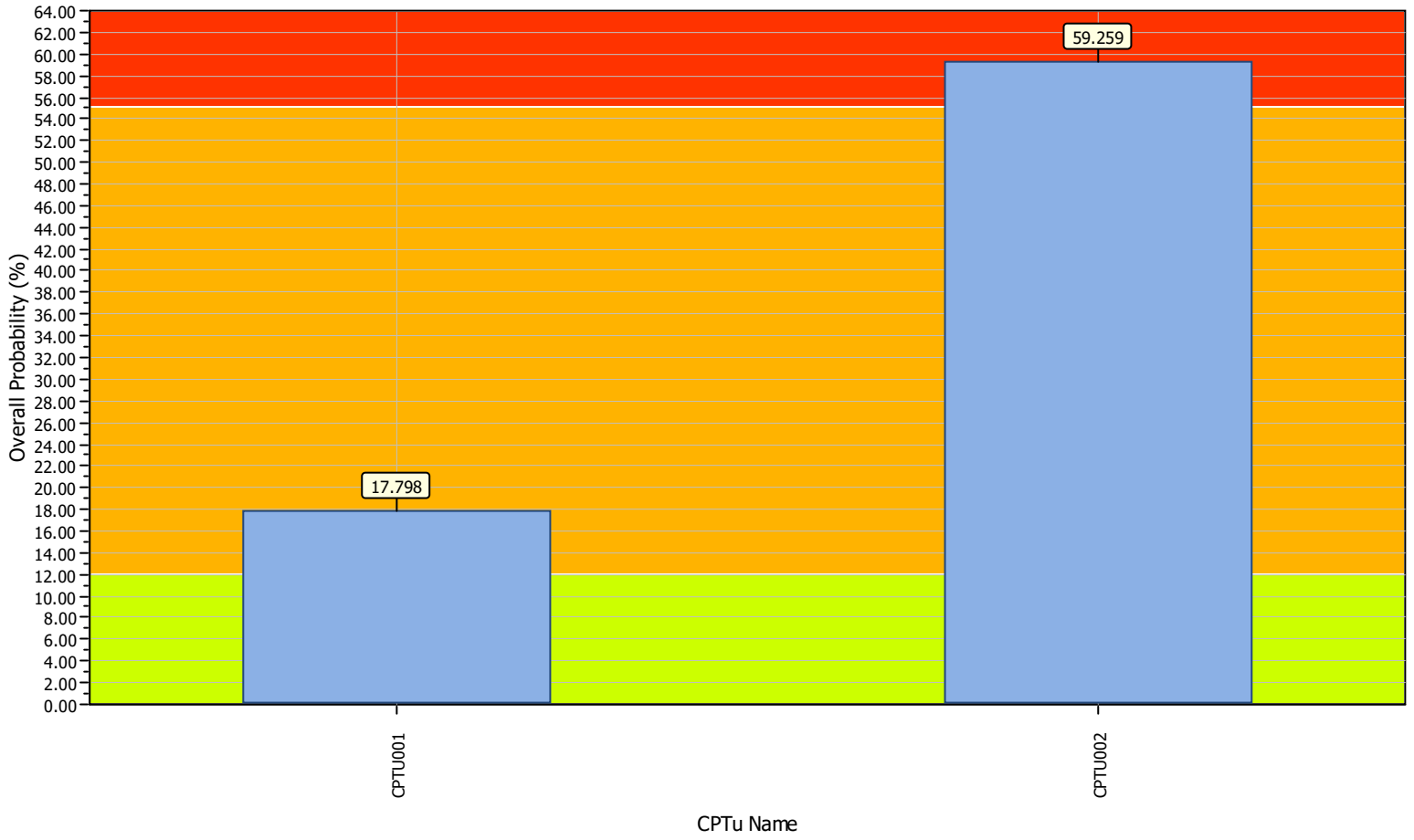
Project title :

Location :

Overall Probability for Liquefaction report



Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 2
0% low probability
50% high probability
50% very high probability

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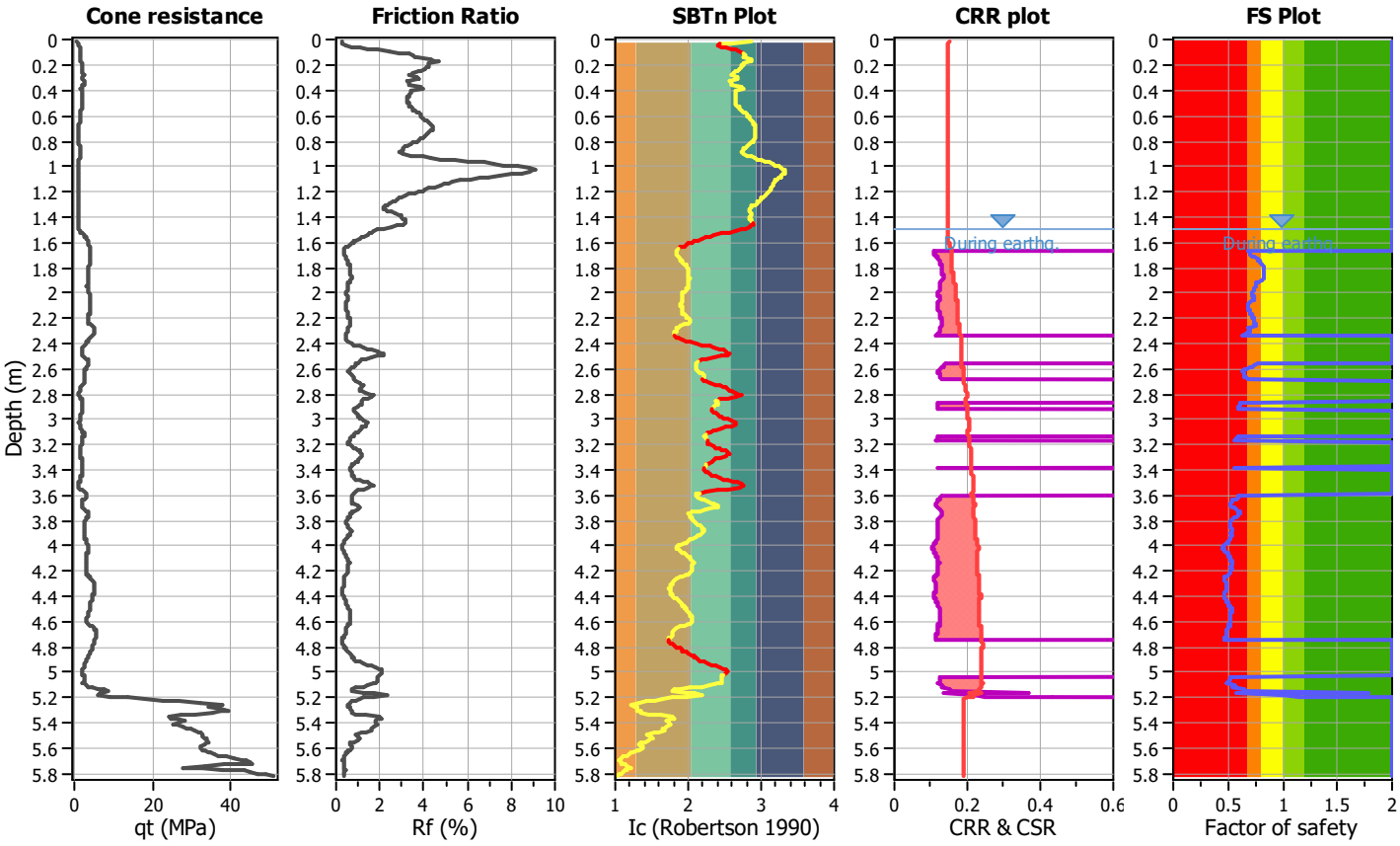
LIQUEFACTION ANALYSIS REPORT

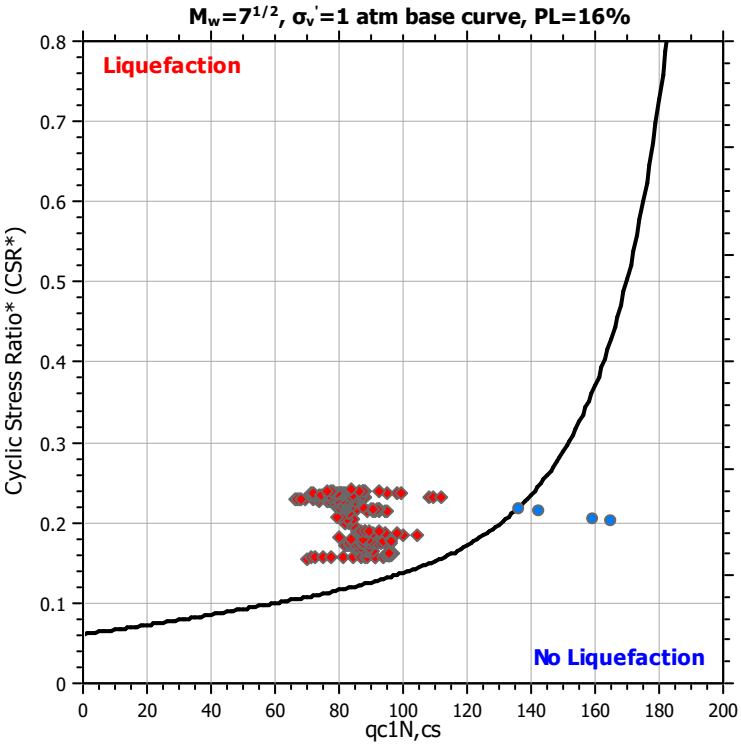
Project title : **Location :**

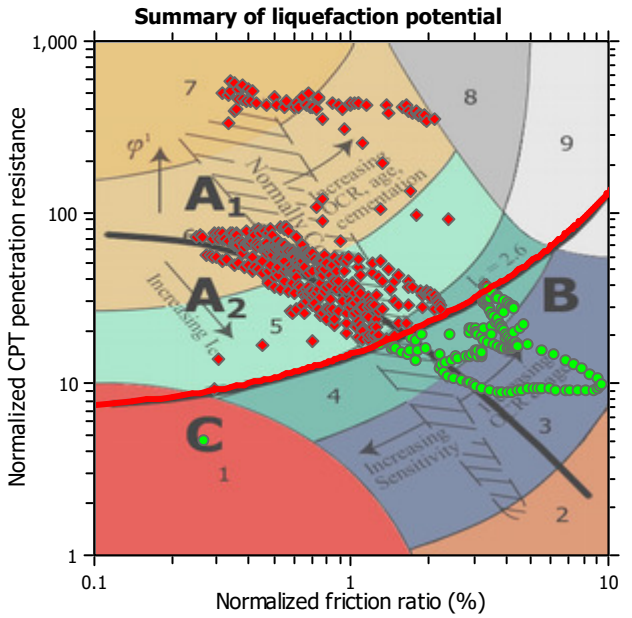
CPT file : CPTU001

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.26	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

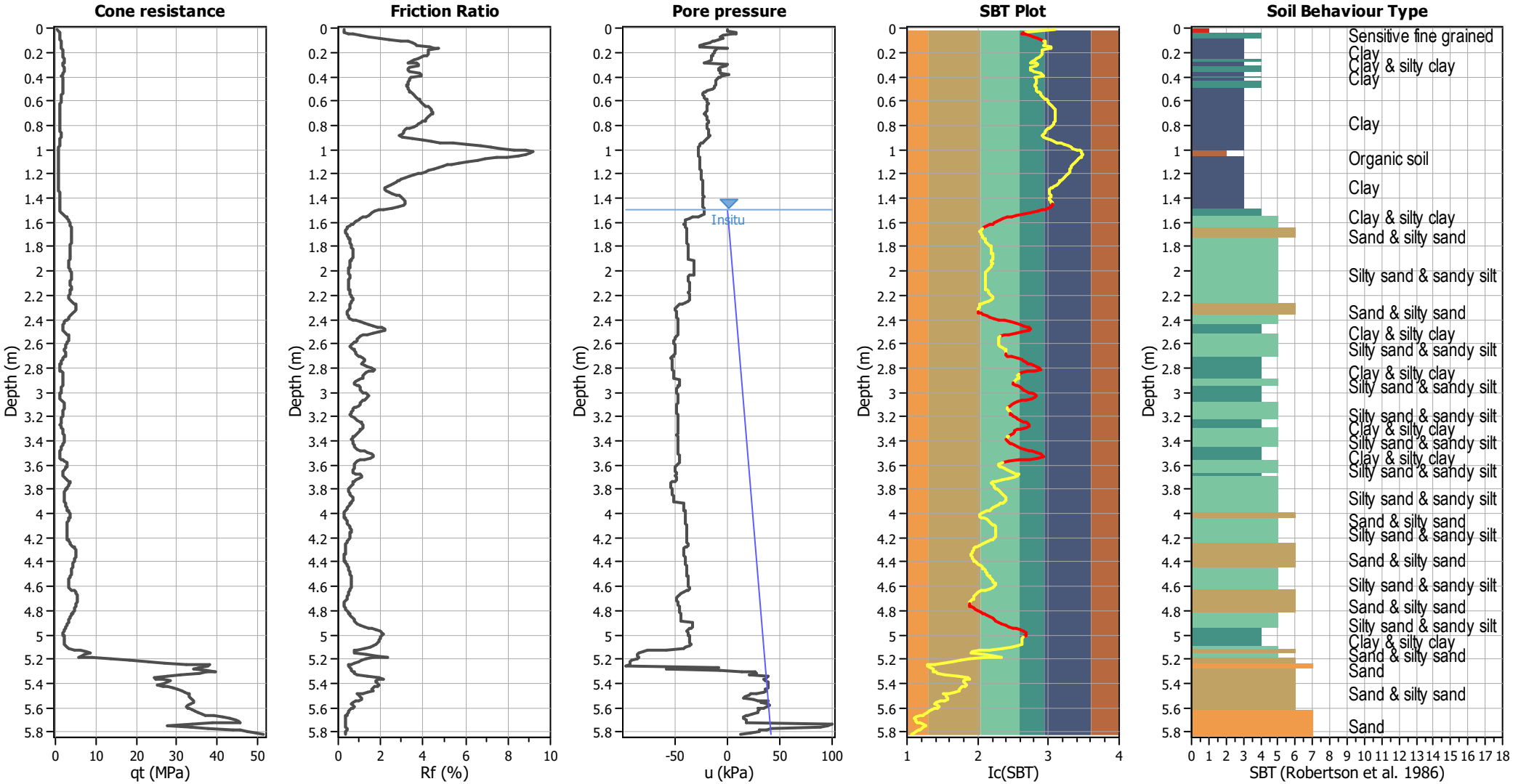






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



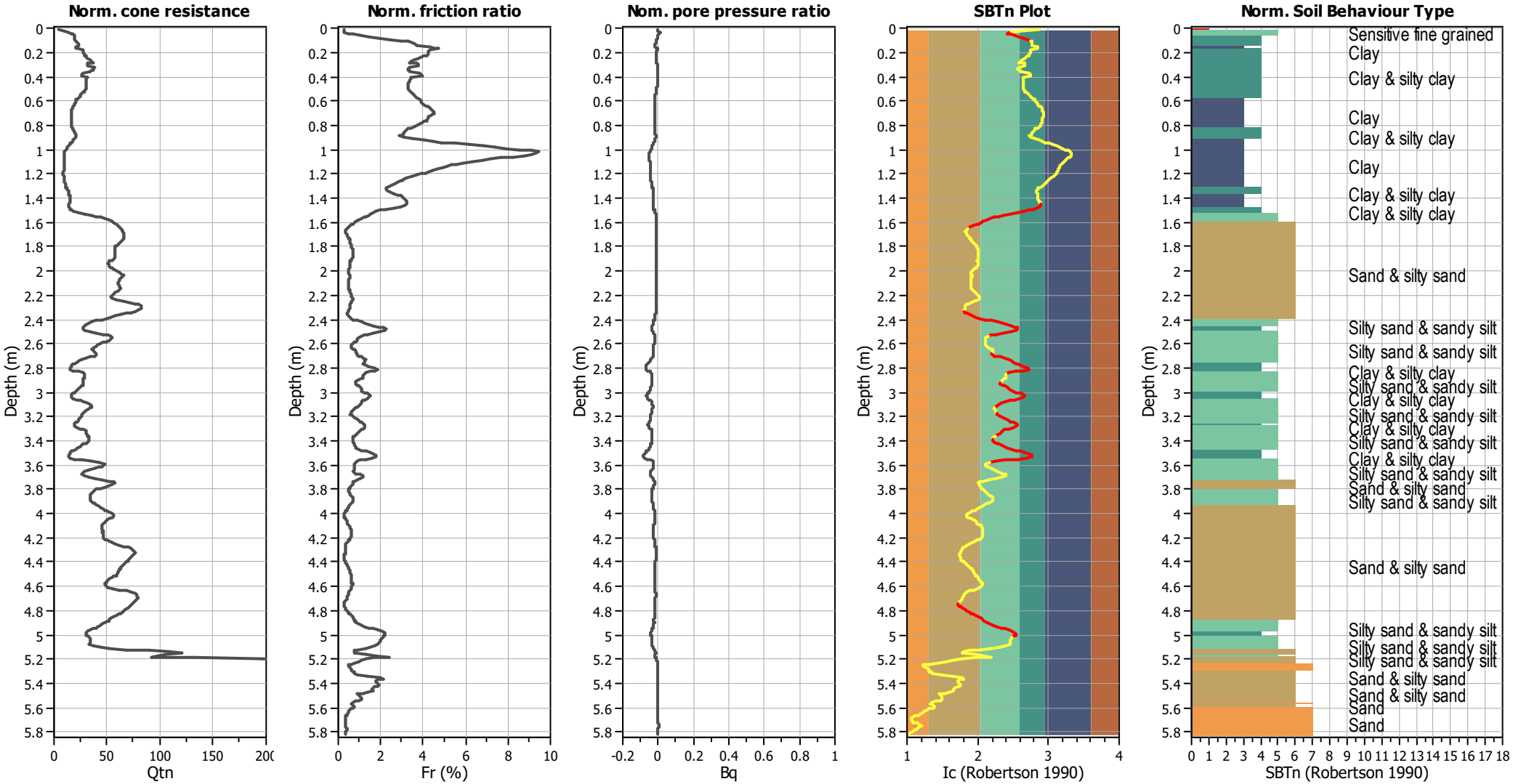
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



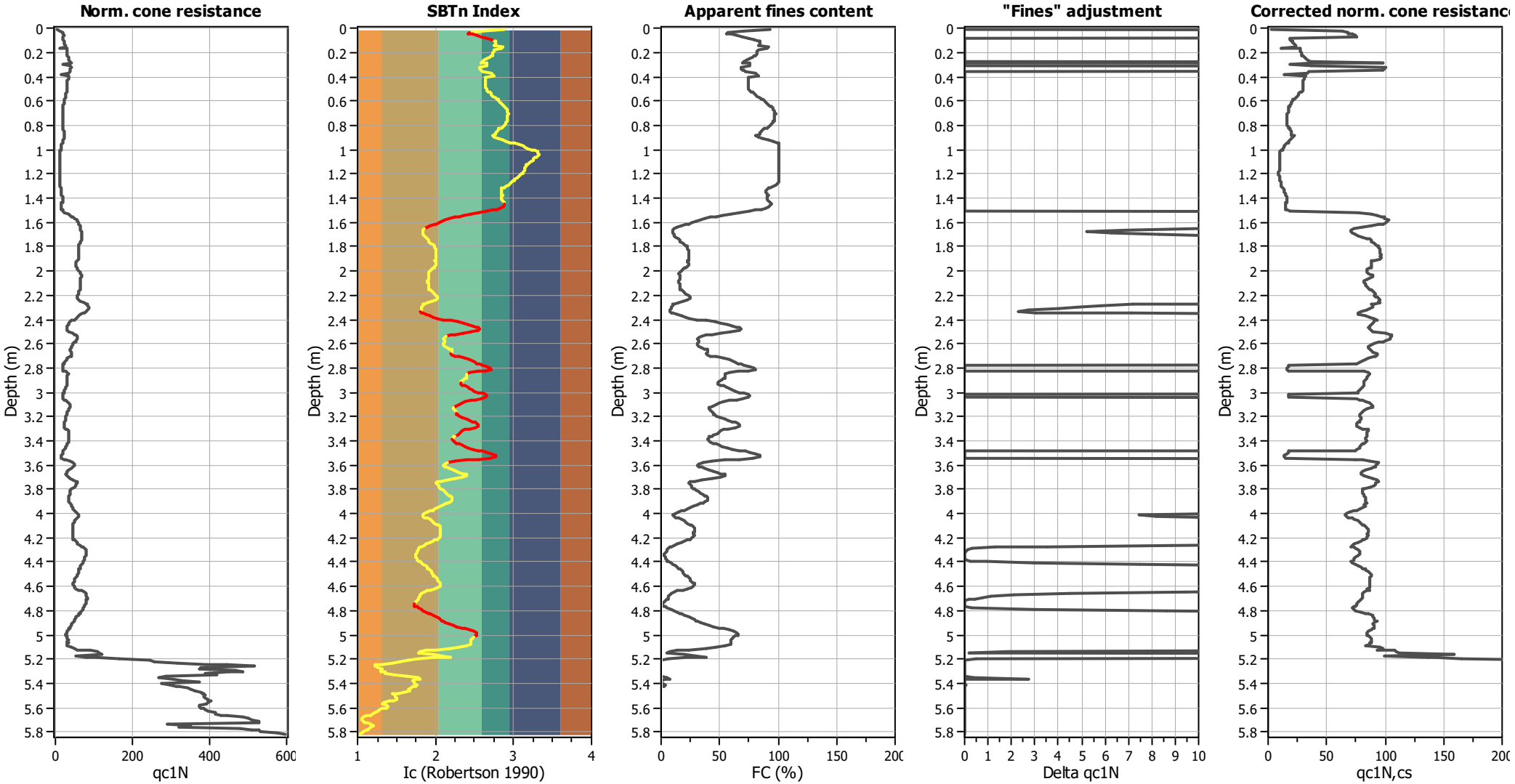
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

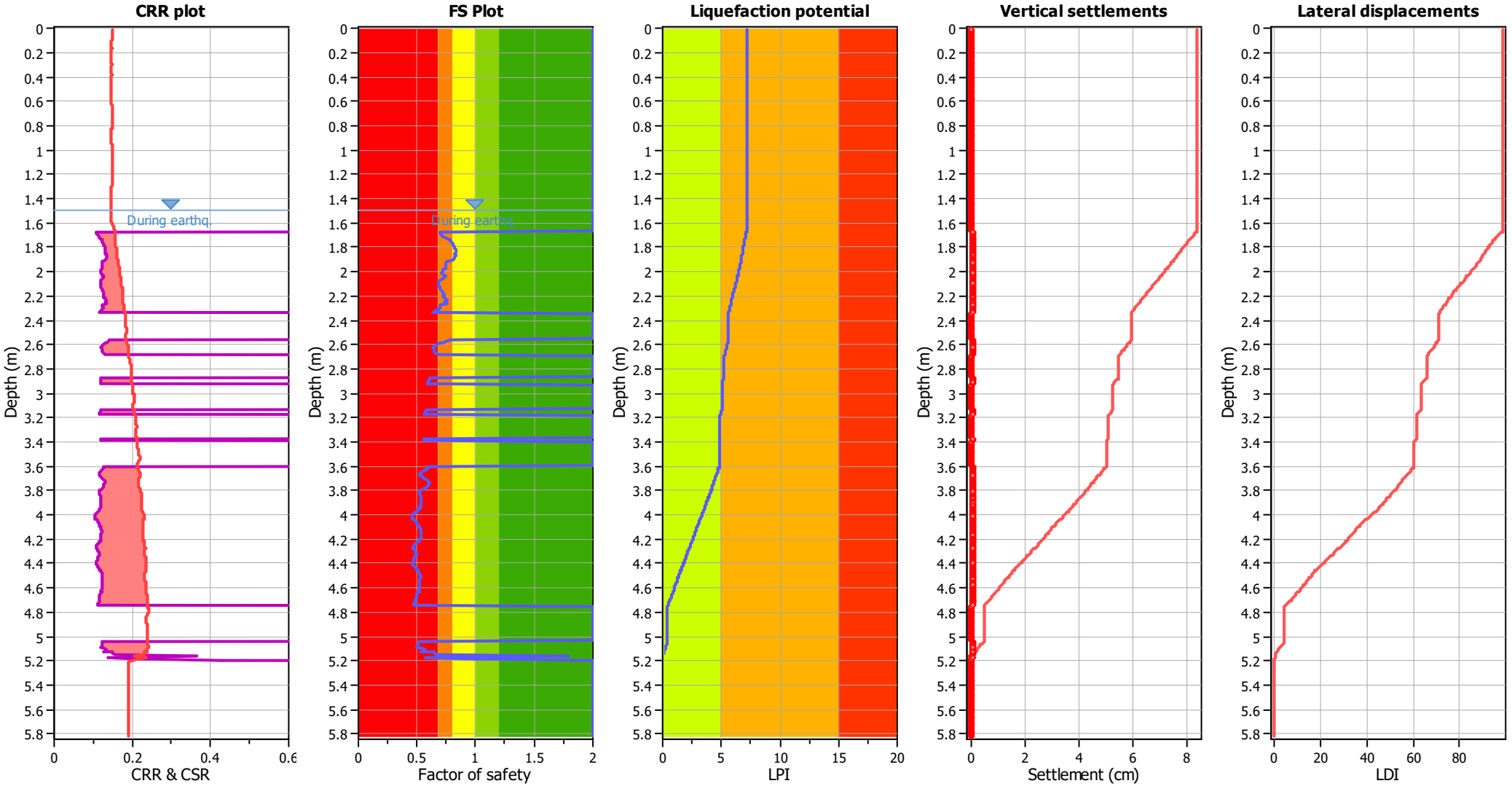
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

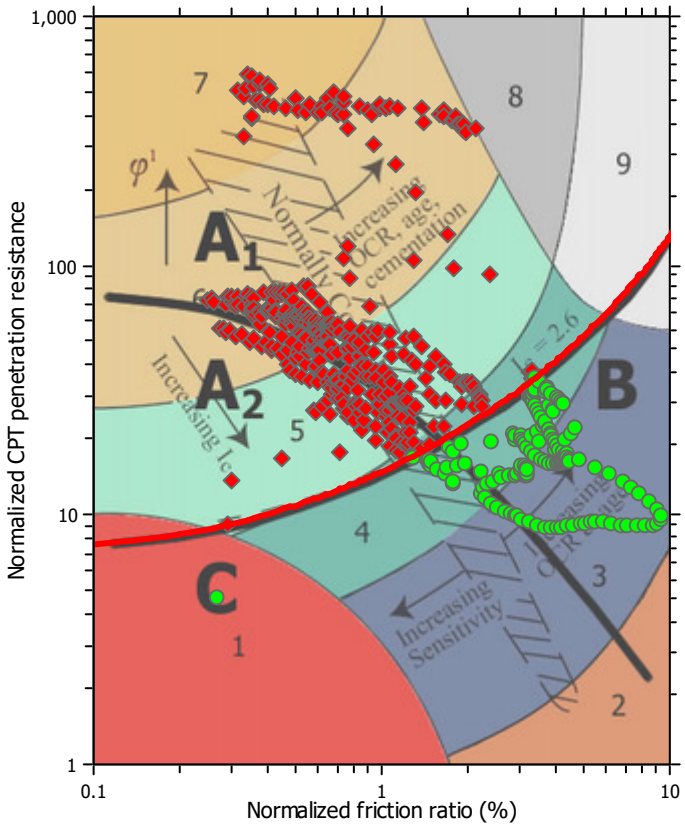
F.S. color scheme

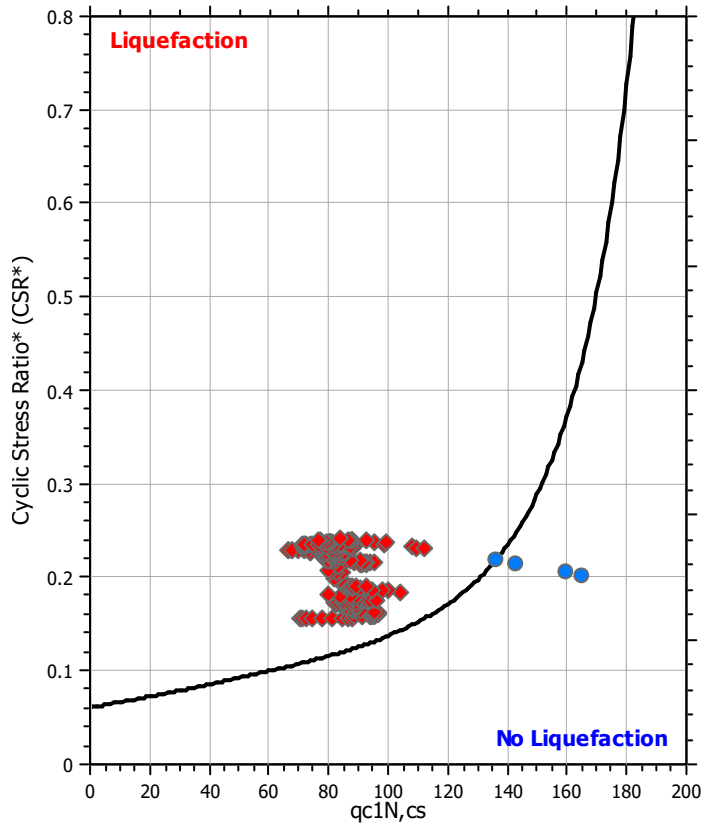
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

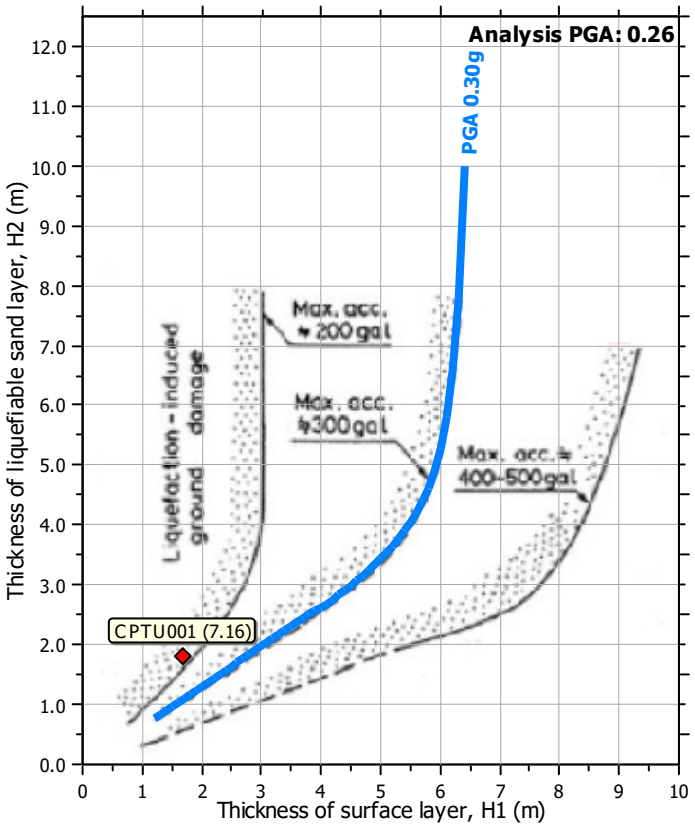
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



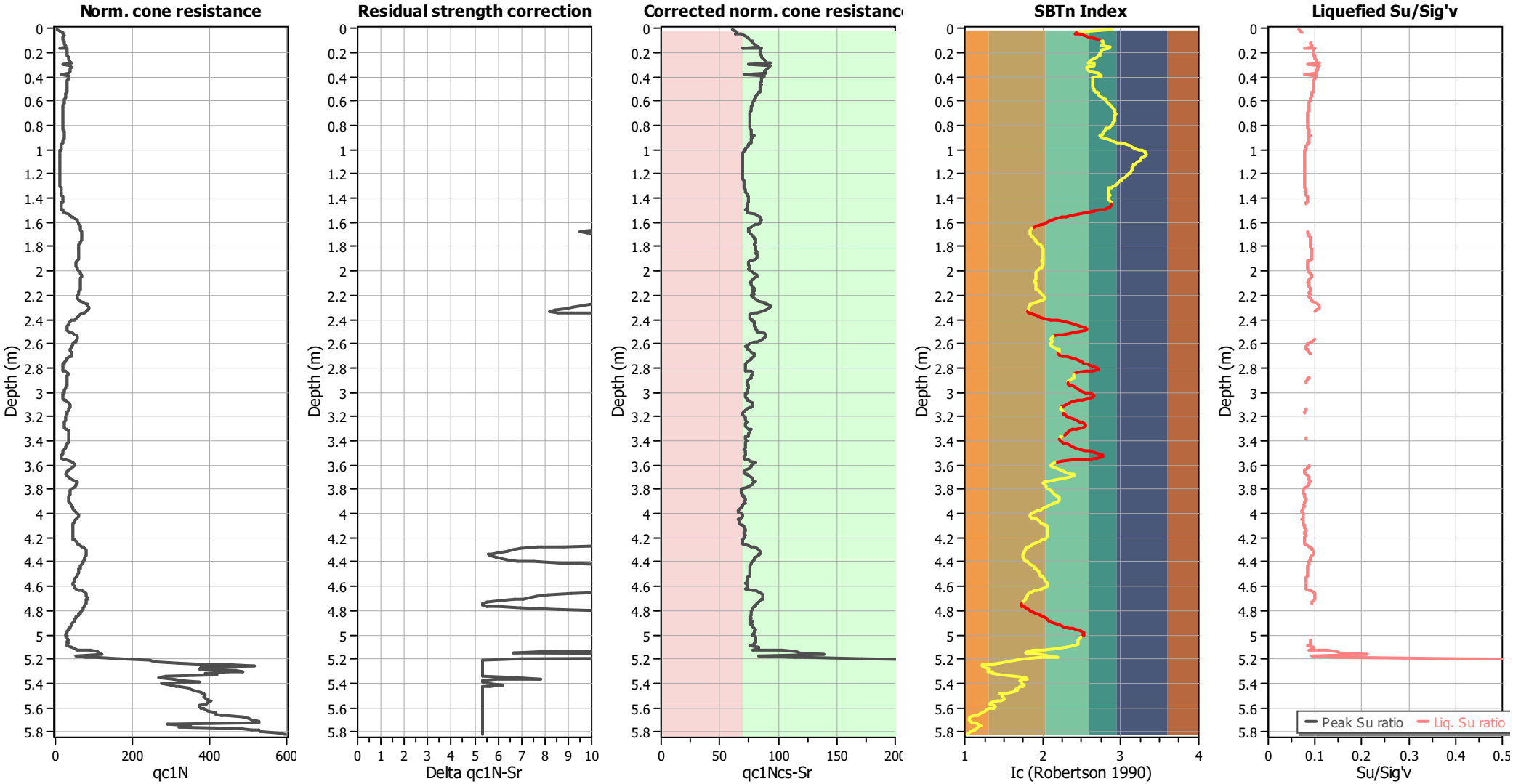




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

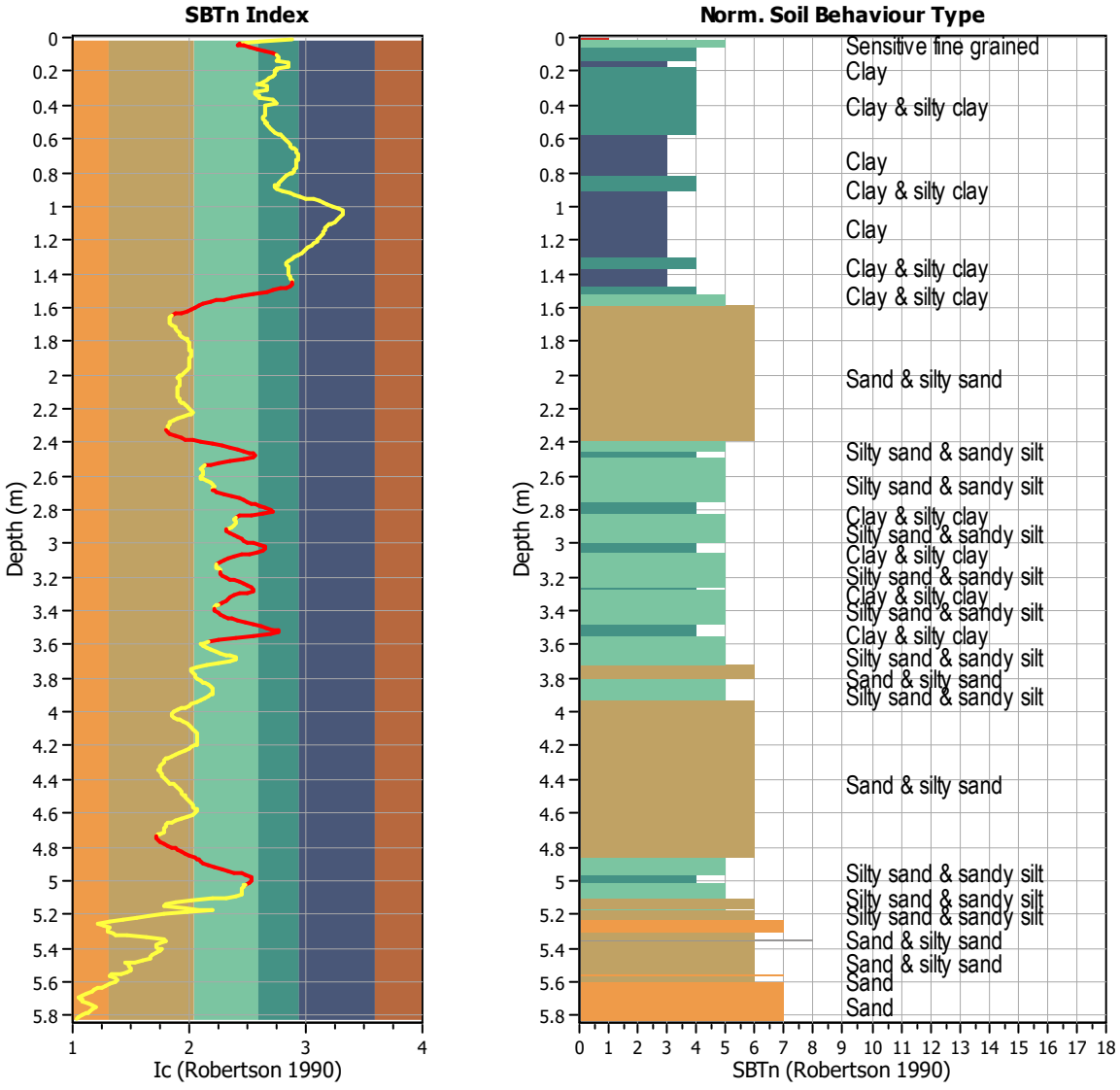
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

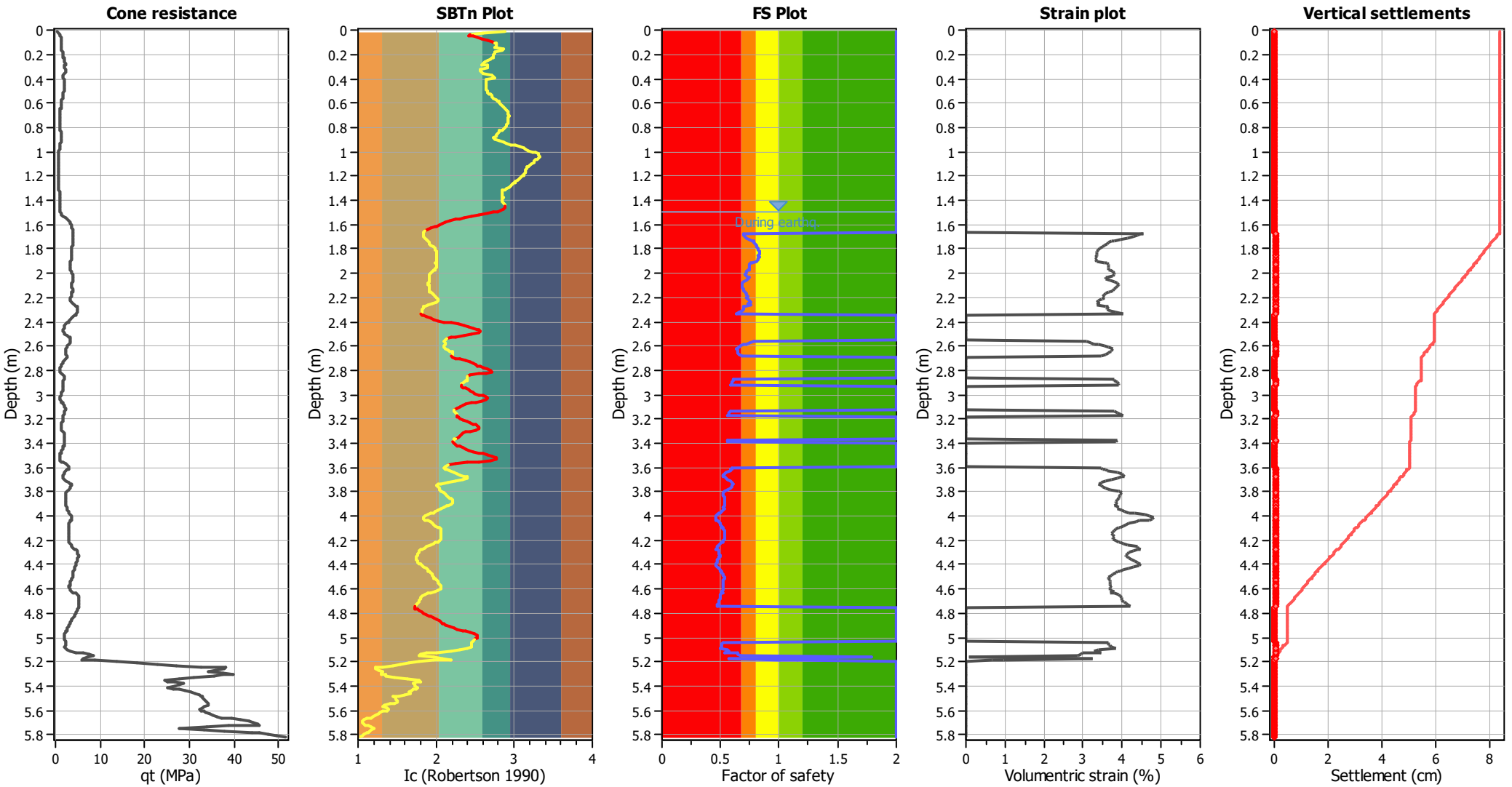
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	582
I_c maximum check value:	3.00	Total points excluded:	163
I_c change ratio value:	0.0100	Exclusion percentage:	28.01%
Minimum number of points in layer:	4	Number of layers detected:	14

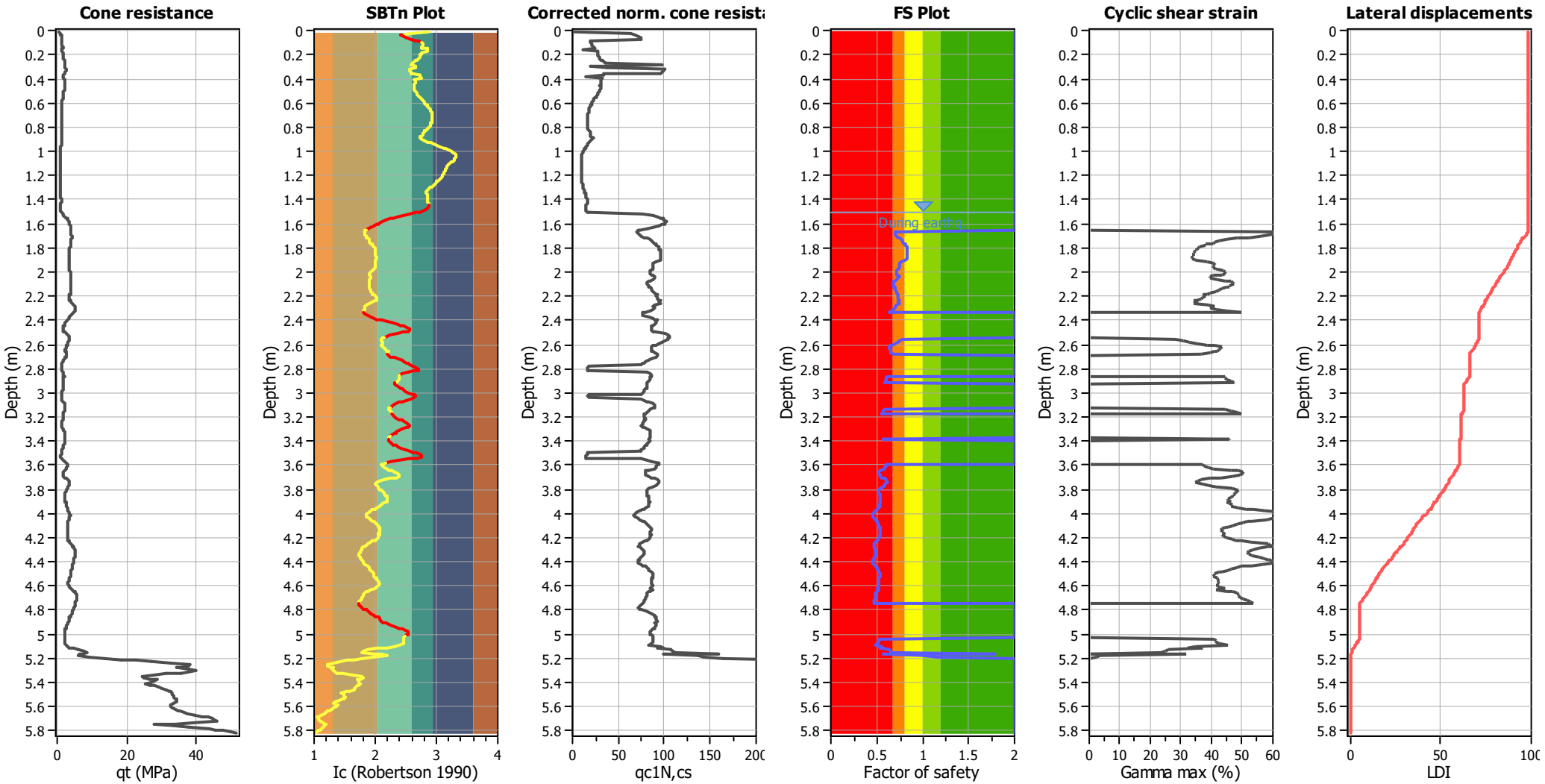
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

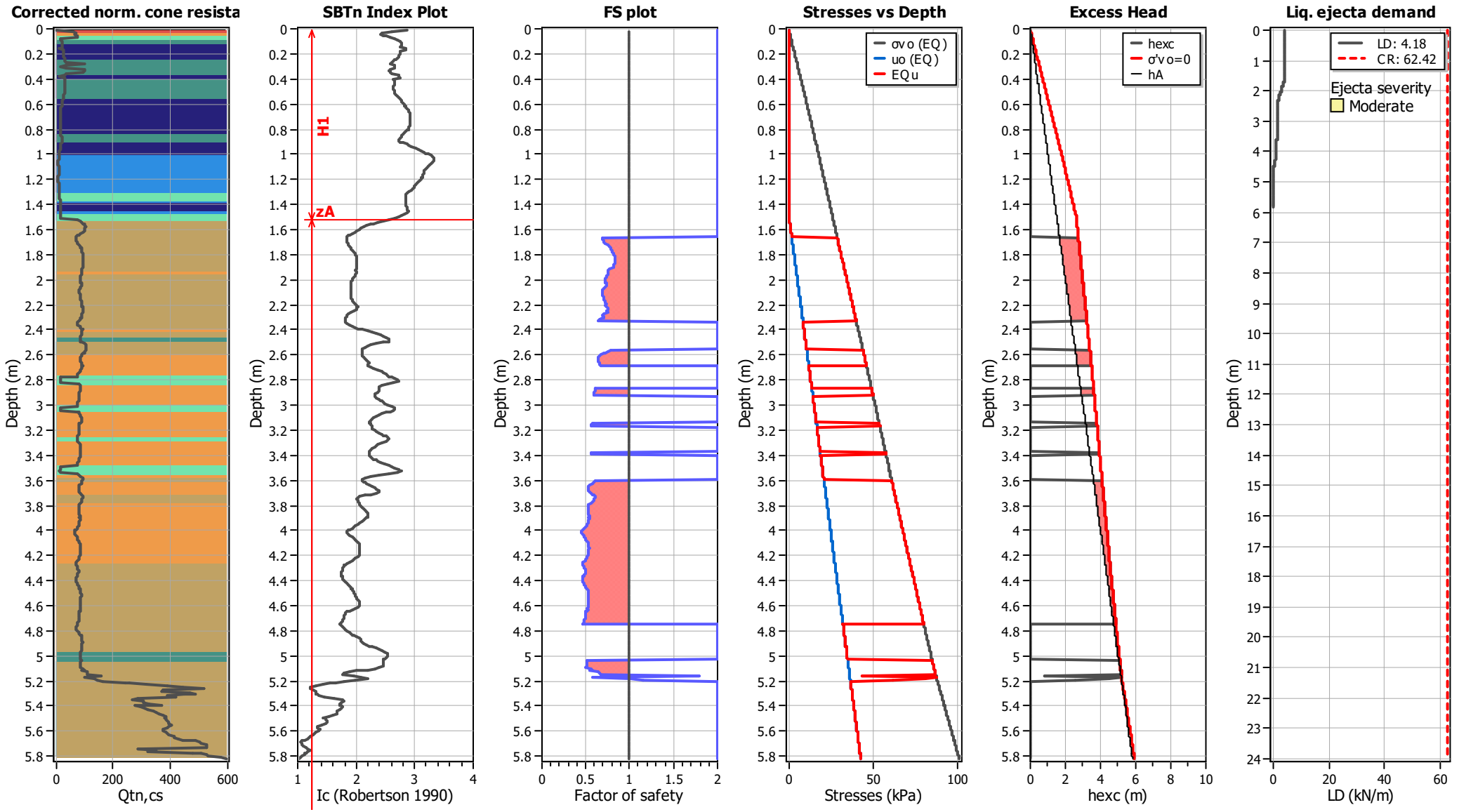
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



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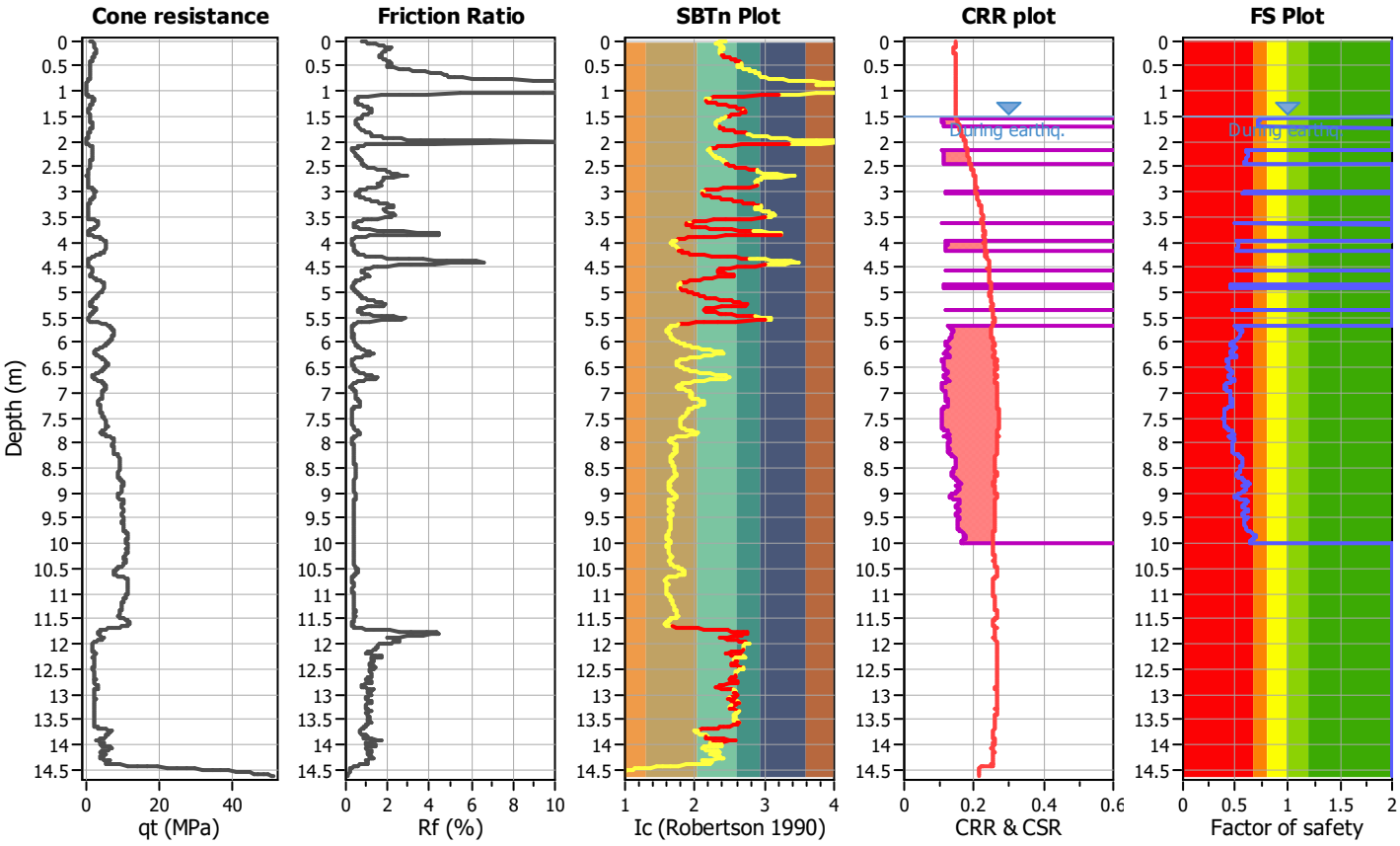
LIQUEFACTION ANALYSIS REPORT

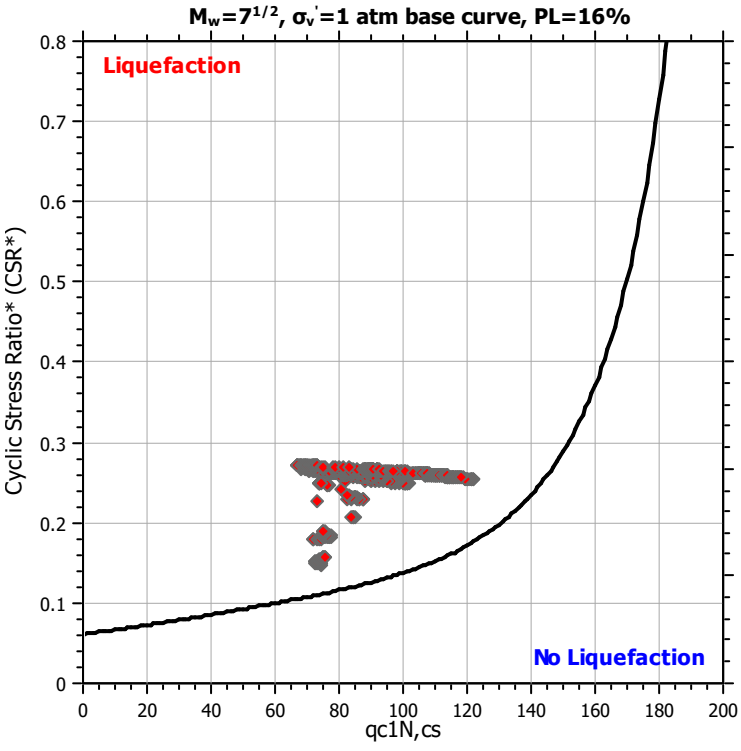
Project title : **Location :**

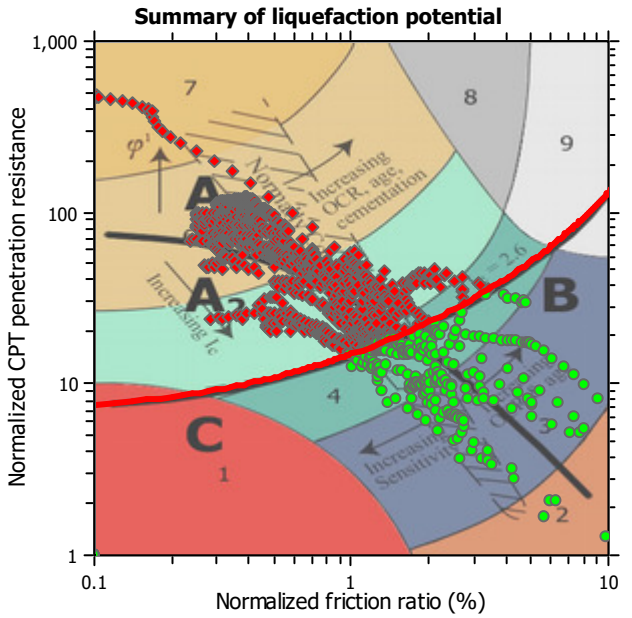
CPT file : CPTU002

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	6.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.26	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

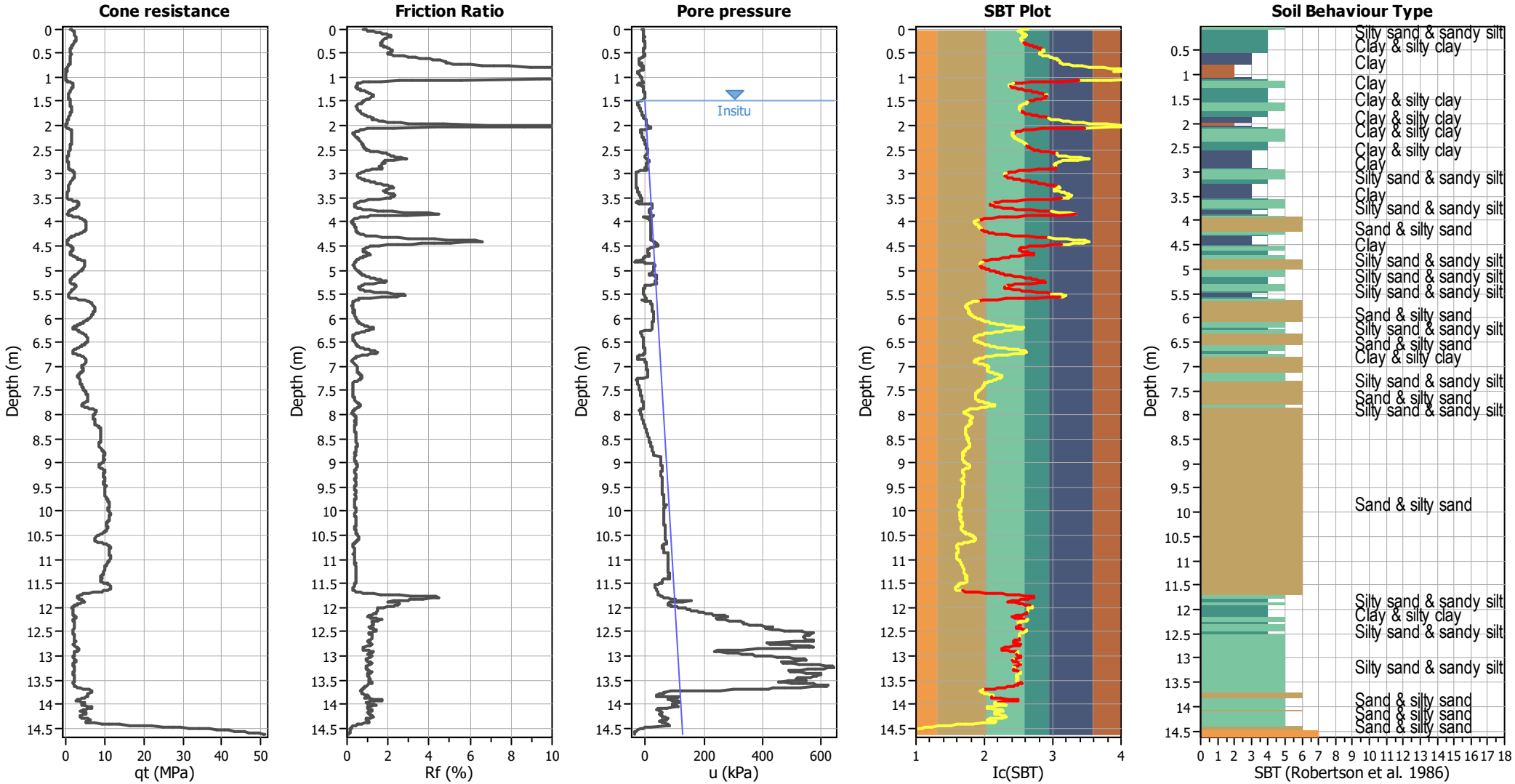






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



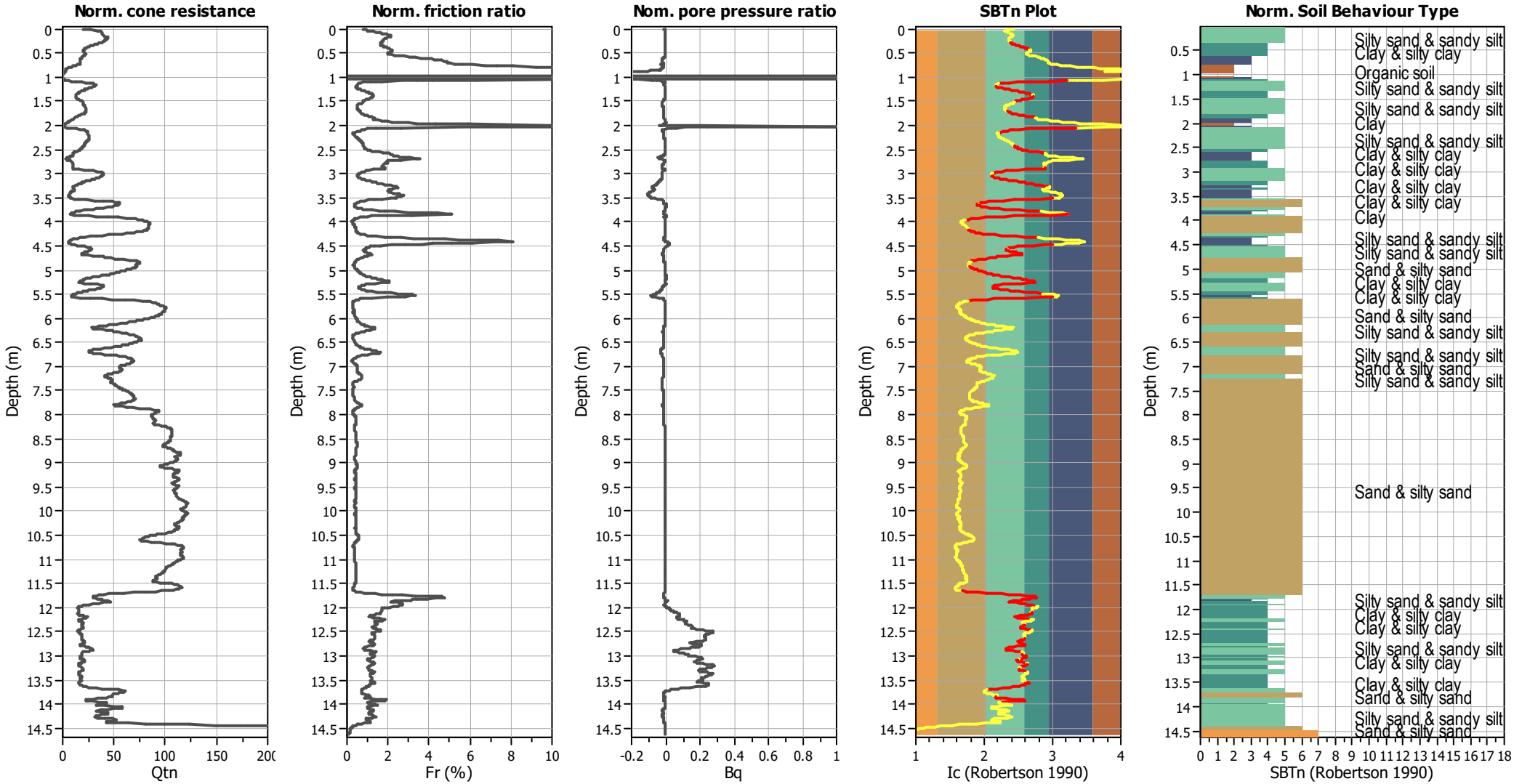
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



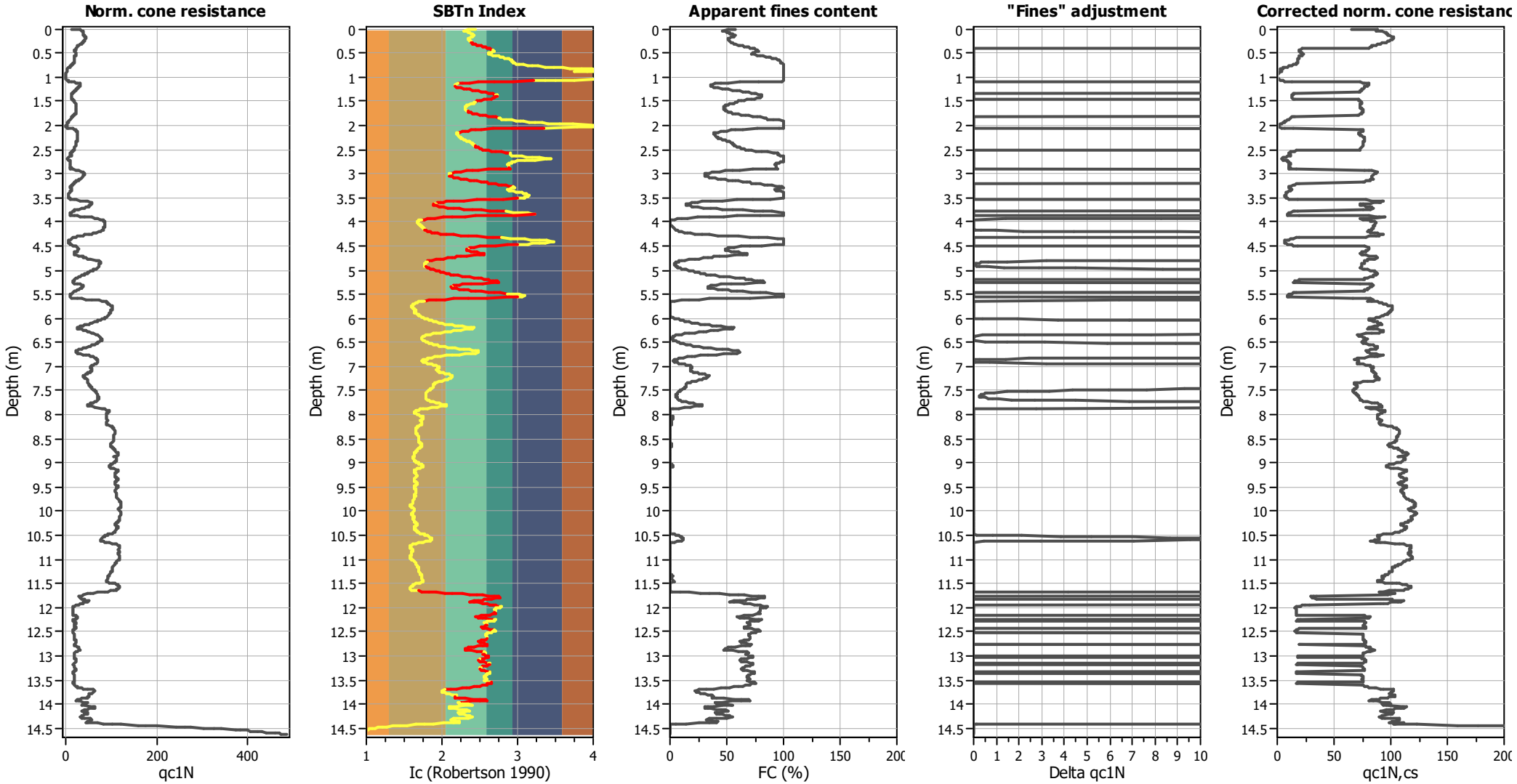
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

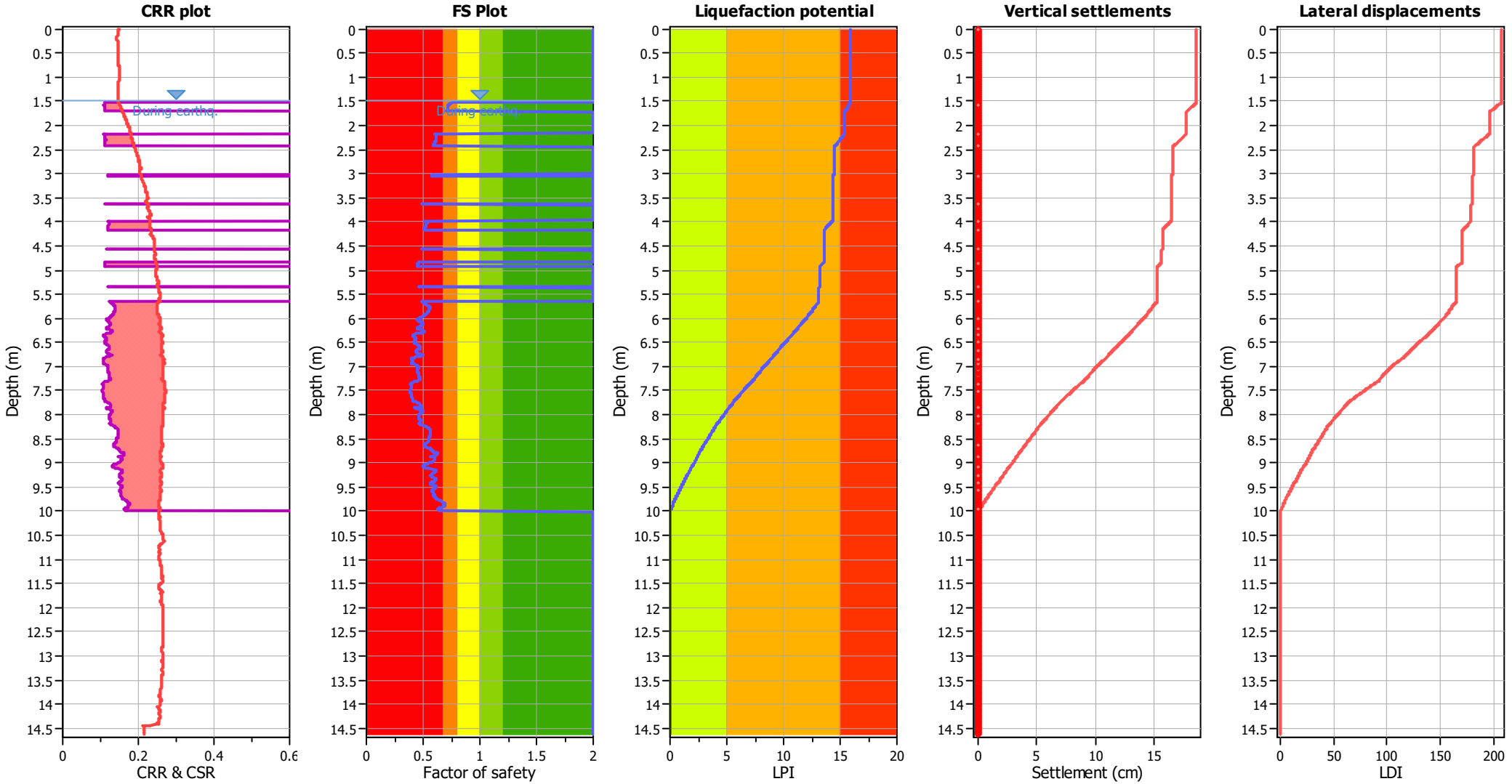
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

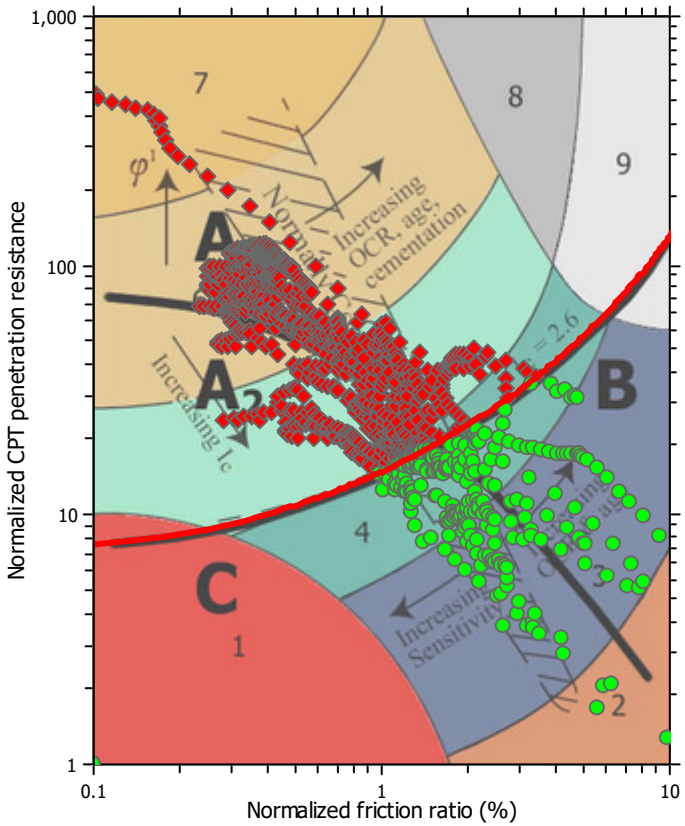
F.S. color scheme

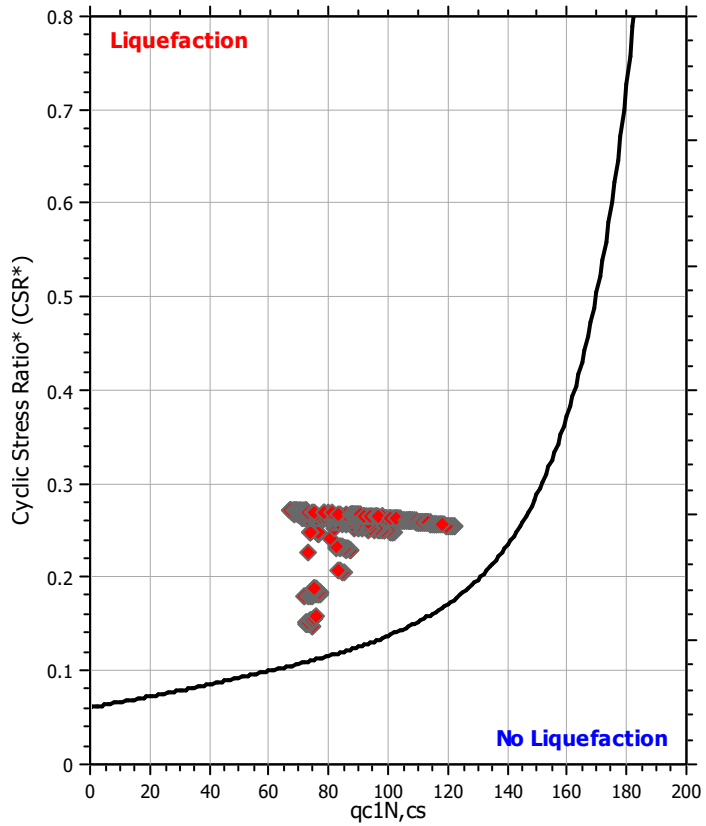
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

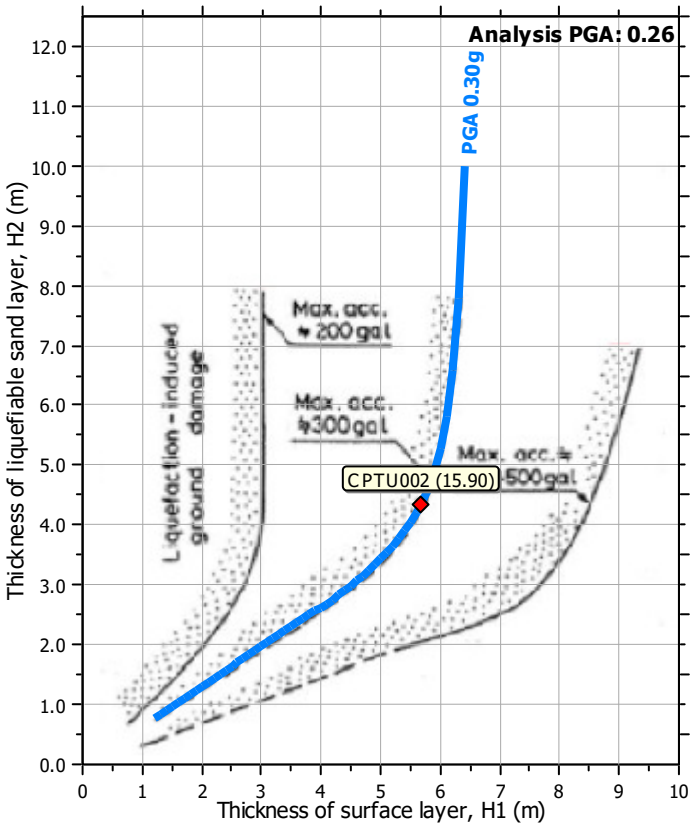
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



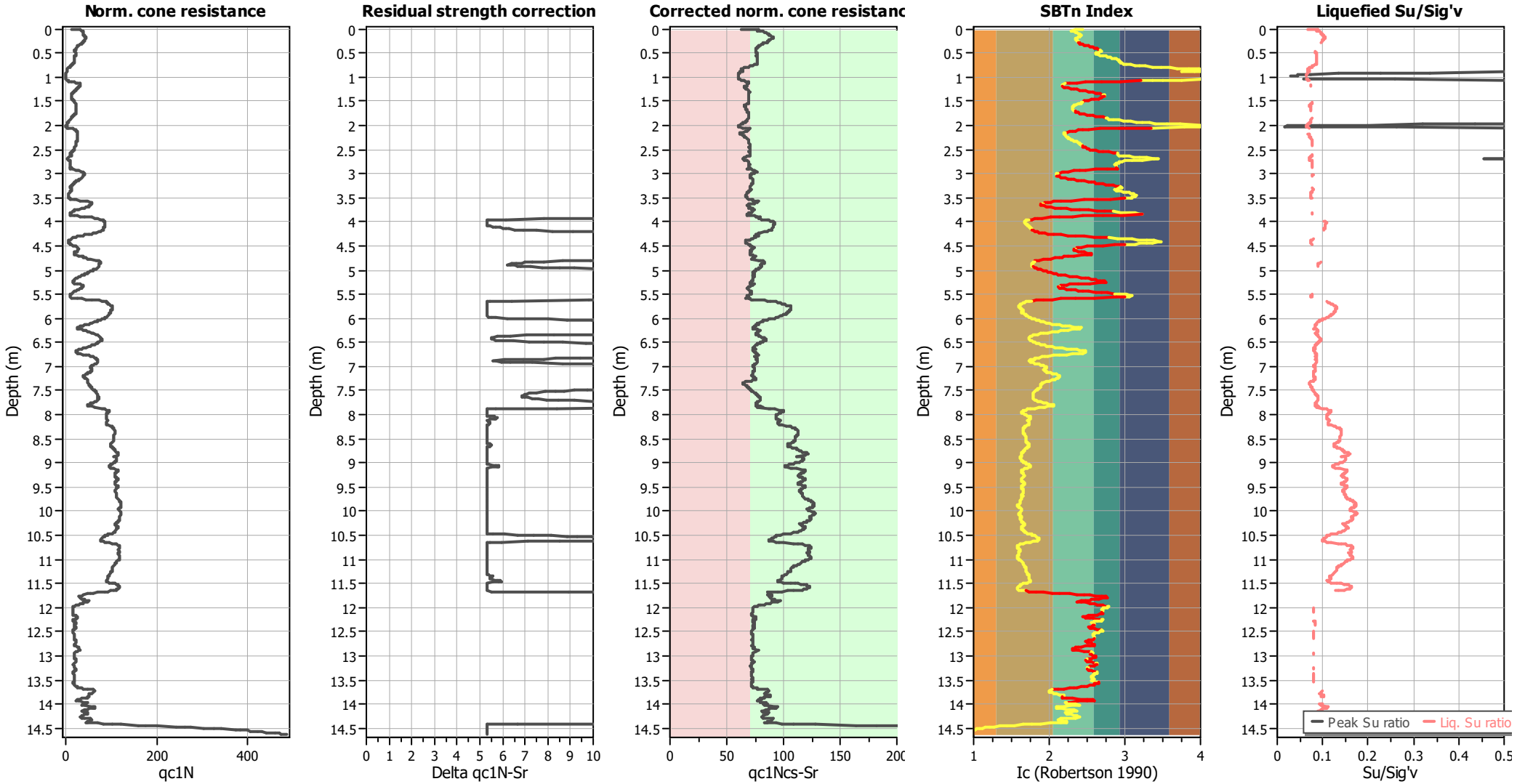




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

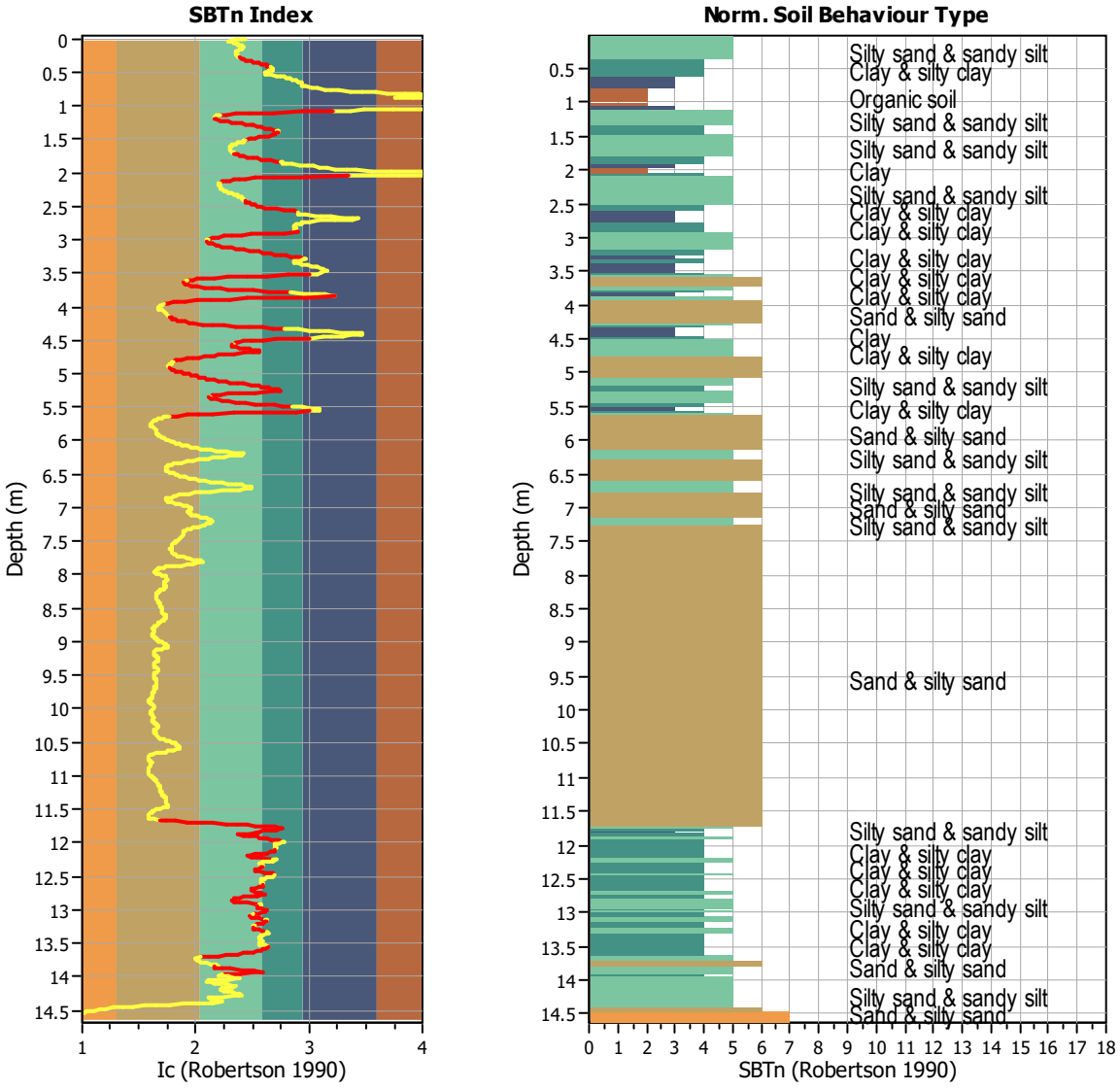
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.26	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

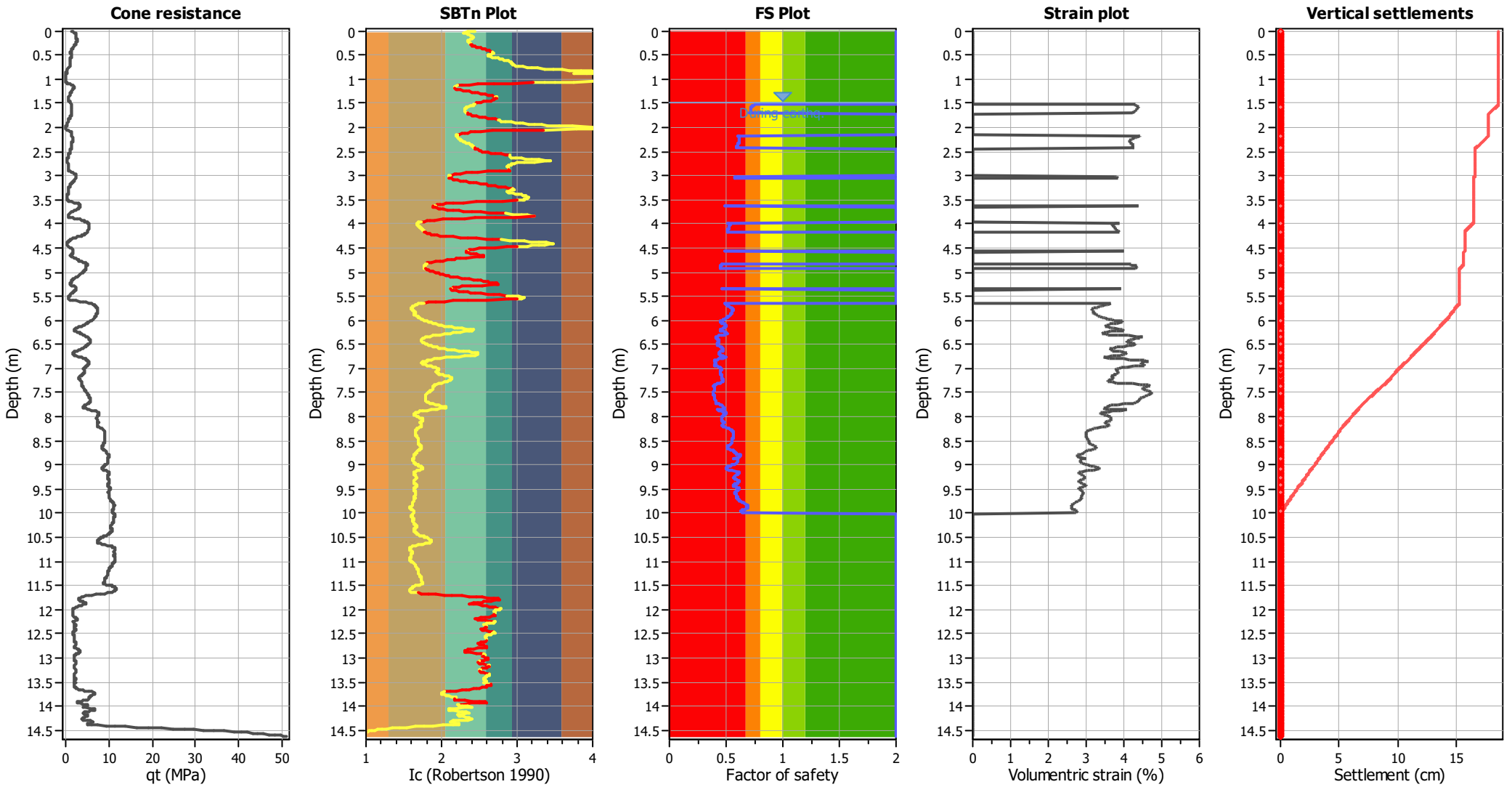
The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties	
I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	4

General statistics	
Total points in CPT file:	1463
Total points excluded:	444
Exclusion percentage:	30.35%
Number of layers detected:	39

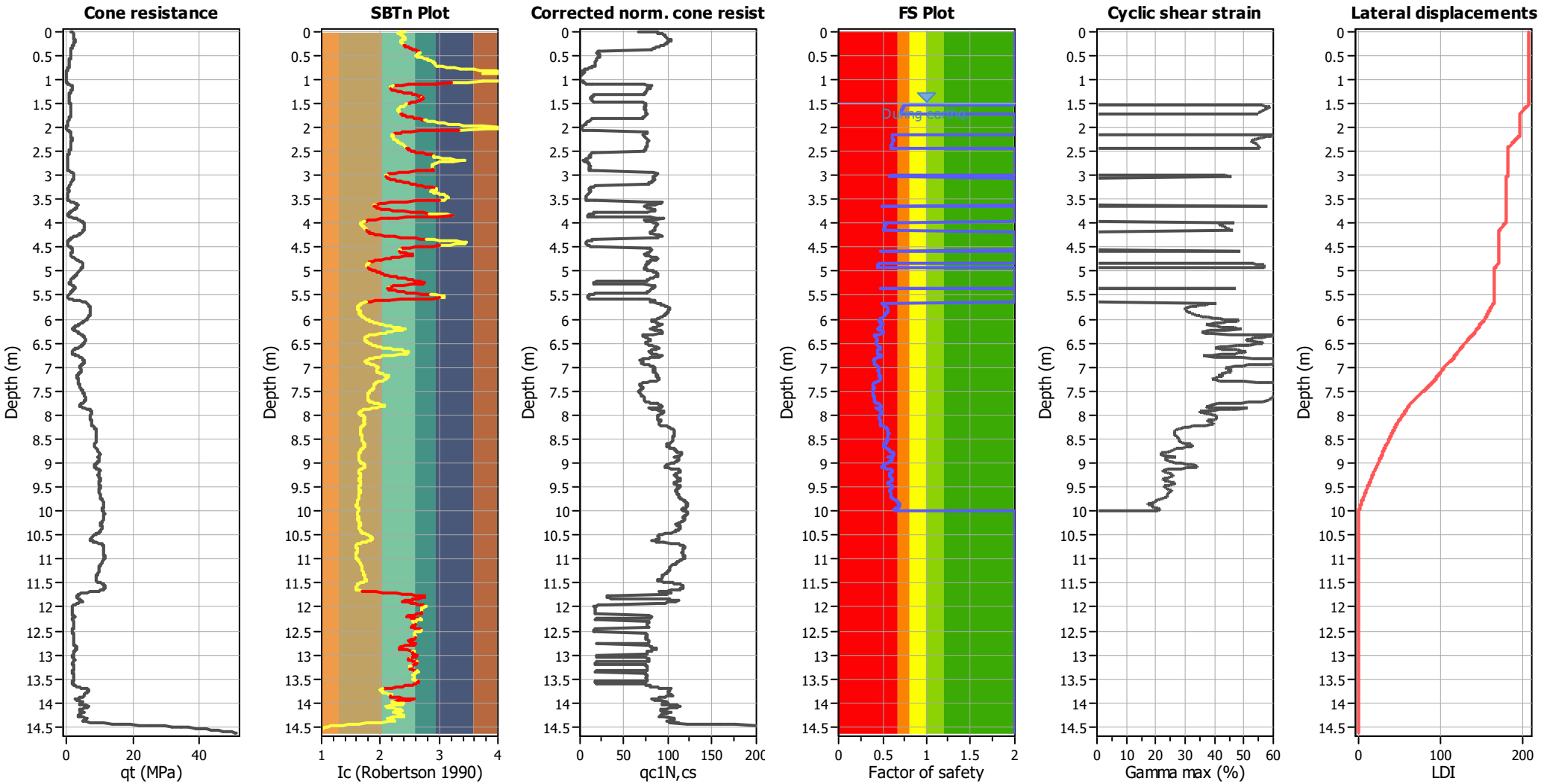
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

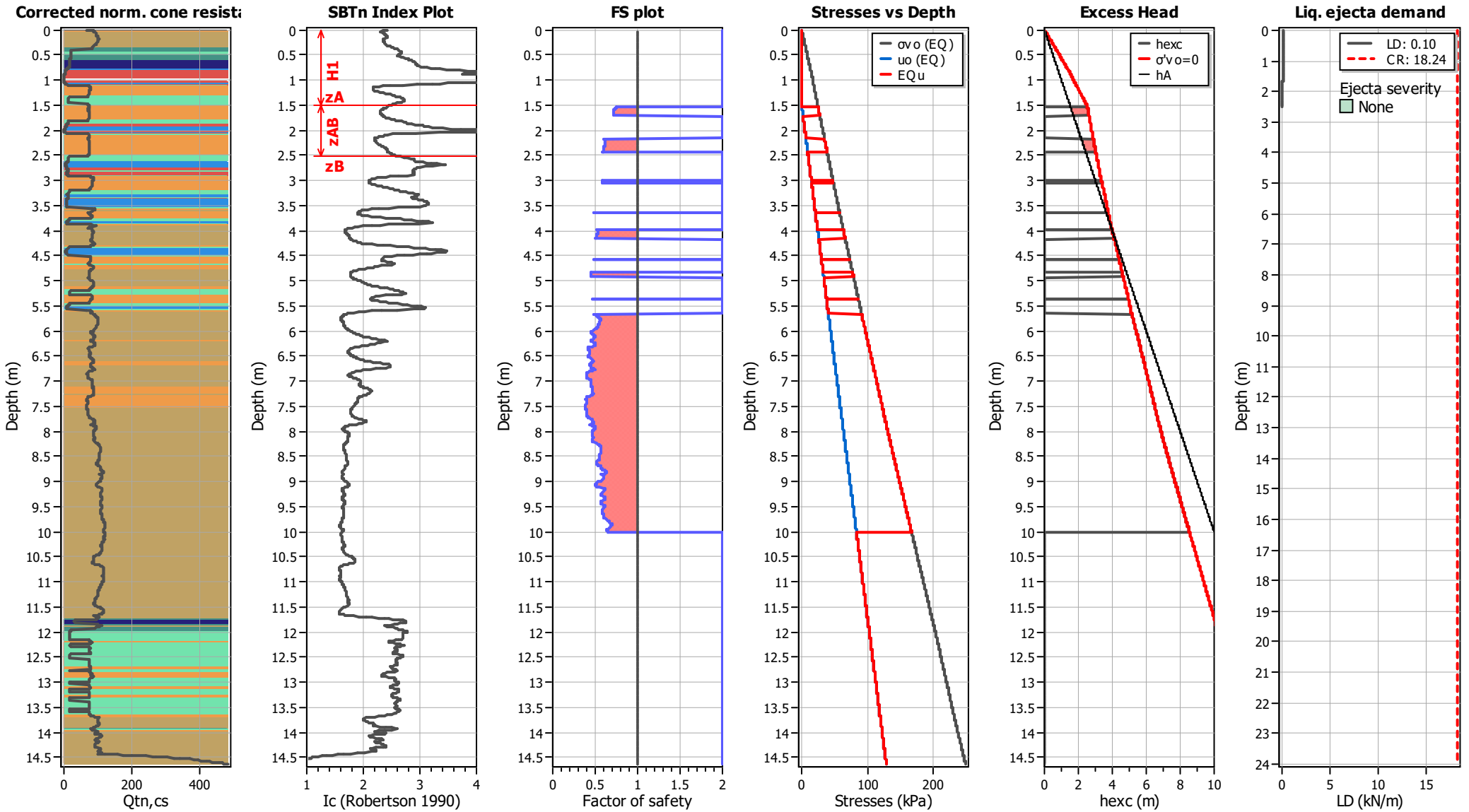
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



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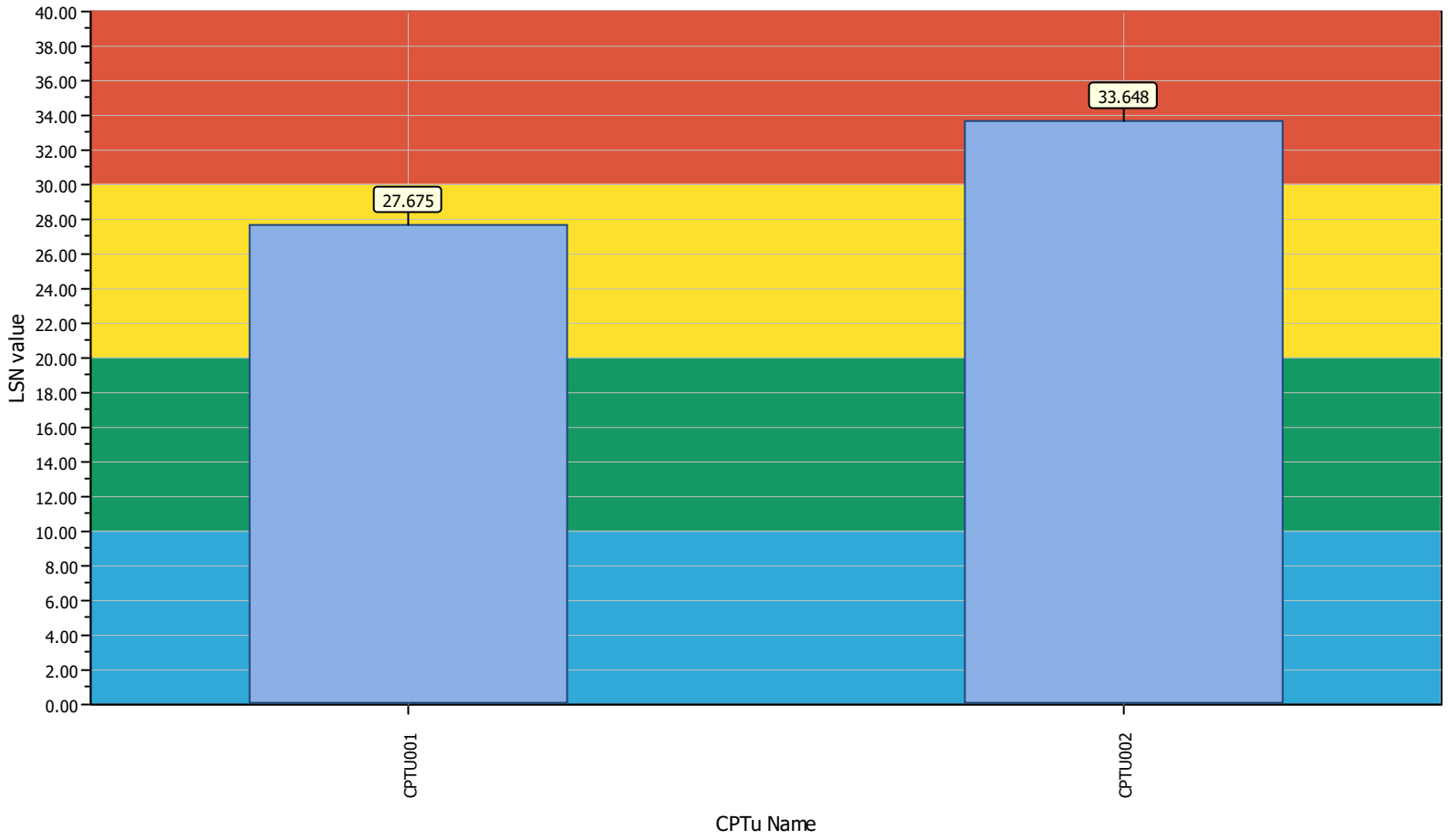
Project title :

Location :

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: 2

0% little liquefaction

0% minor liquefaction

50% moderate liquefaction

50% moderate to major liquefaction

0% major liquefaction

0% severe liquefaction

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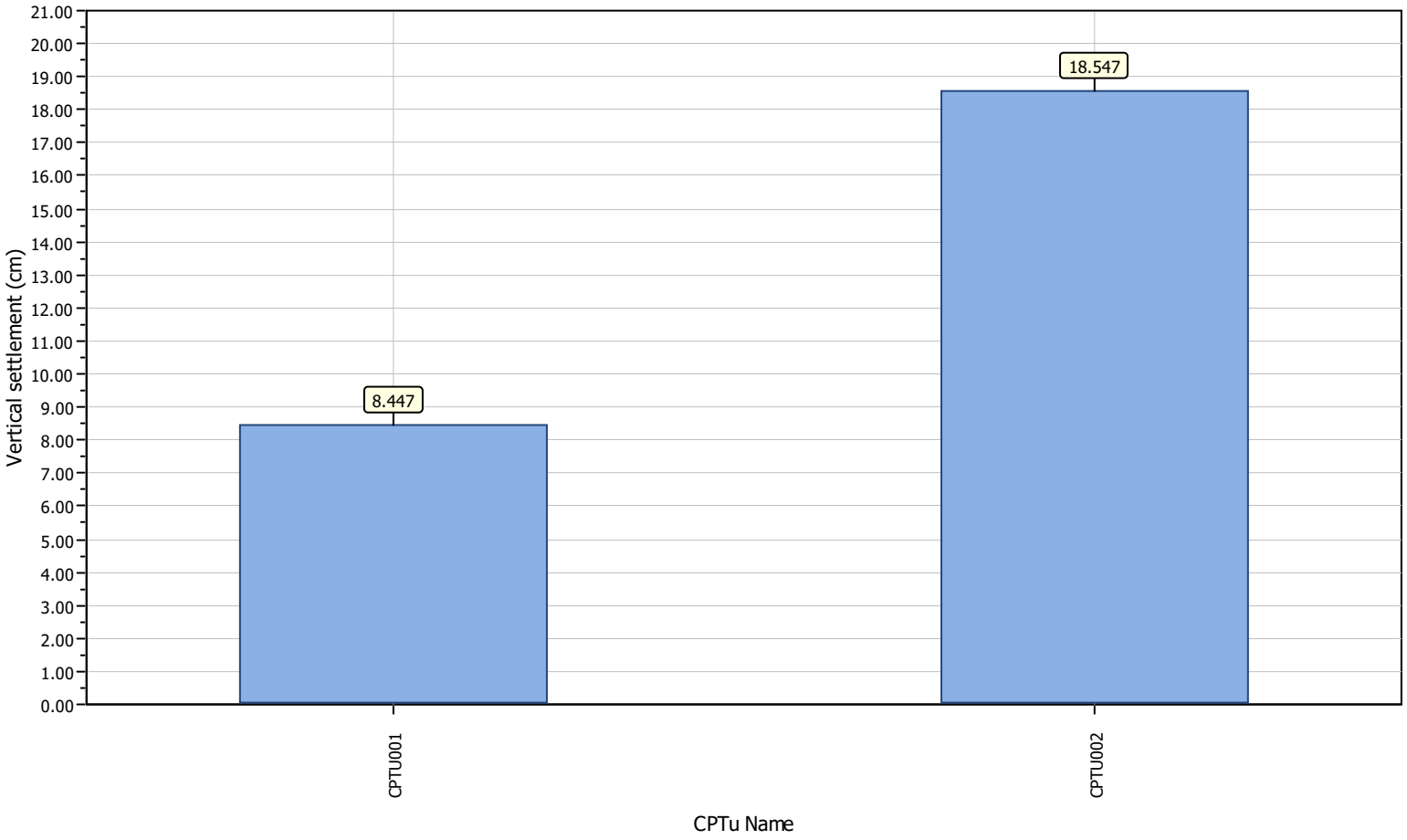
Project title :

Location :

Overall vertical settlements report



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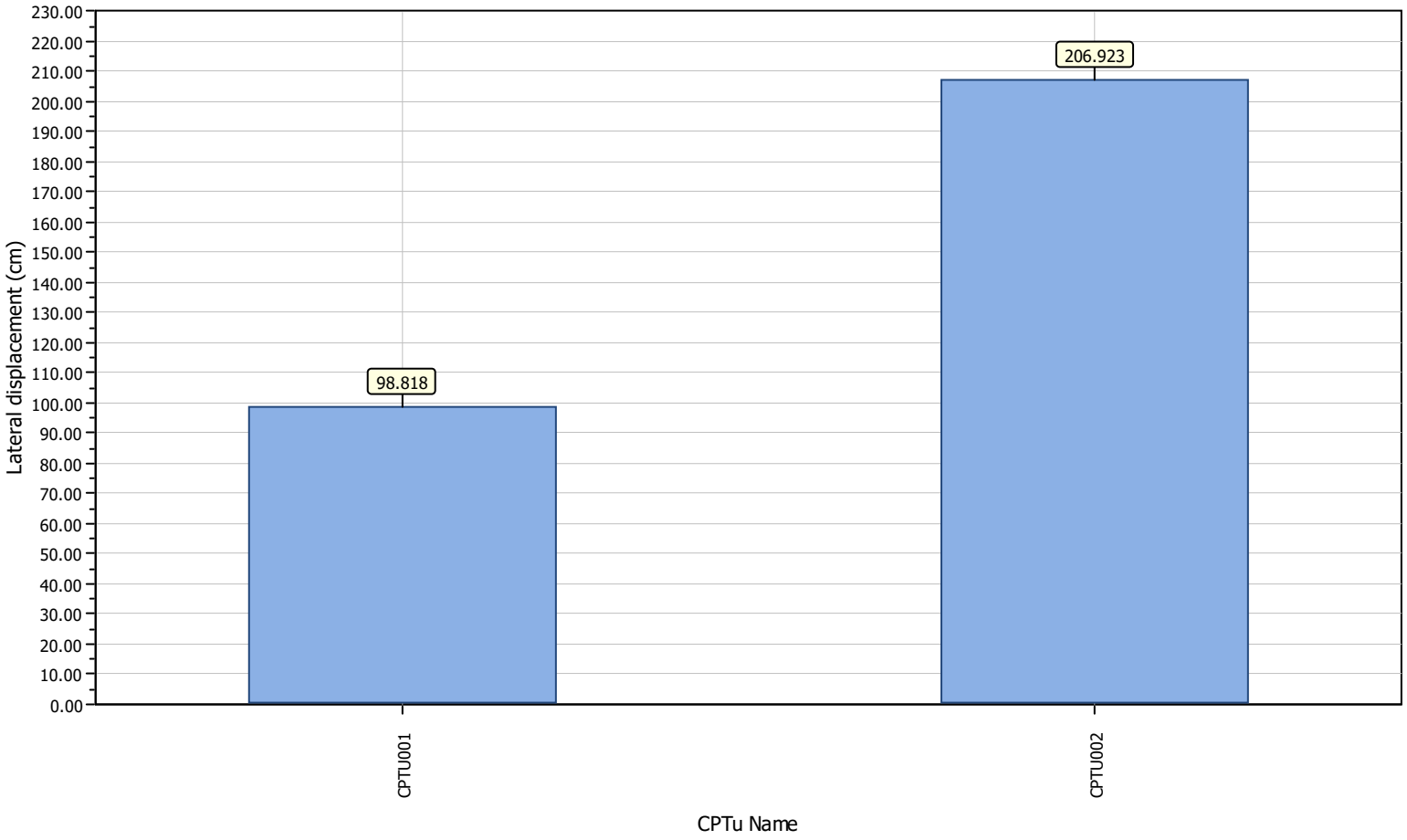
Project title :

Location :

Overall lateral displacements report



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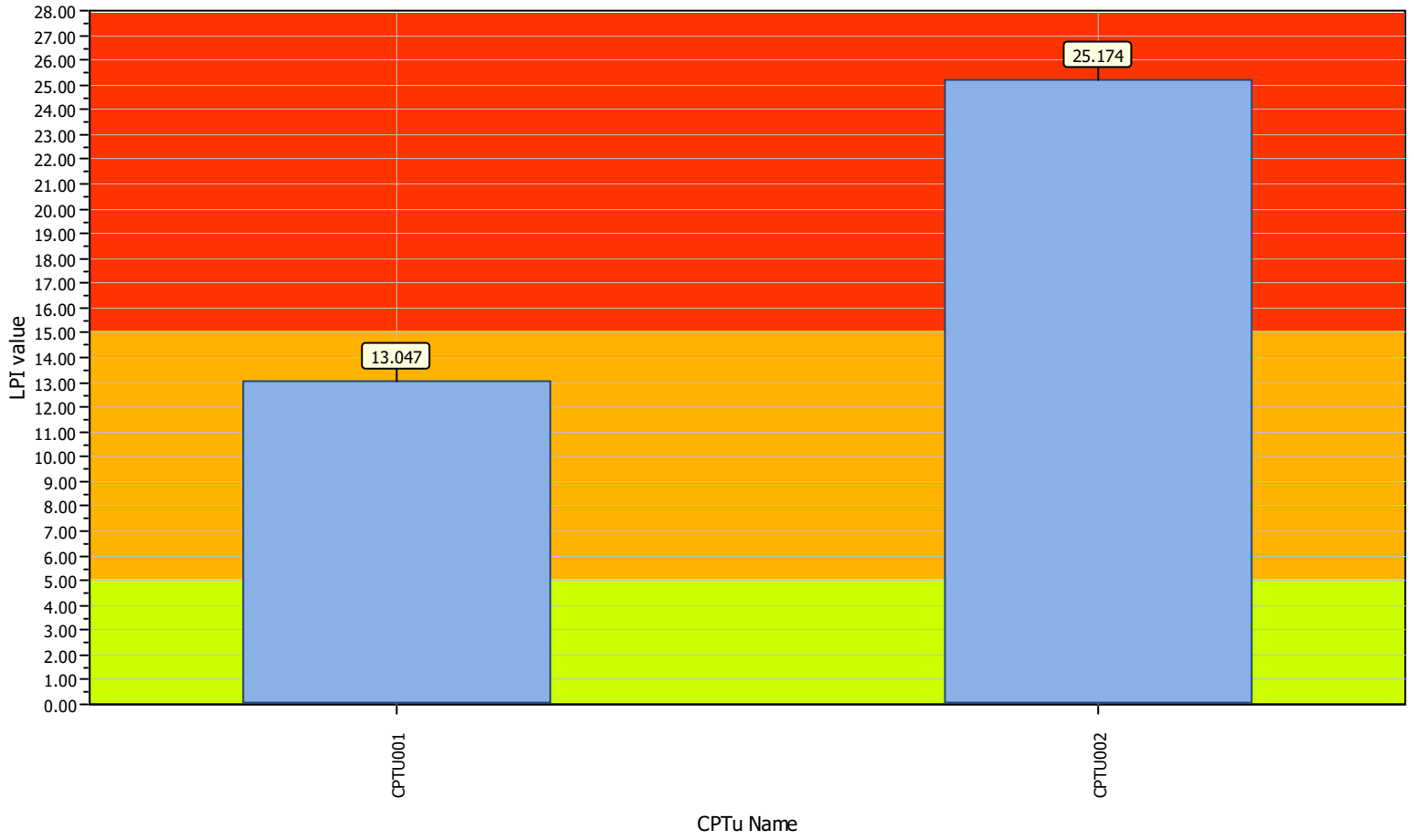
Project title :

Location :

Overall Liquefaction Potential Index report



LPI color scheme

- Very high risk
- High risk
- Low risk

Basic statistics

Total CPT number: 2
0% low risk
50% high risk
50% very high risk

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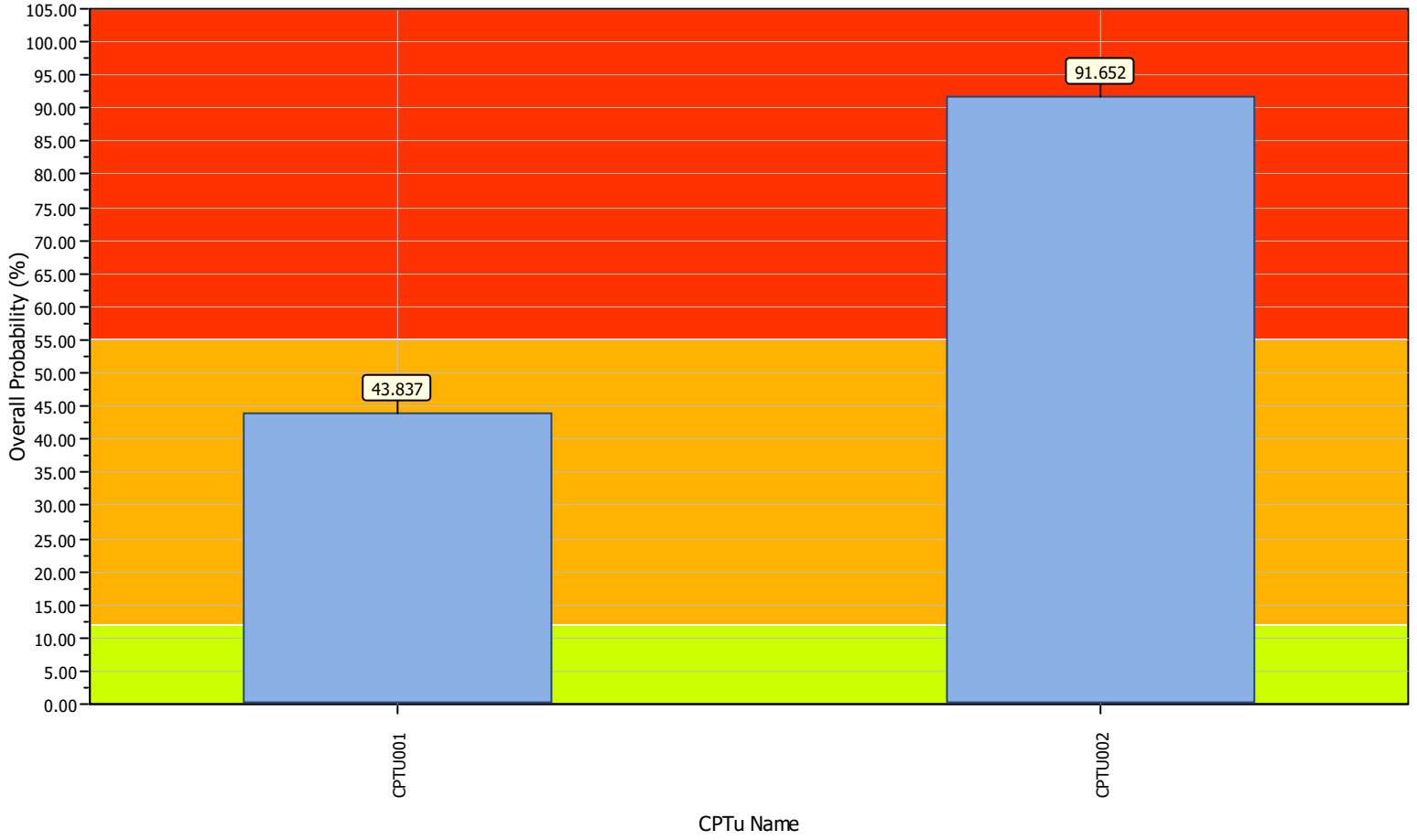
Project title :

Location :

Overall Probability for Liquefaction report



Probability color scheme

- Very High Probability
- High Probability
- Low Probability

Basic statistics

Total CPT number: 2
0% low probability
50% high probability
50% very high probability

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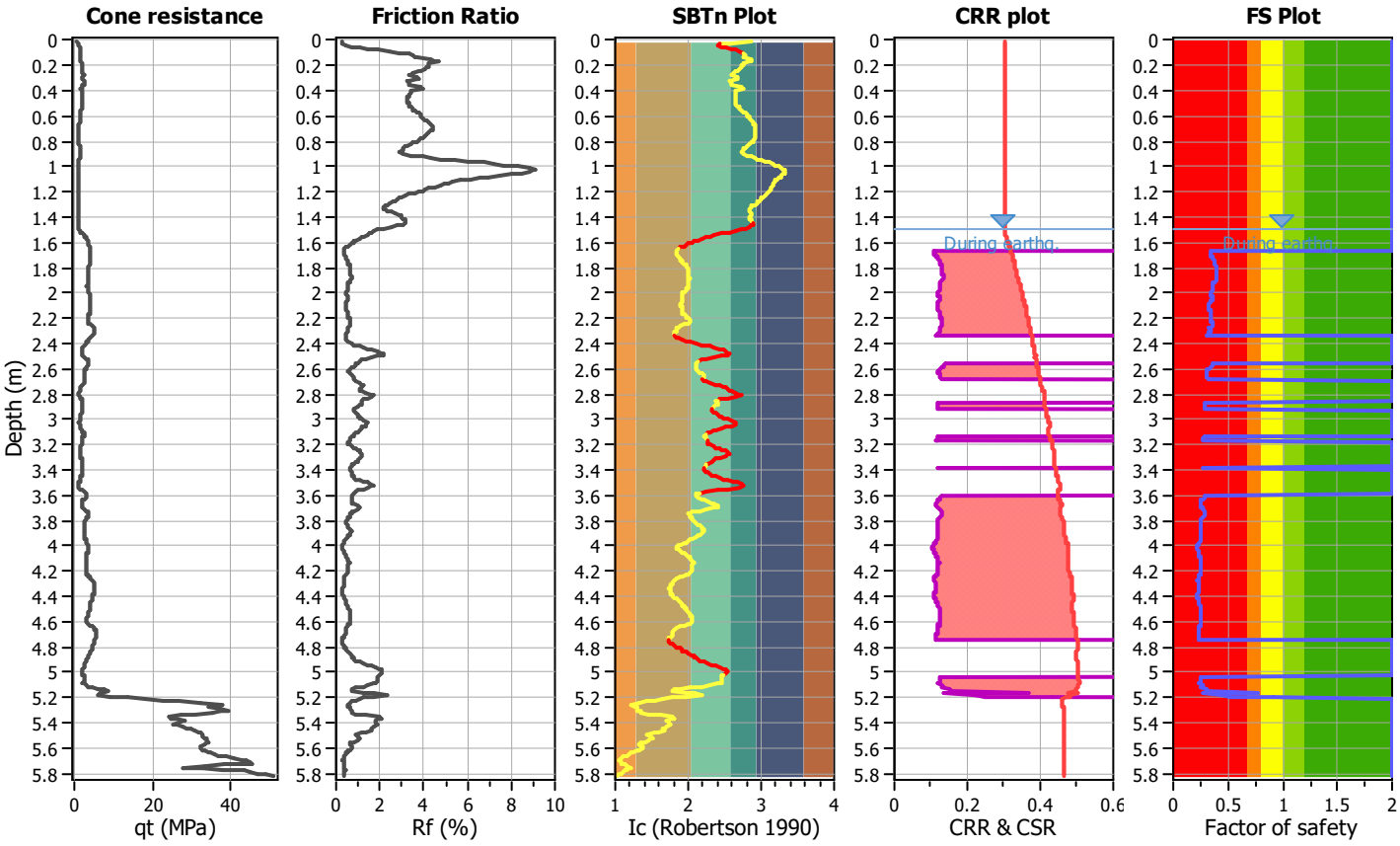
LIQUEFACTION ANALYSIS REPORT

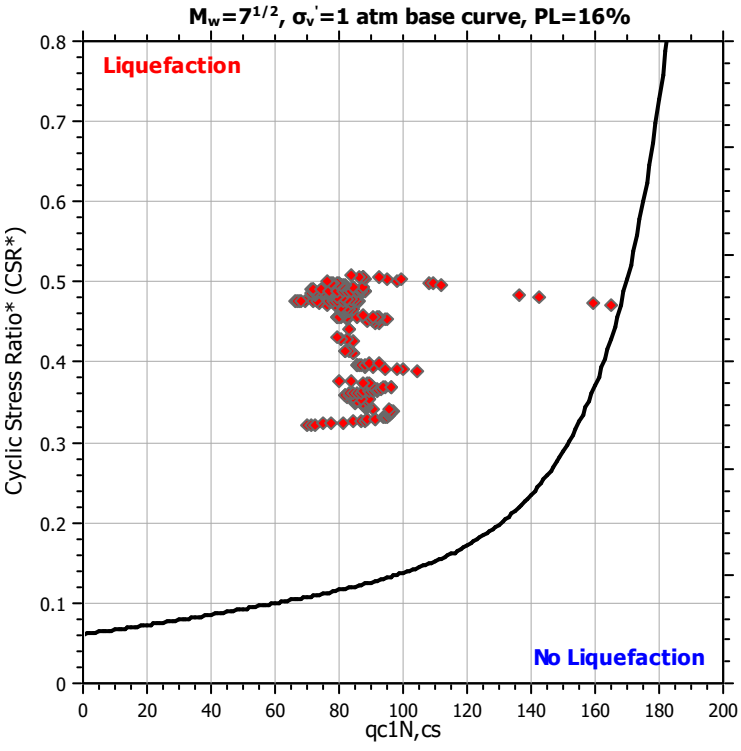
Project title : **Location :**

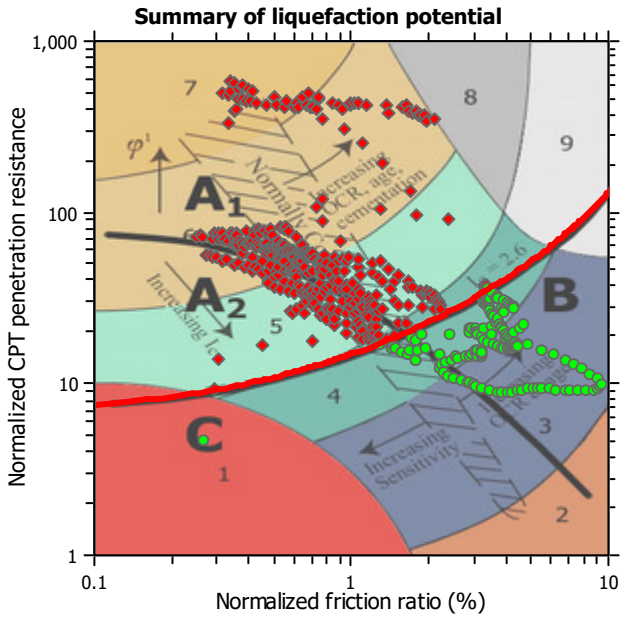
CPT file : CPTU001

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	7.30	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.52	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

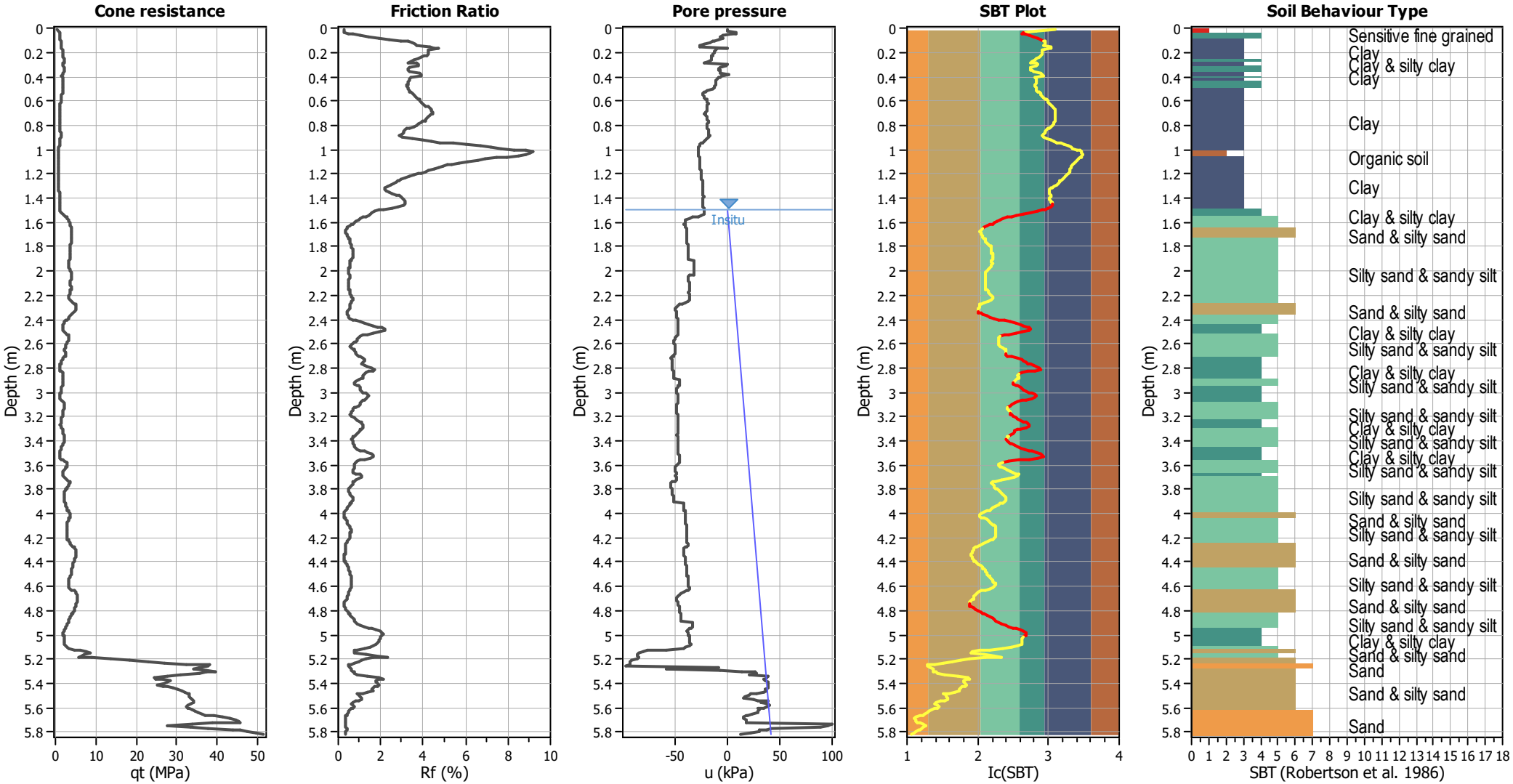






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



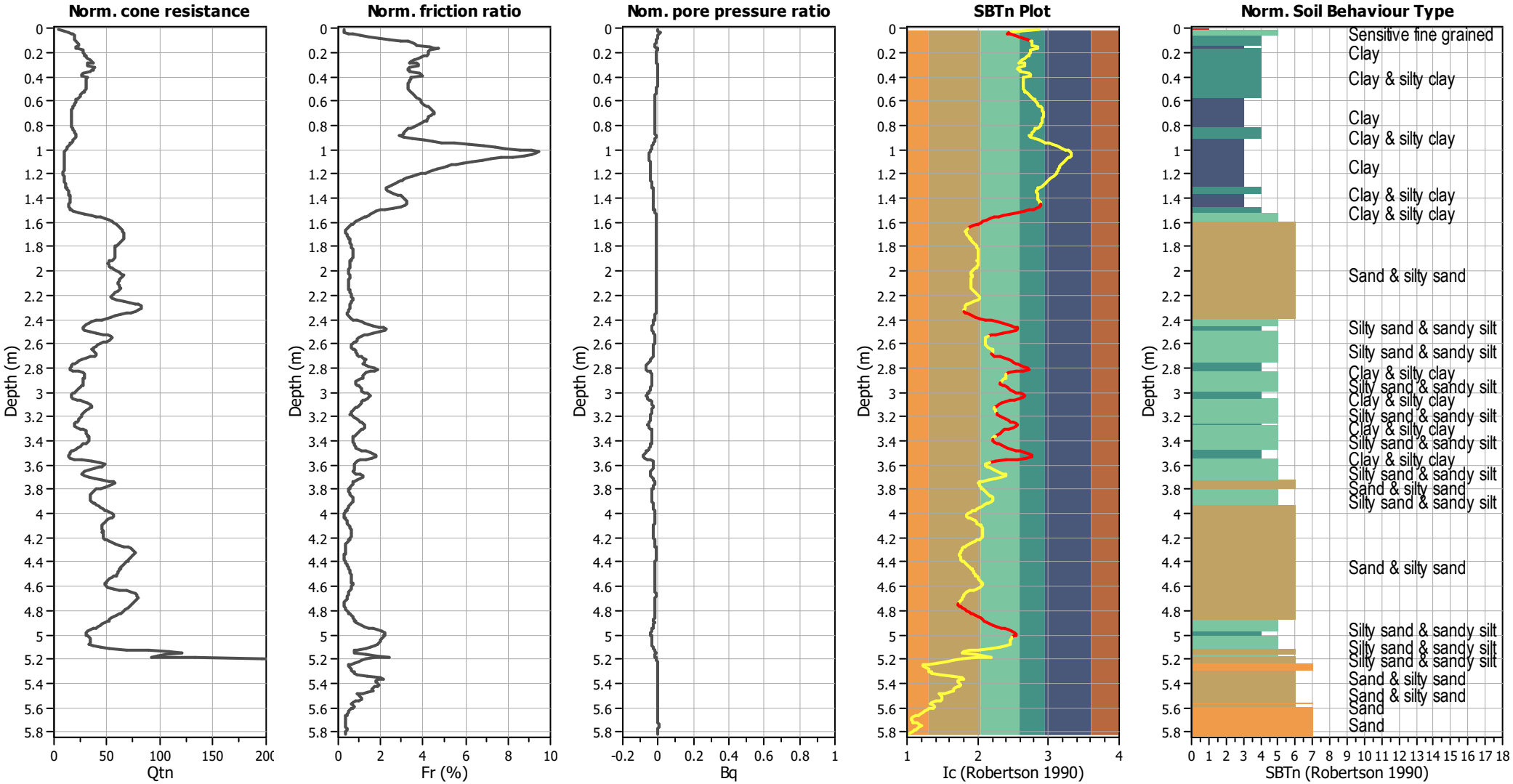
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



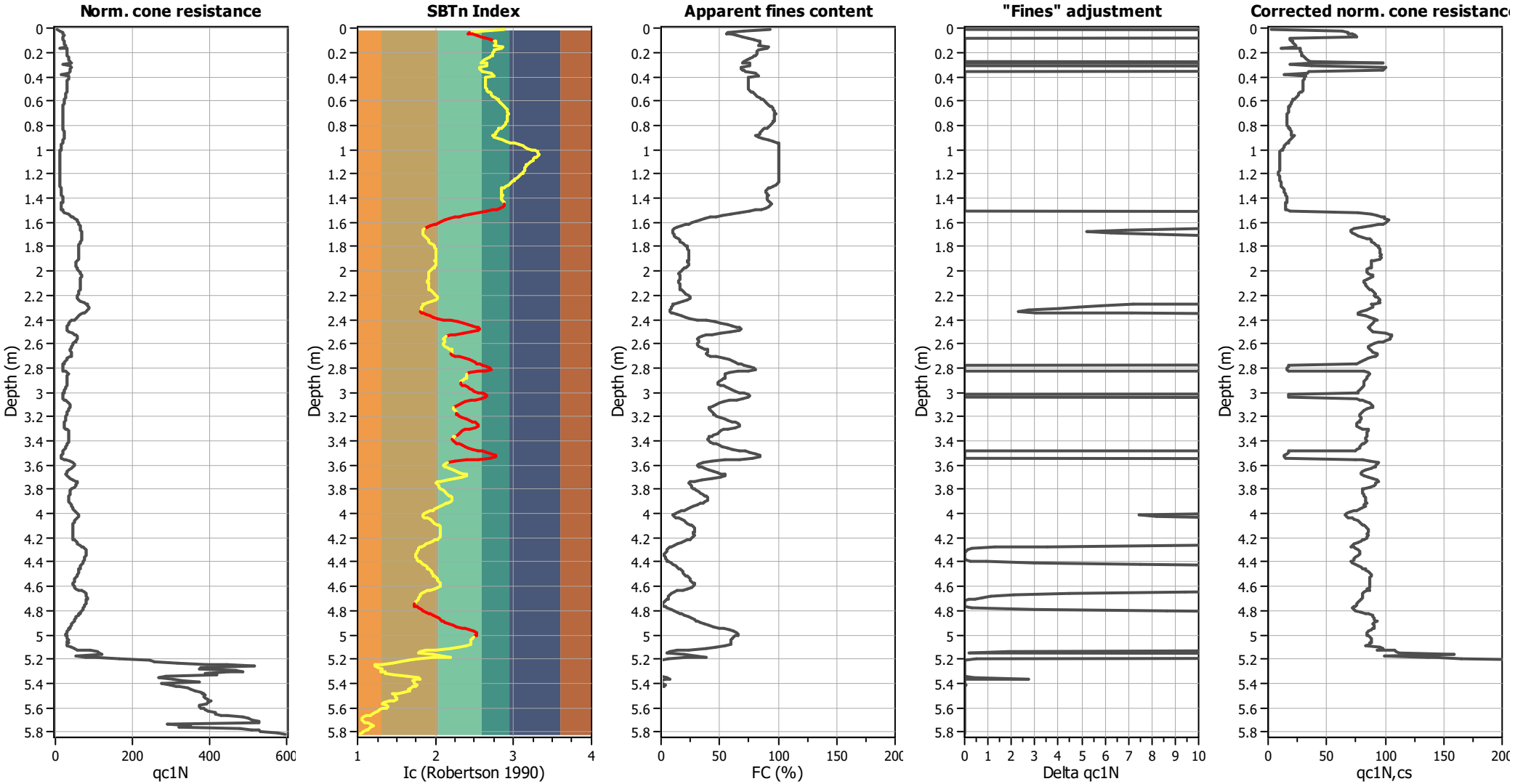
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

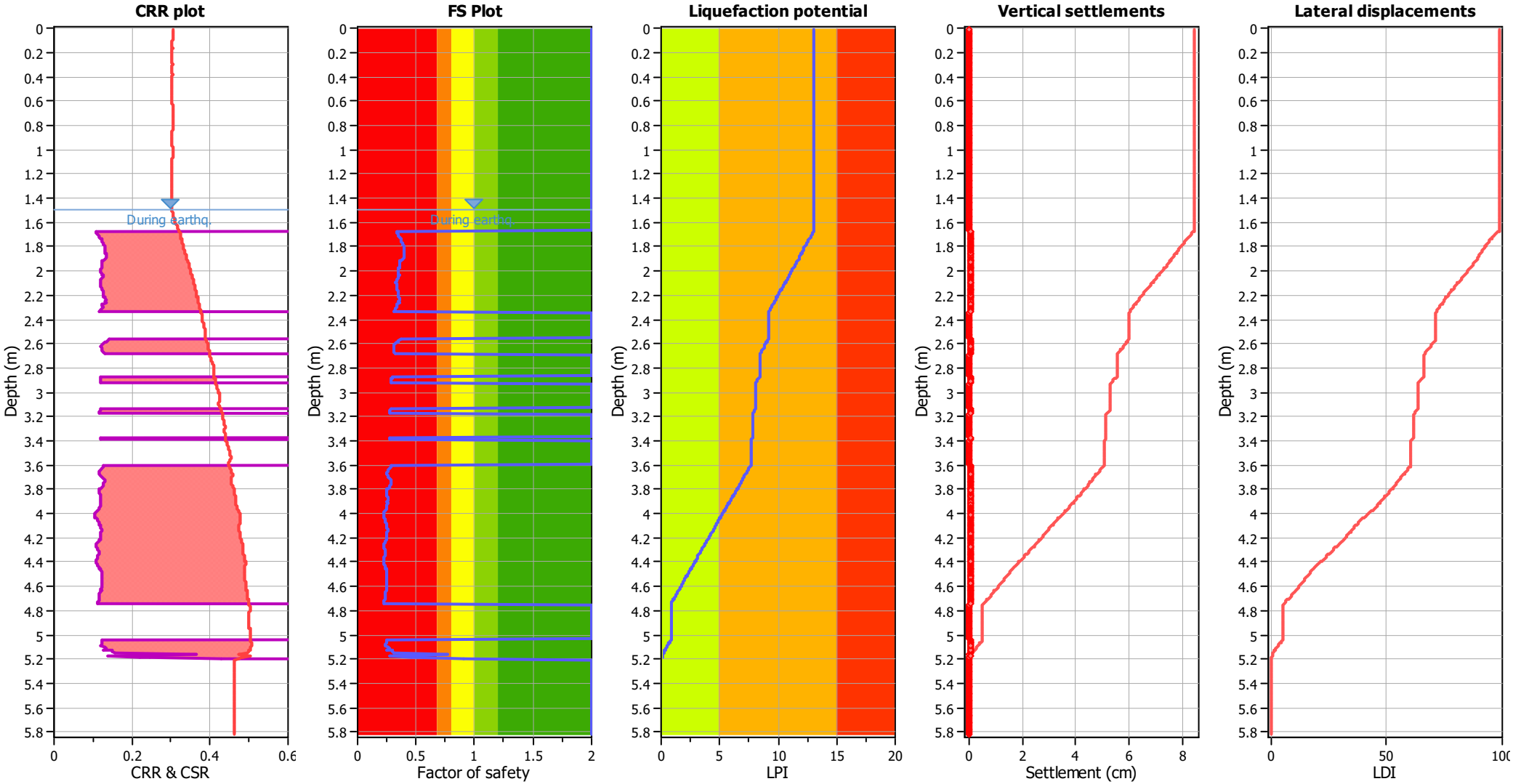
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

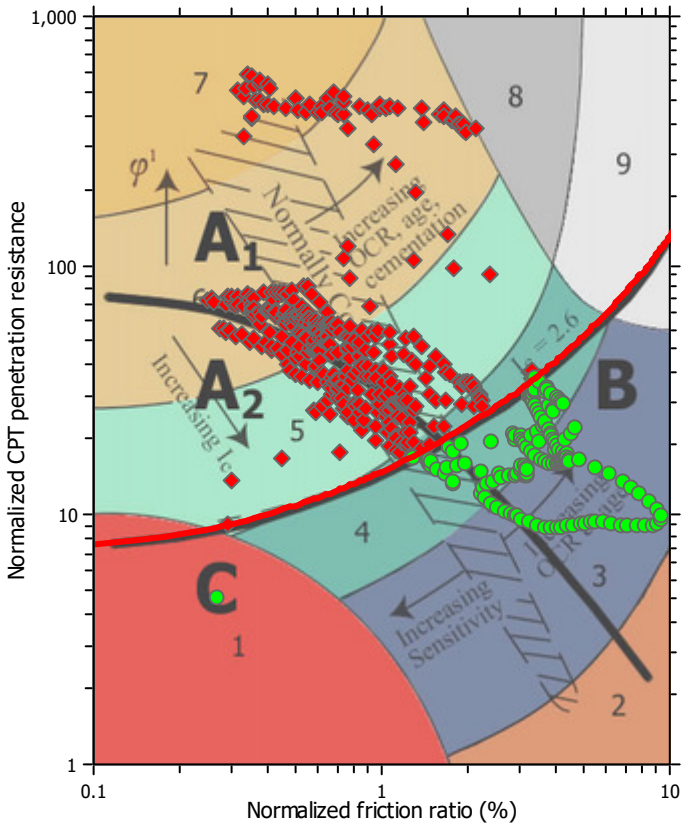
F.S. color scheme

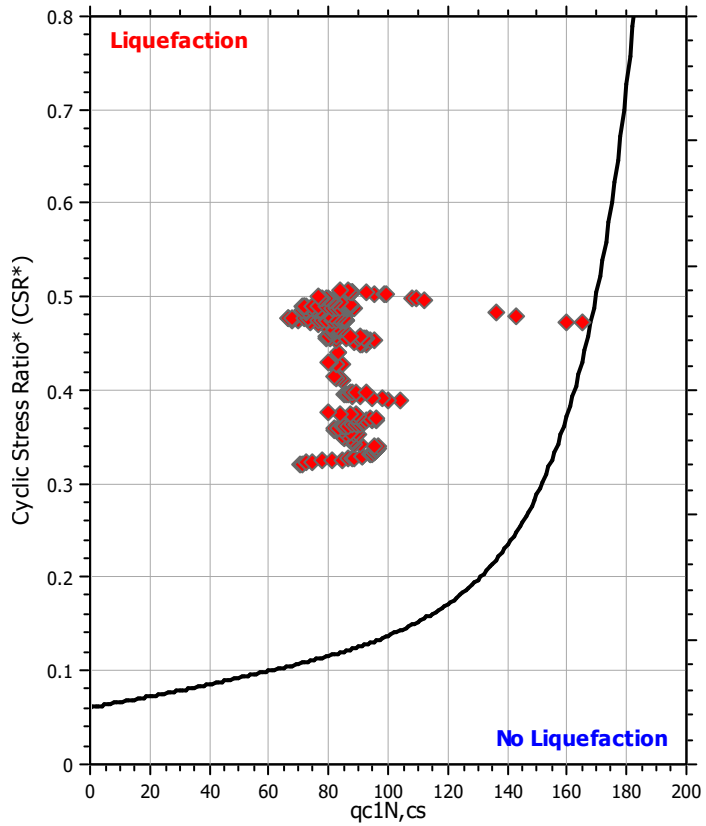
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

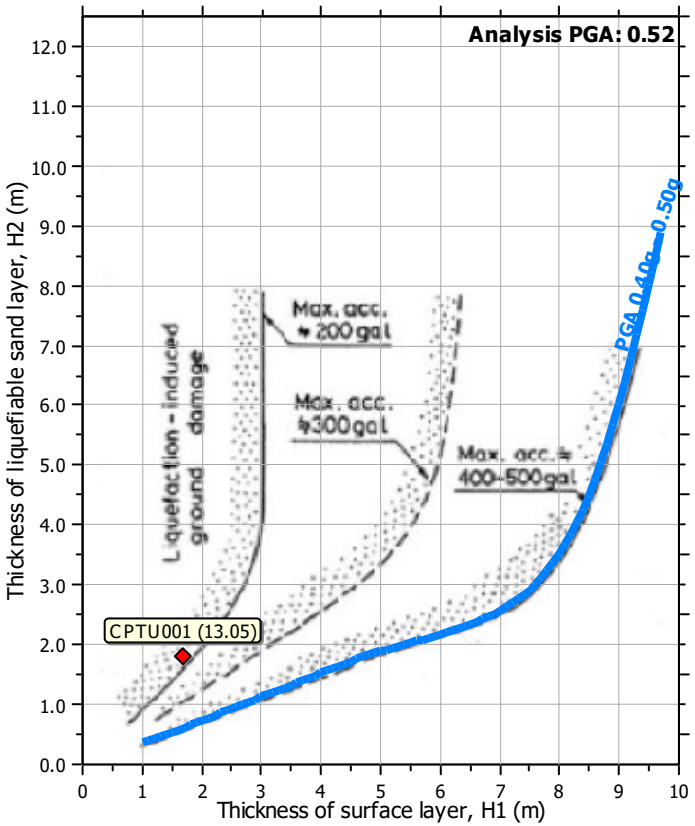
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



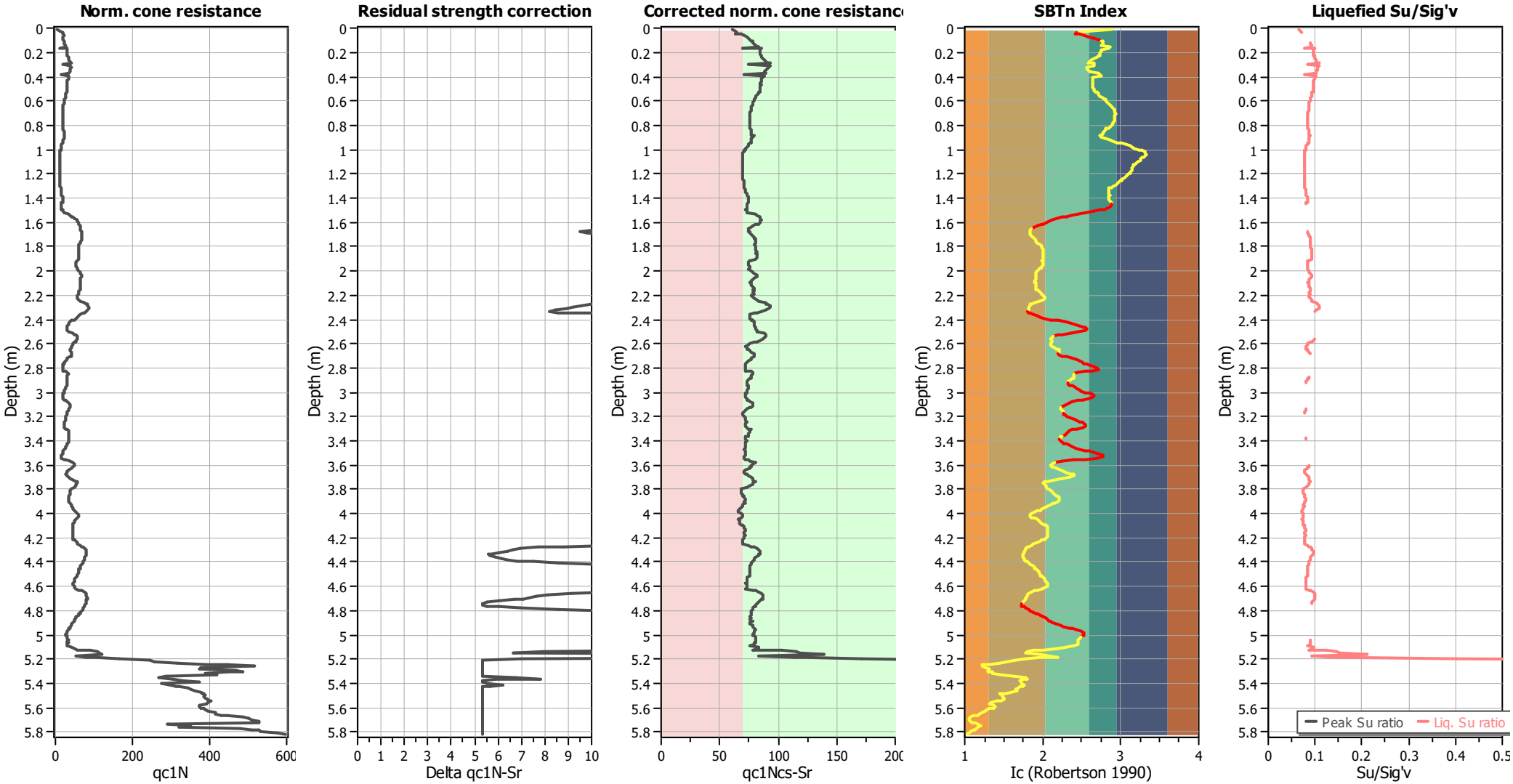




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

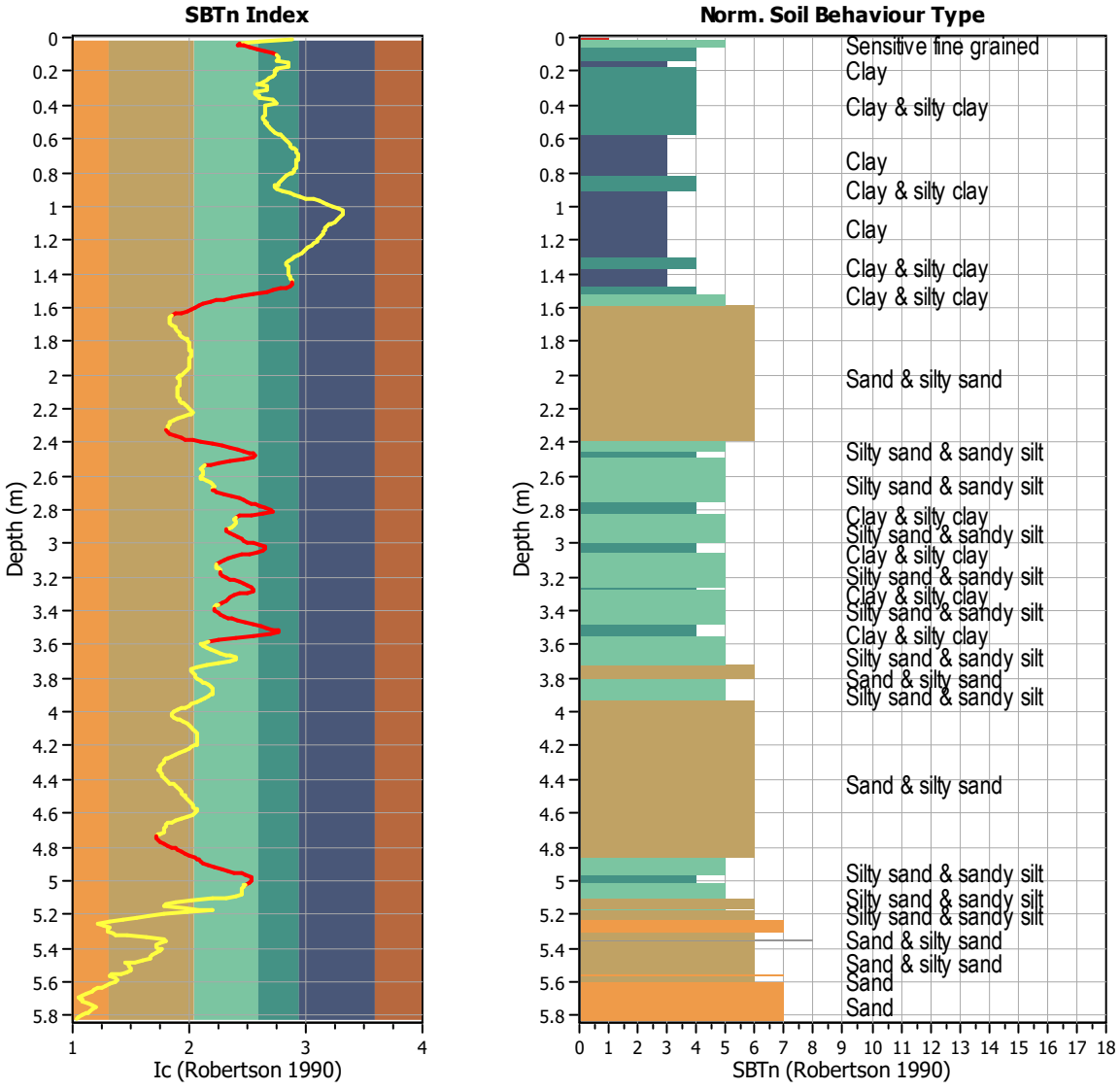
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

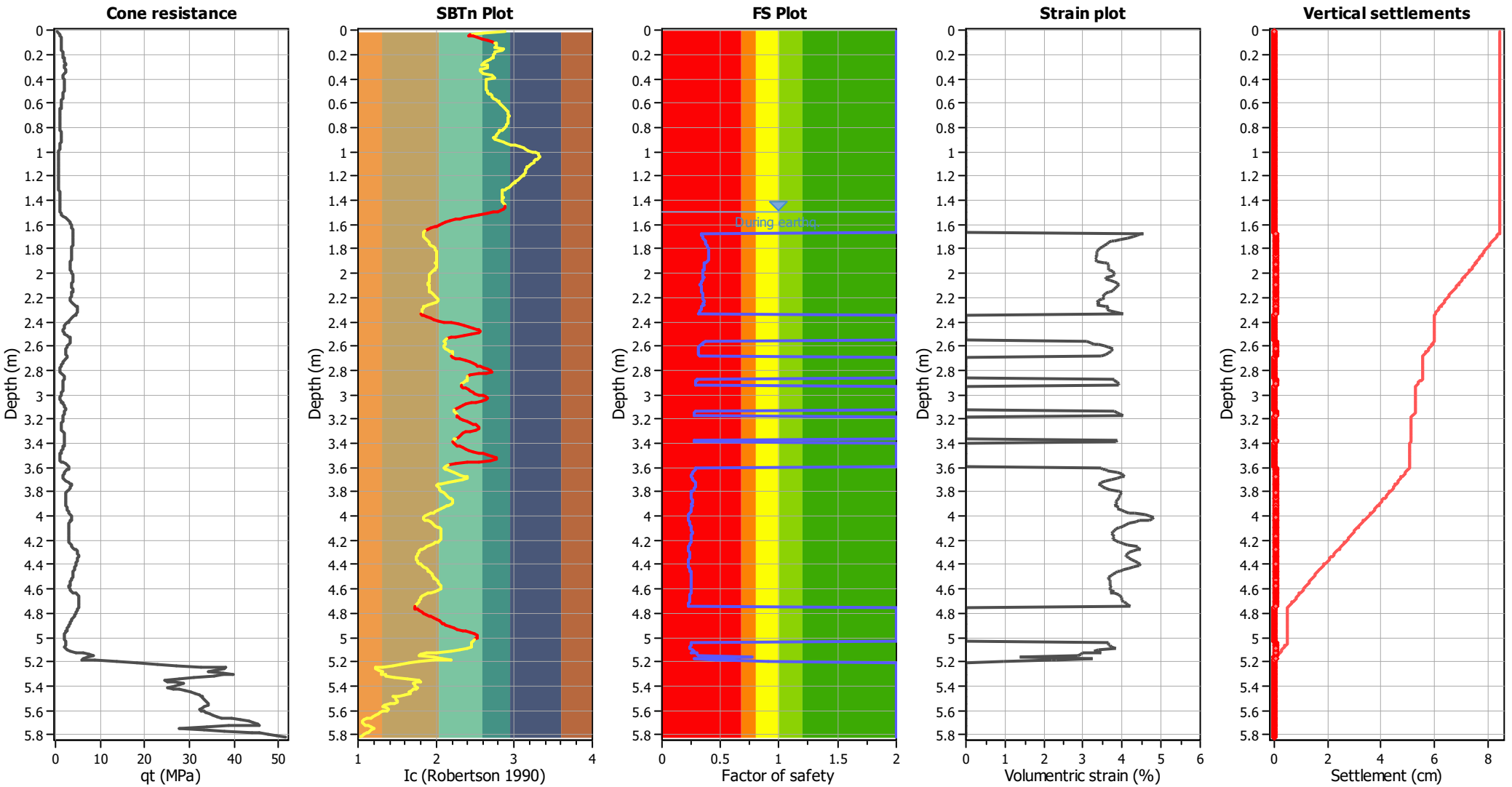
The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



Transition layer algorithm properties		General statistics	
I_c minimum check value:	1.70	Total points in CPT file:	582
I_c maximum check value:	3.00	Total points excluded:	163
I_c change ratio value:	0.0100	Exclusion percentage:	28.01%
Minimum number of points in layer:	4	Number of layers detected:	14

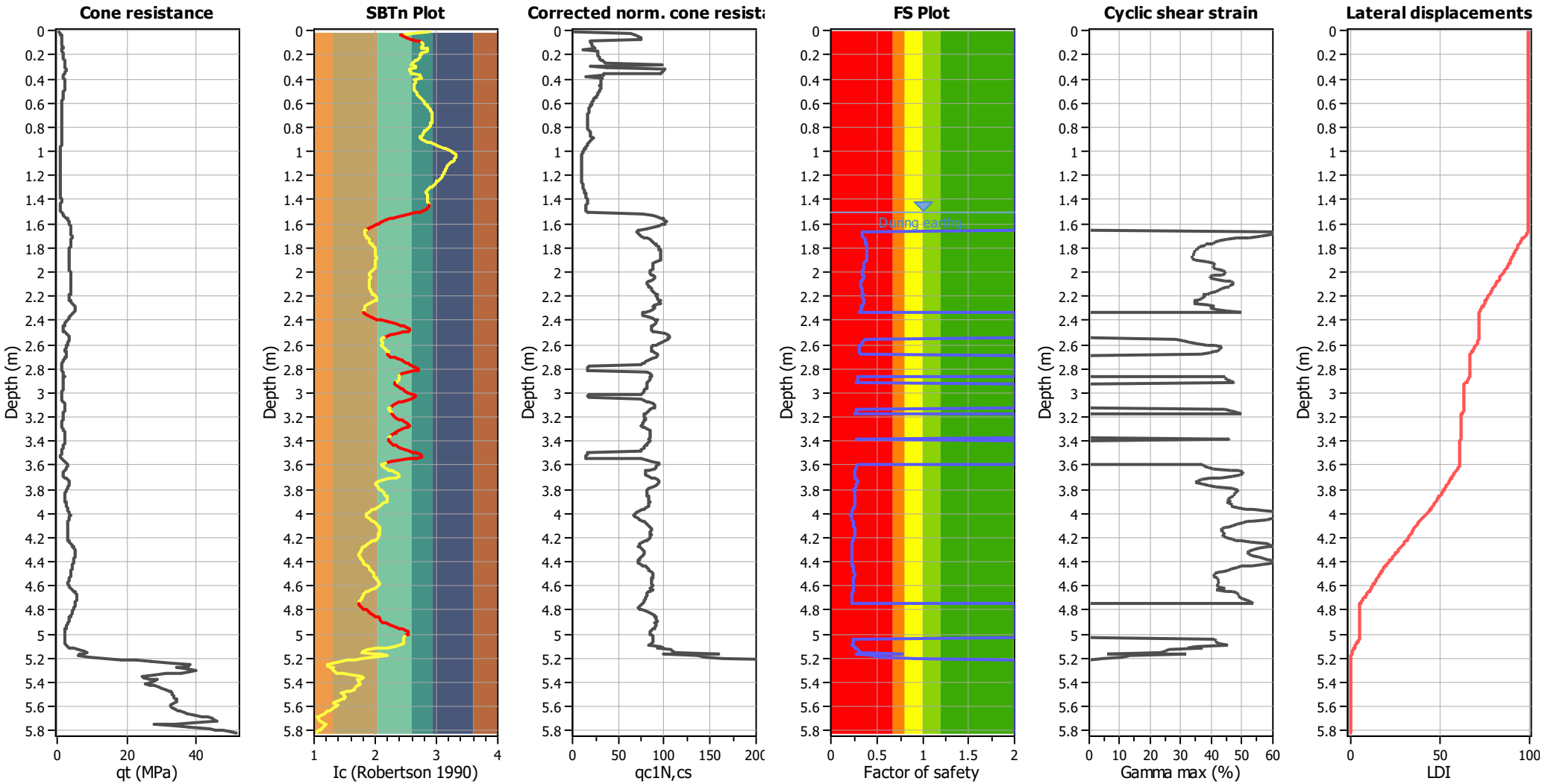
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

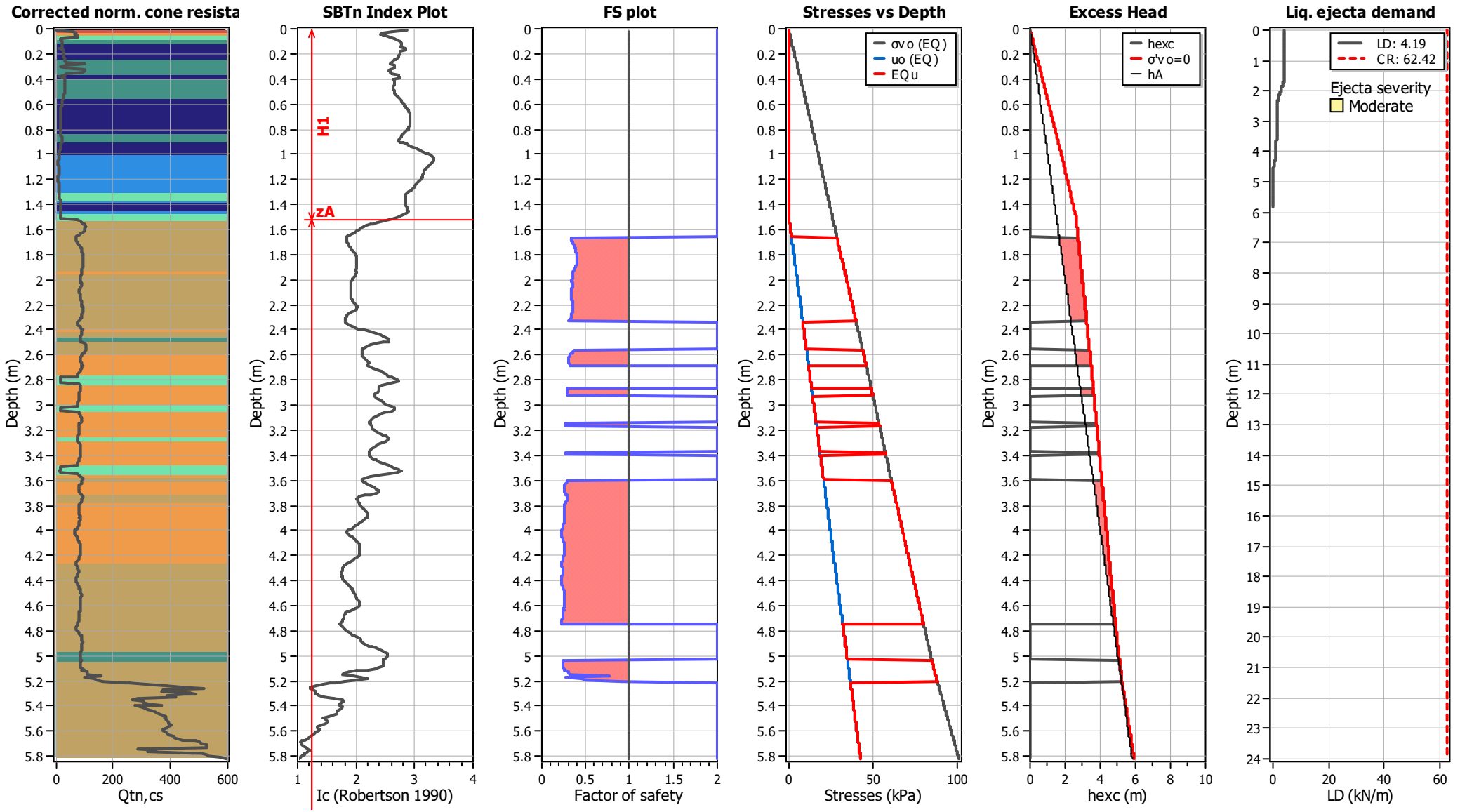
Estimation of post-earthquake lateral Displacements



Abbreviations

q_t: Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation



SMART ALLIANCES LTD
PO BOX 546
BLENHEIM 7240
http://www.smartalliances.co.nz

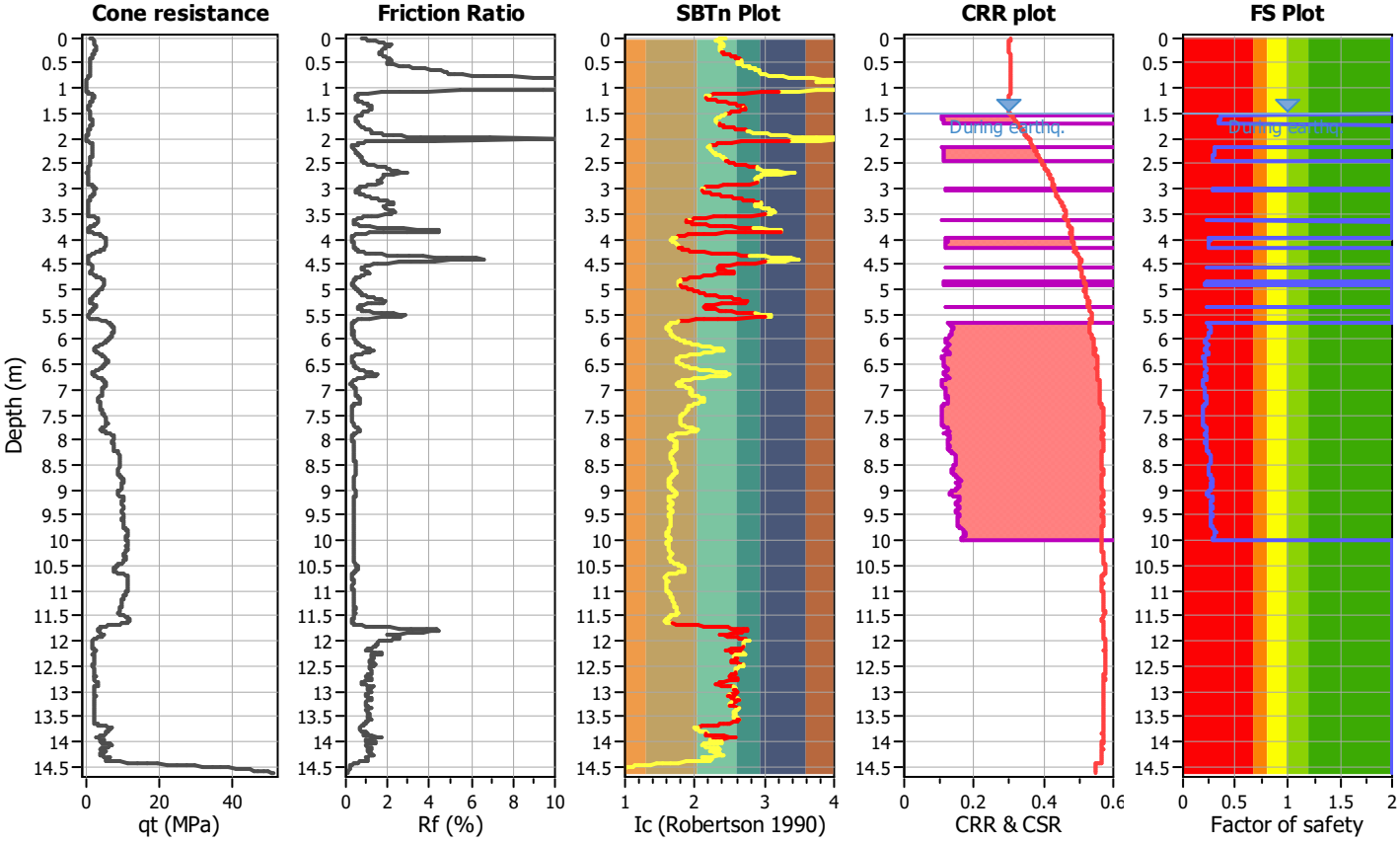
LIQUEFACTION ANALYSIS REPORT

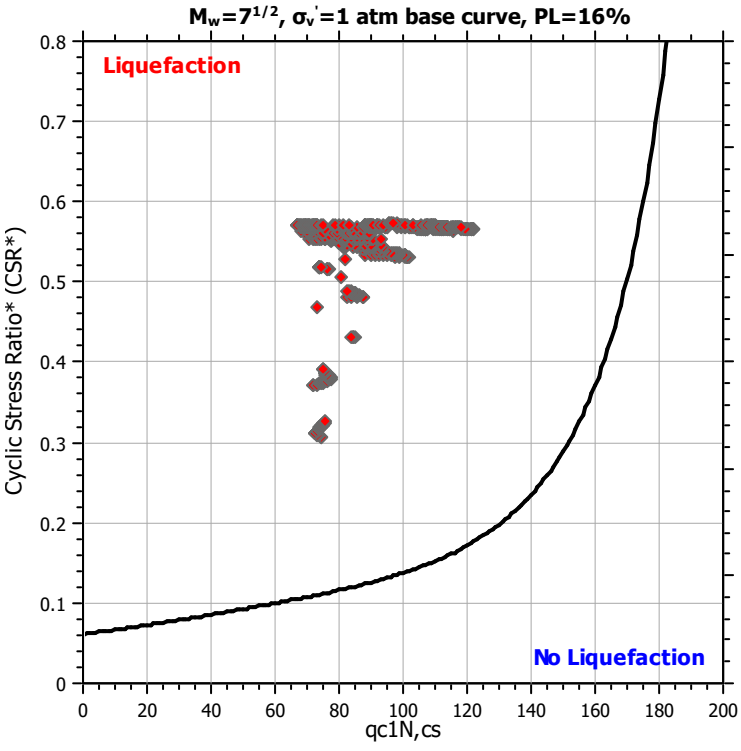
Project title : **Location :**

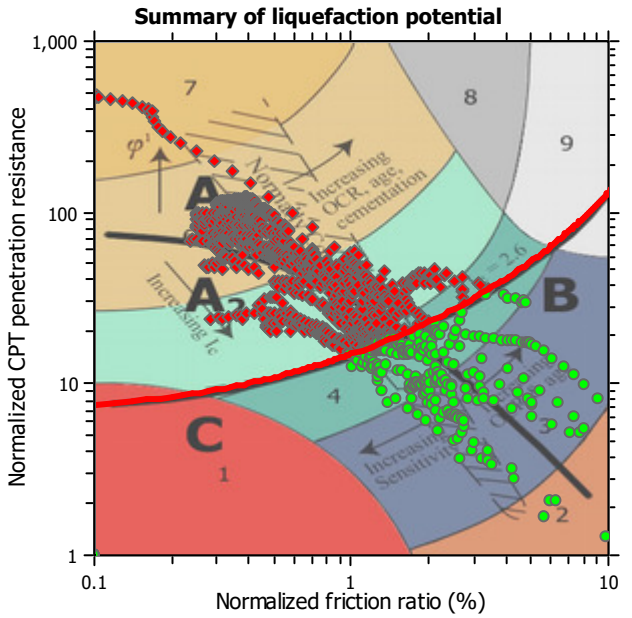
CPT file : CPTU002

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	1.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	1.50 m	Fill height:	N/A	Limit depth applied:	Yes
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	10.00 m
Earthquake magnitude M_w:	7.30	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	NCEER, (Youd
Peak ground acceleration:	0.52	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

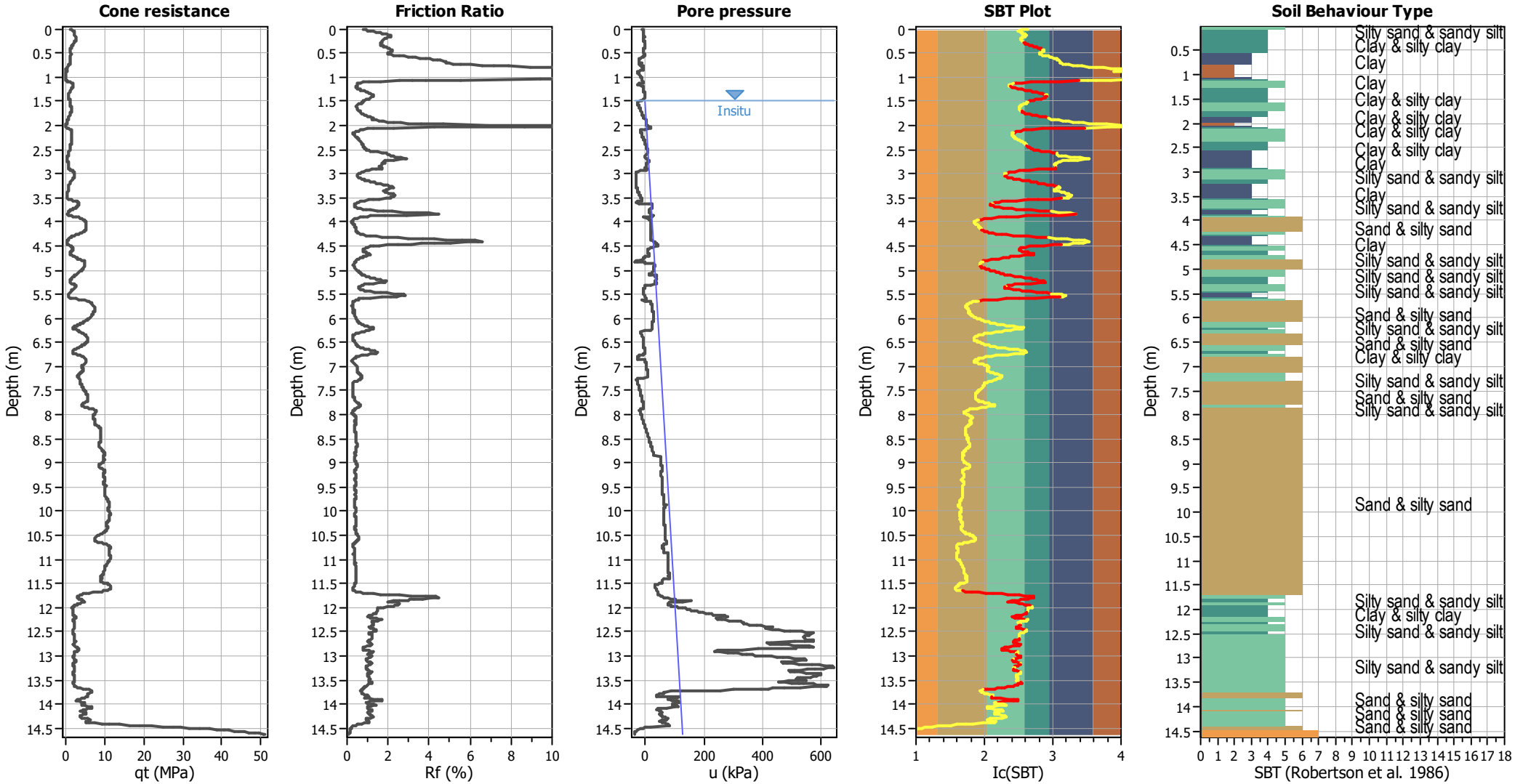






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



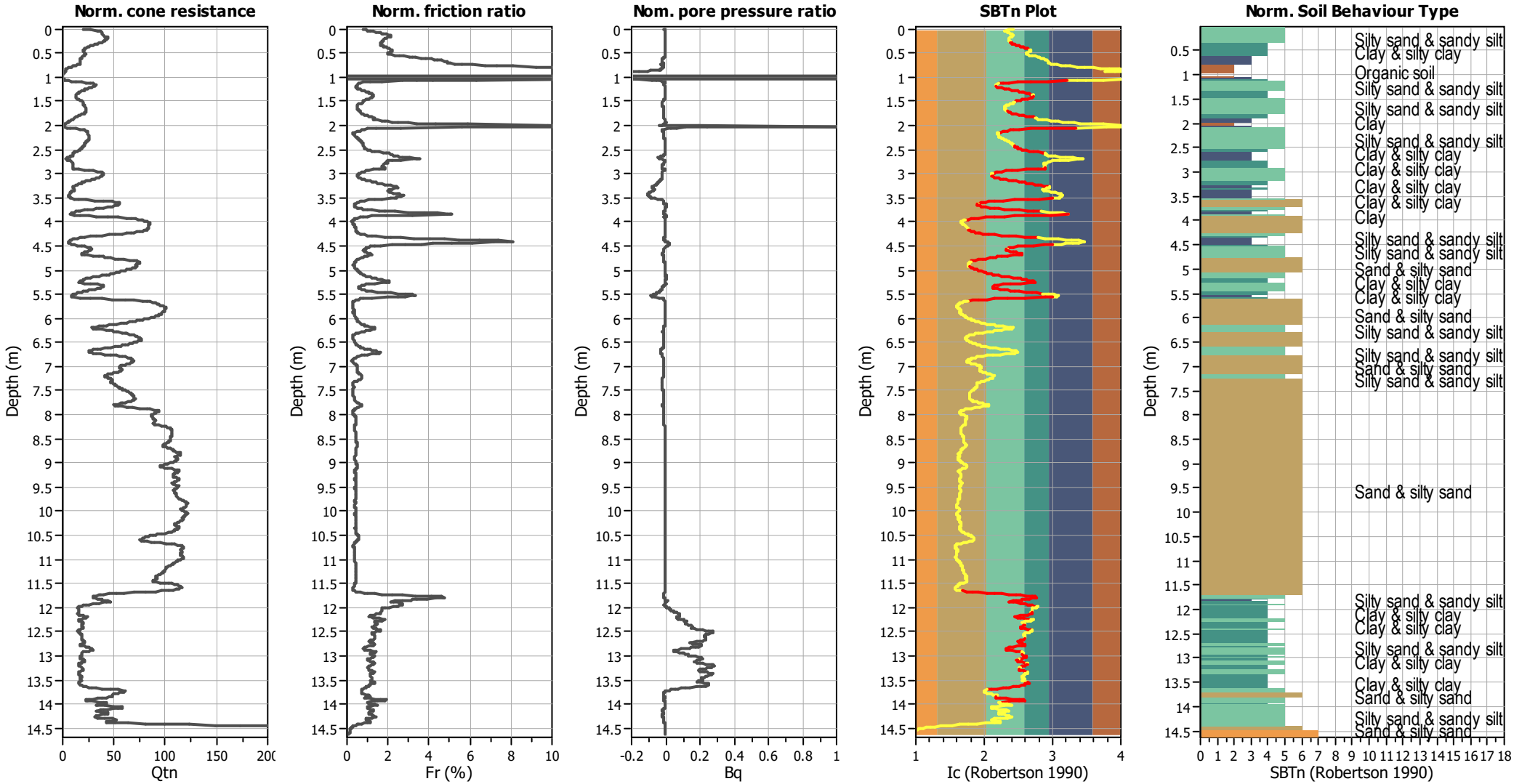
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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

CPT basic interpretation plots (normalized)



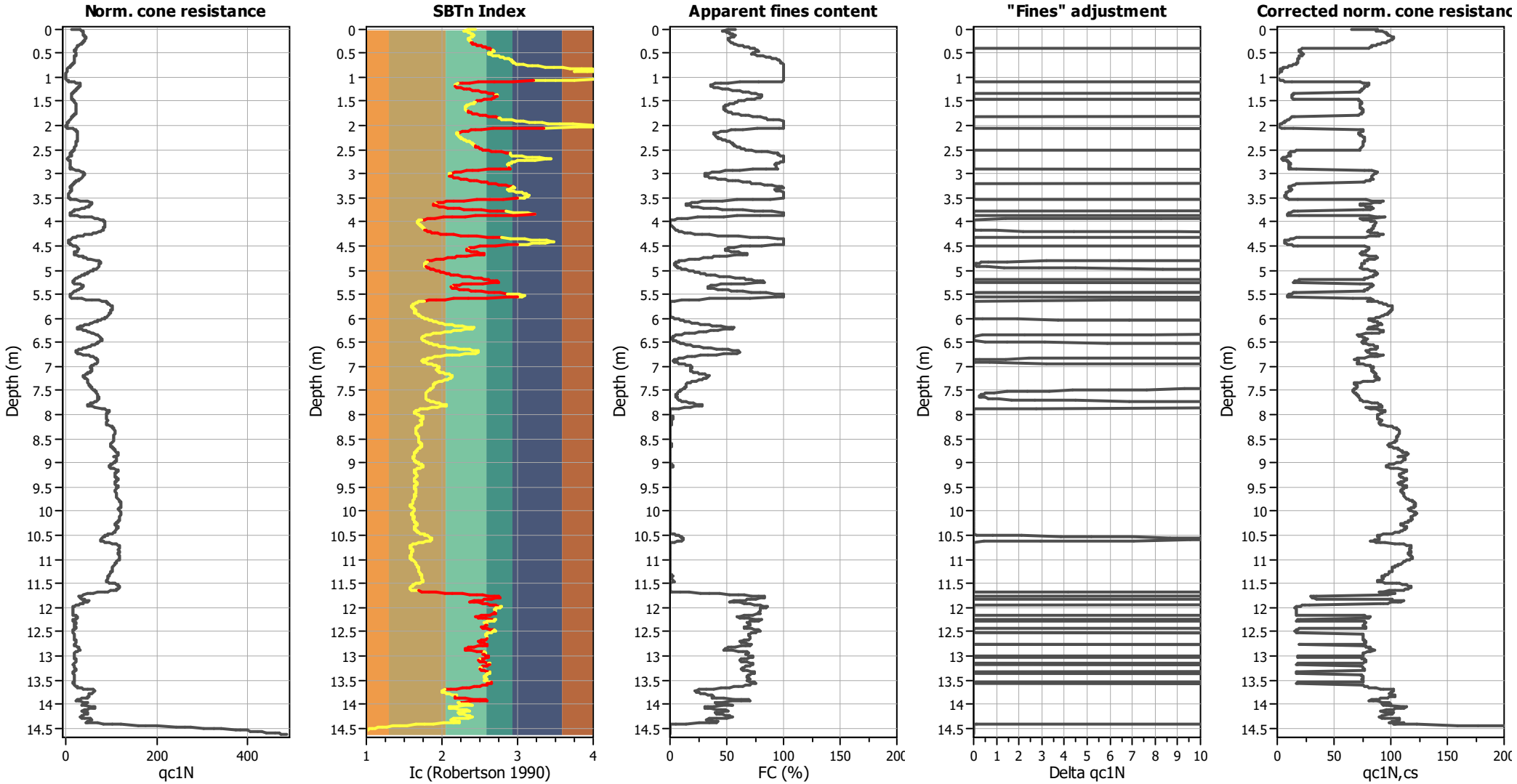
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

SBTn 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

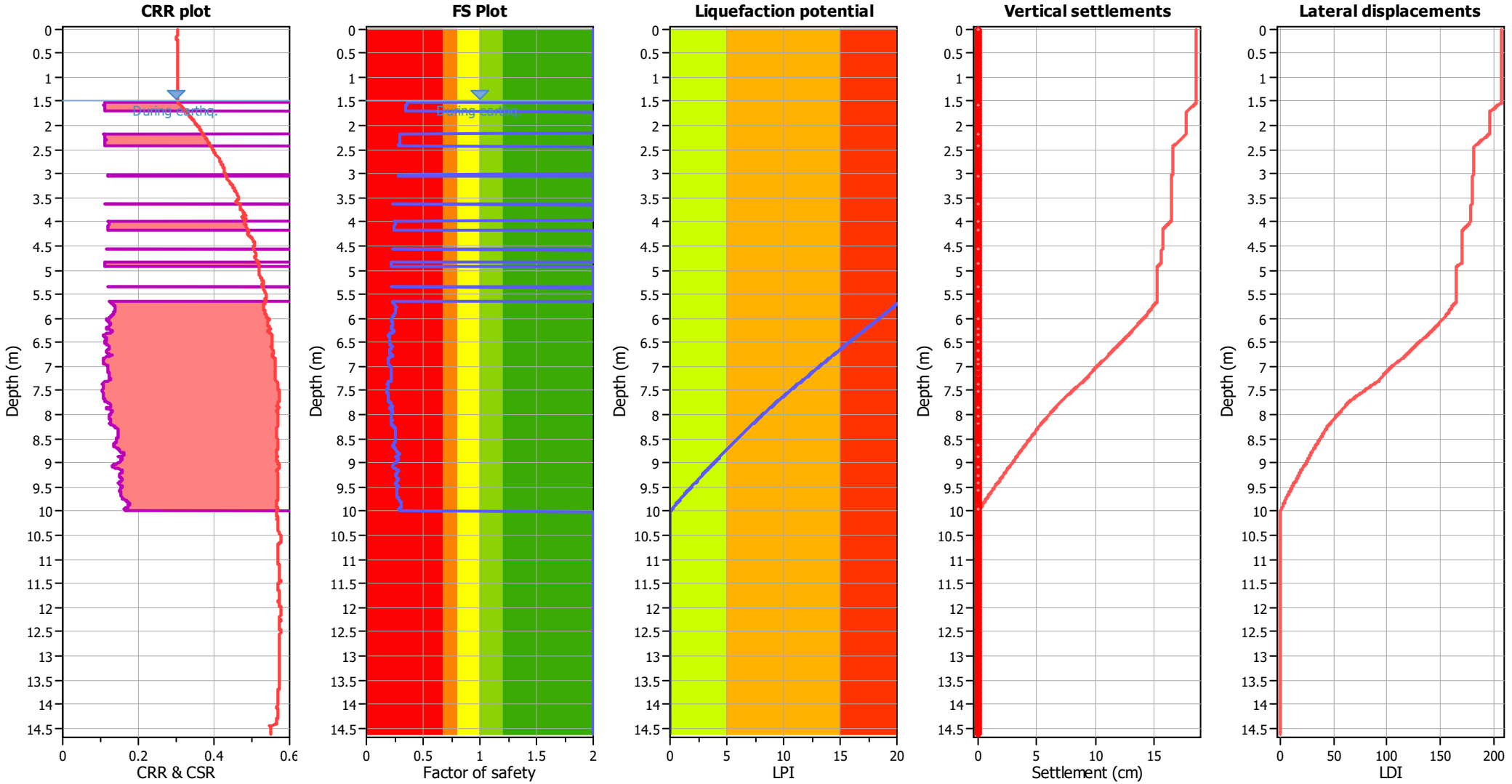
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

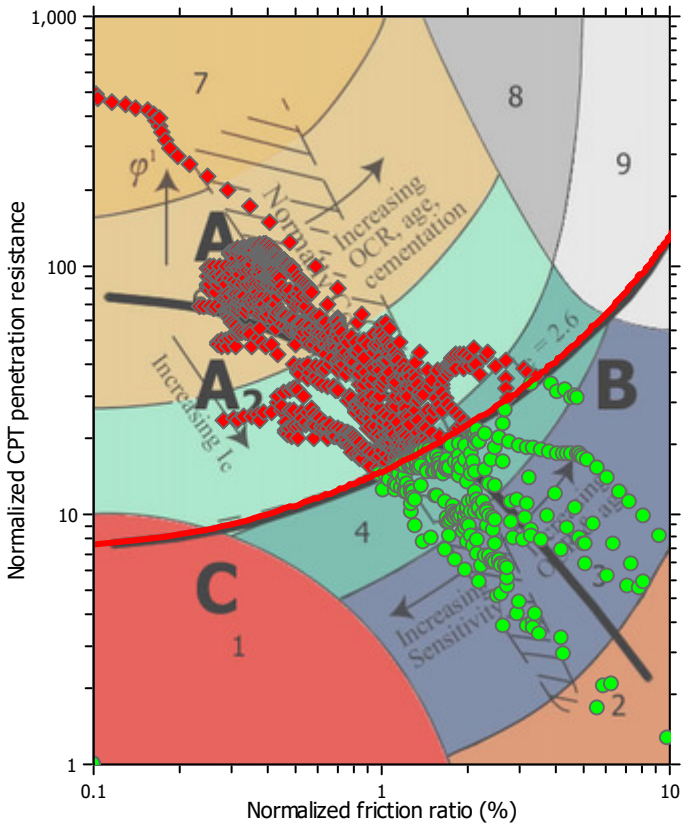
F.S. color scheme

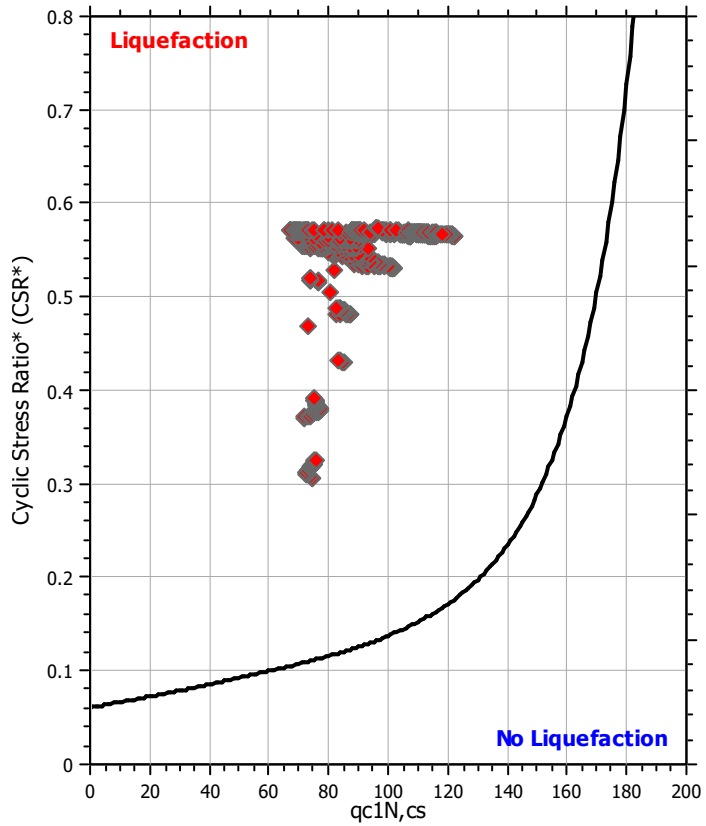
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

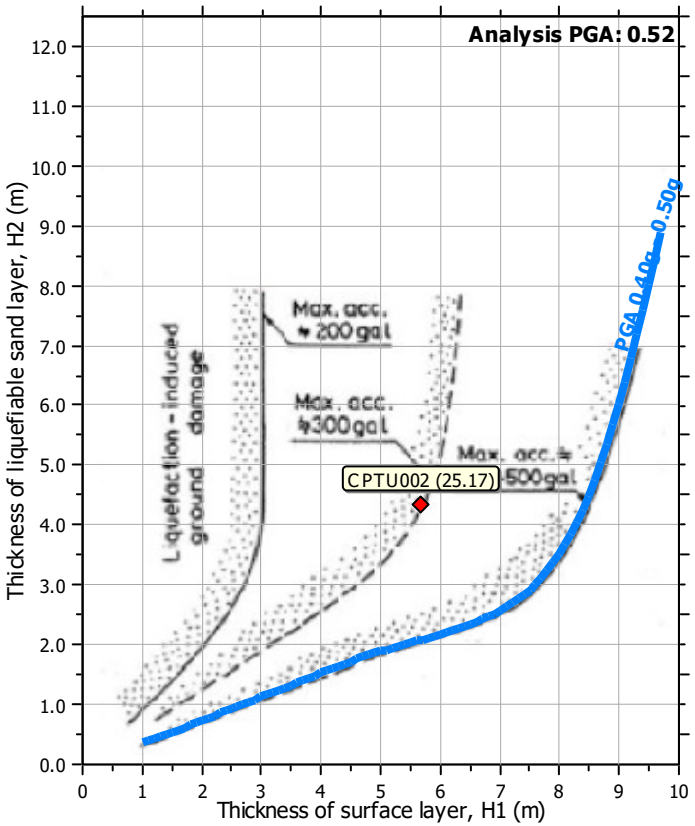
LPI color scheme

- Very high risk
- High risk
- Low risk

Liquefaction analysis summary plots



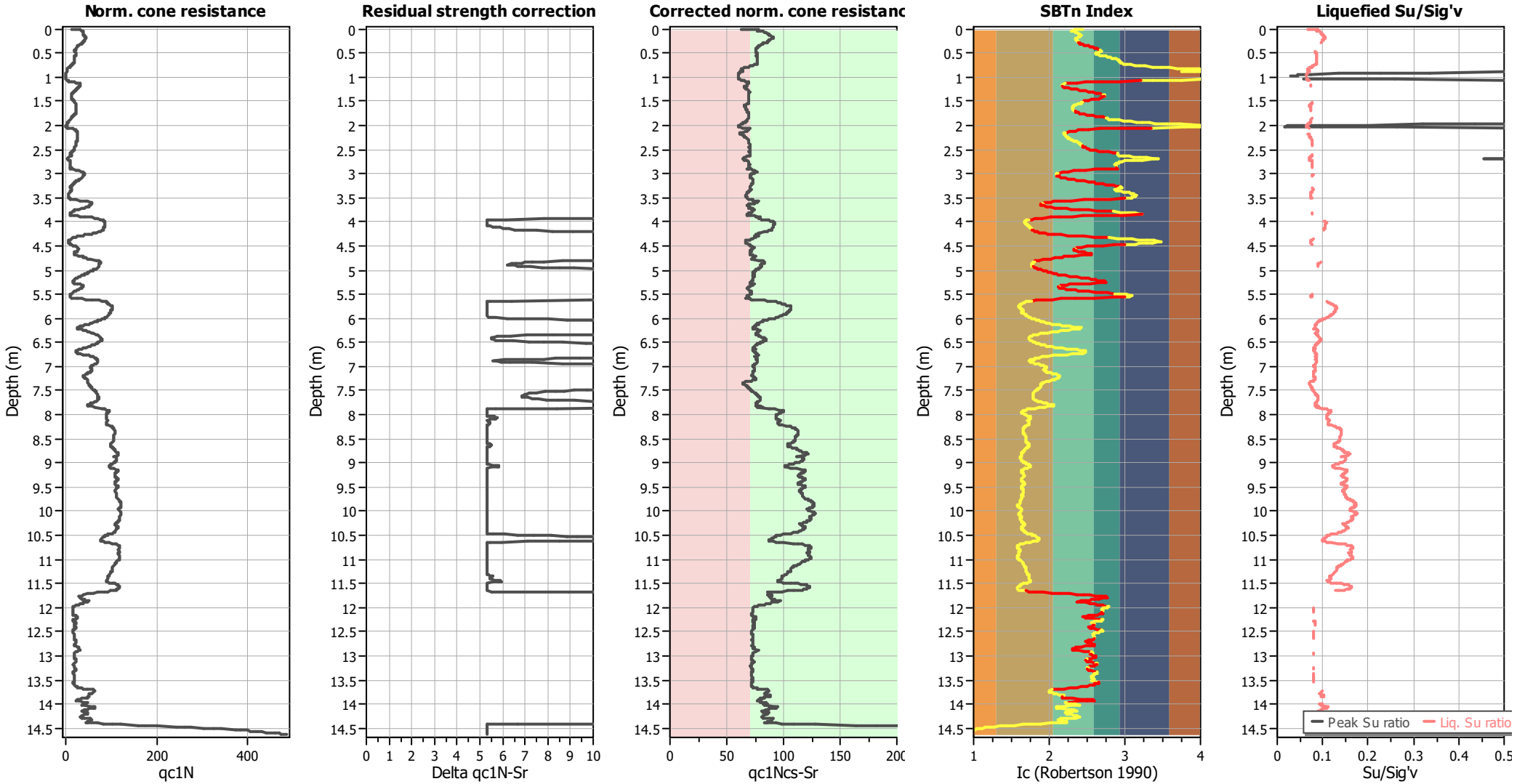




Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

Check for strength loss plots (Idriss & Boulanger (2008))



Input parameters and analysis data

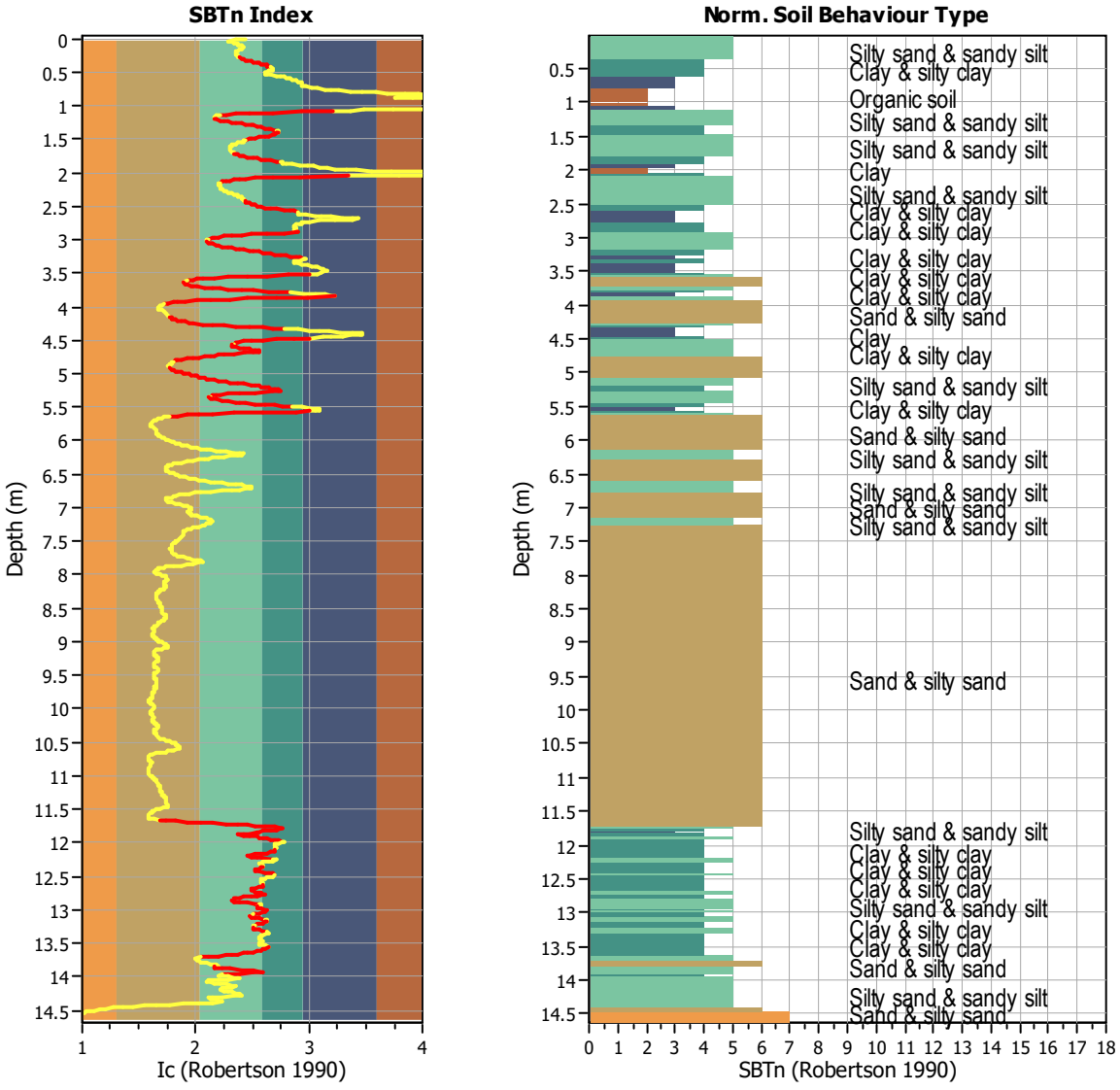
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.50 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.52	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.50 m	Fill height:	N/A	Limit depth:	10.00 m

TRANSITION LAYER DETECTION ALGORITHM REPORT
Summary Details & Plots

Short description

The software will delete data when the cone is in transition from either clay to sand or vise-versa. To do this the software requires a range of I_c values over which the transition will be defined (typically somewhere between $1.80 < I_c < 3.0$) and a rate of change of I_c. Transitions typically occur when the rate of change of I_c is fast (i.e. delta I_c is small).

The SBT_n plot below, displays in red the detected transition layers based on the parameters listed below the graphs.



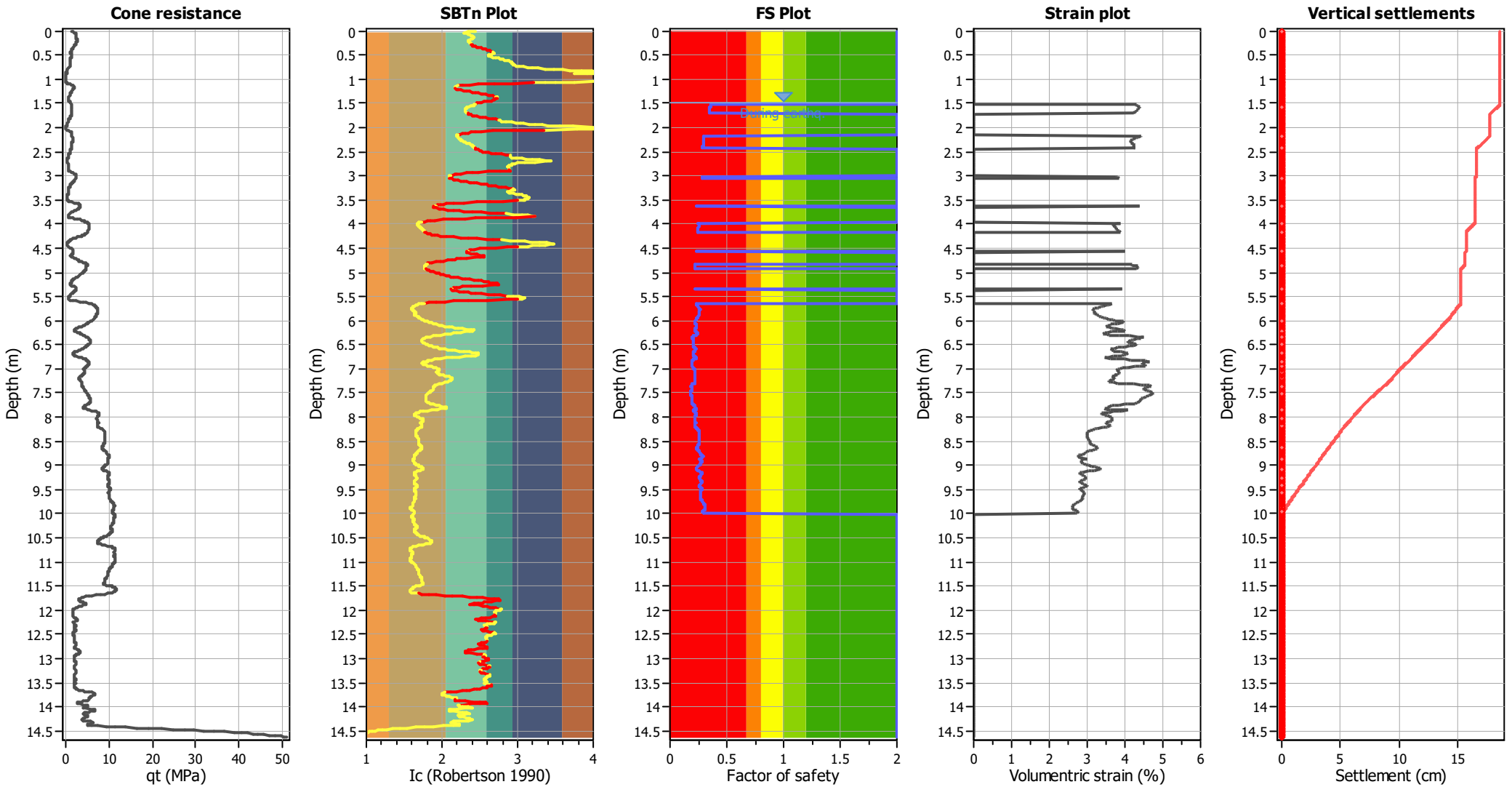
Transition layer algorithm properties

I_c minimum check value:	1.70
I_c maximum check value:	3.00
I_c change ratio value:	0.0100
Minimum number of points in layer:	4

General statistics

Total points in CPT file:	1463
Total points excluded:	444
Exclusion percentage:	30.35%
Number of layers detected:	39

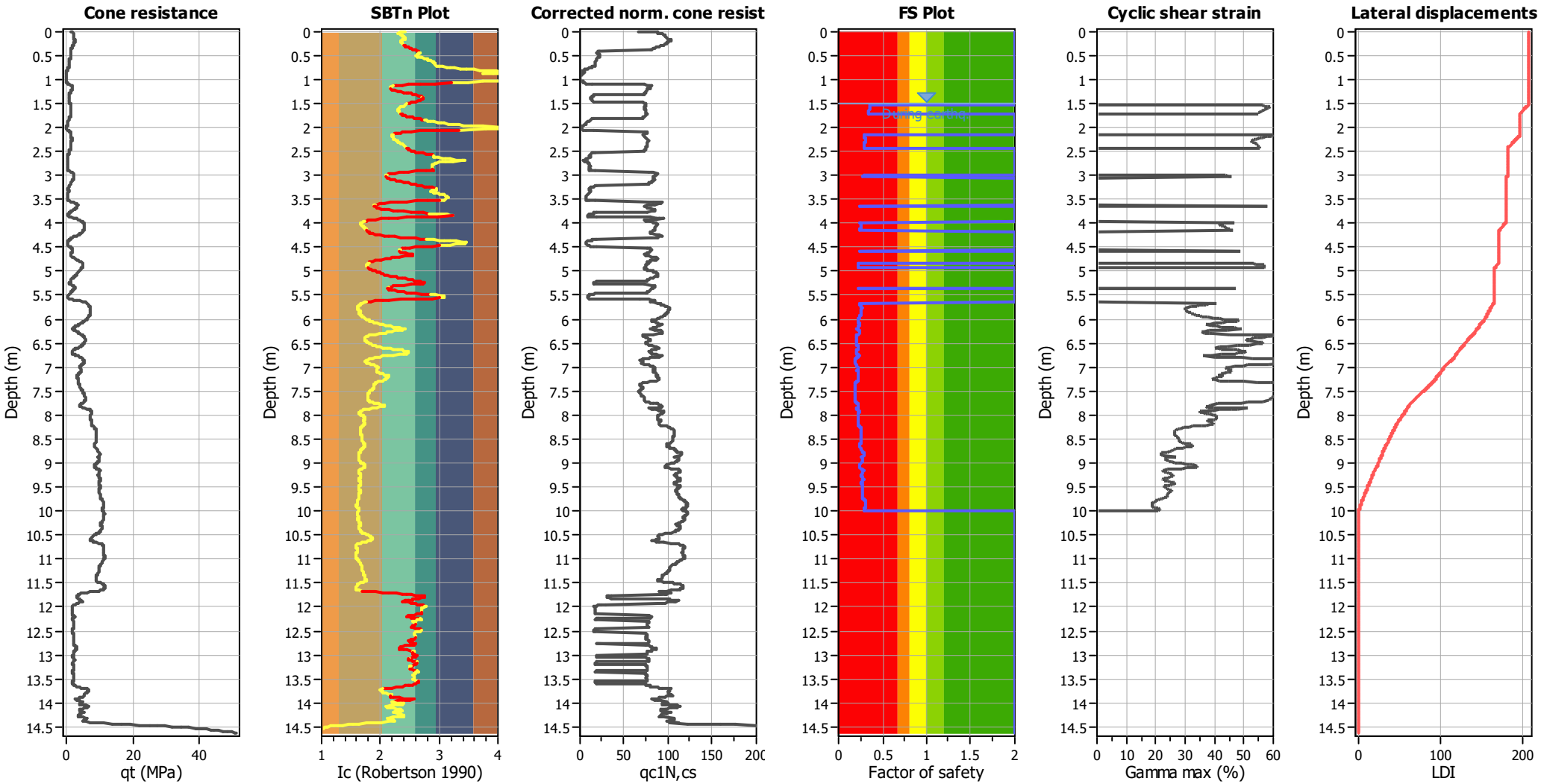
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

Estimation of post-earthquake lateral Displacements



Abbreviations

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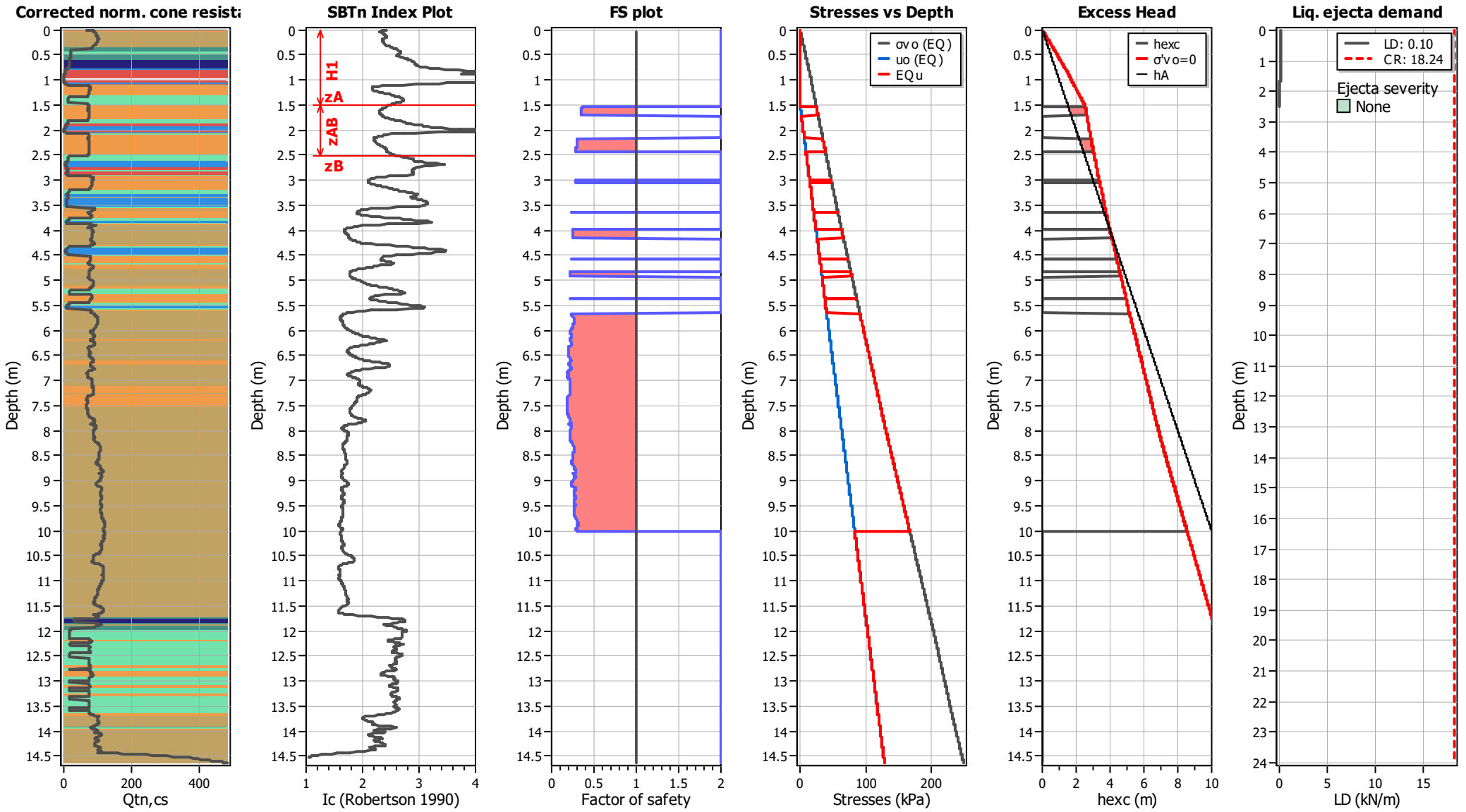
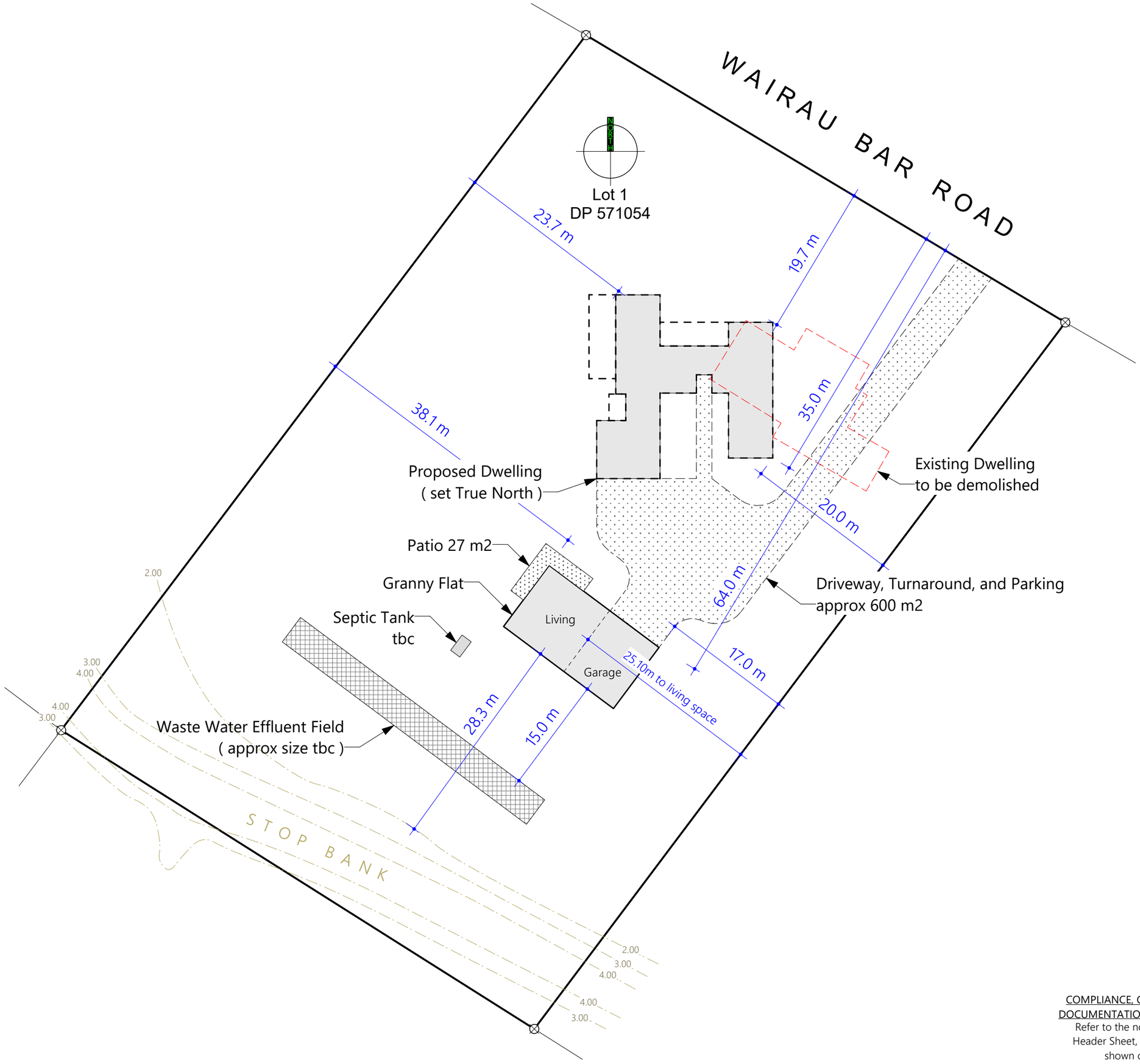
I_c: Soil Behaviour Type Index
$q_{c1N,cs}$: Equivalent clean sand normalized CPT total cone resistance
F.S.: Factor of safety
γ_{max}: Maximum cyclic shear strain
LDI: Lateral displacement index

Ejecta Severity Estimation





COMPLIANCE, CO-ORDINATION OF DOCUMENTATION & GENERAL NOTES

Refer to the notes on Sheet A01 - Header Sheet, in addition to those shown on this sheet.

design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT

Ryan and Charlene McDONALD RESIDENCE

PROJECT

Proposed Residence

ADDRESS

318 Wairau Bar Road
Spring Creek

Lot 1 DP 571054
0.8431 ha

DRAWING

Site Plan

SCALE

n/a

DATE

05.12.2024

JOB #

DESIGNER

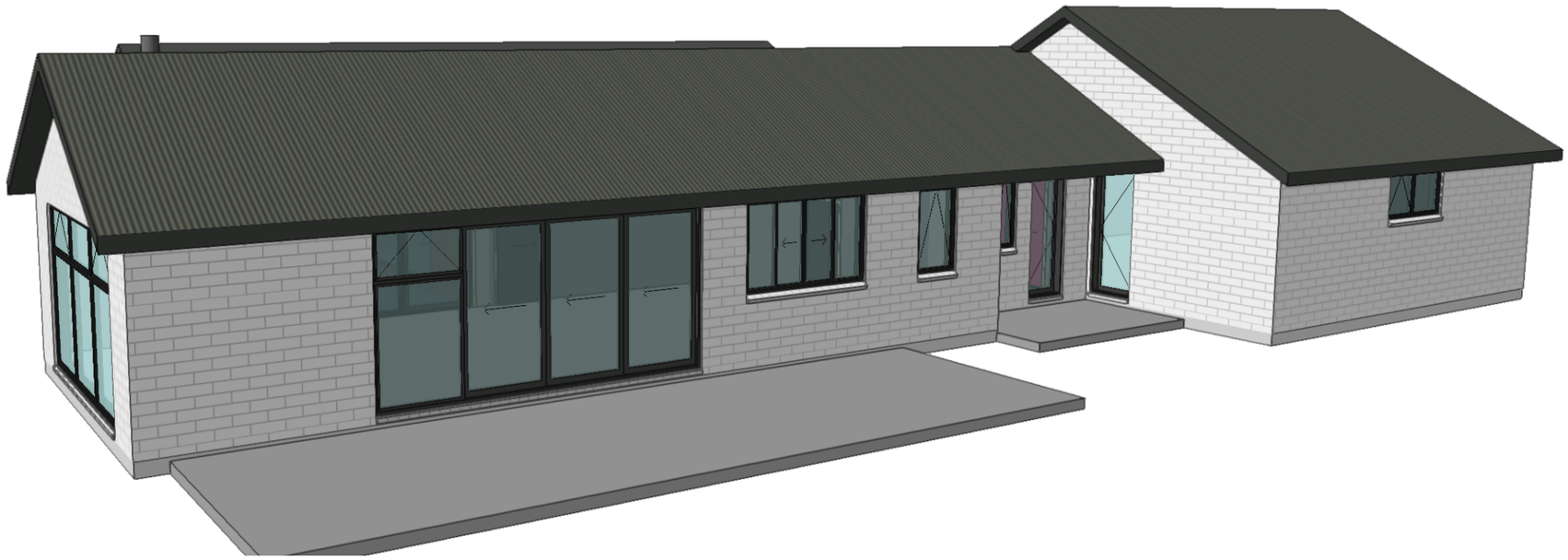
Simon Reeve

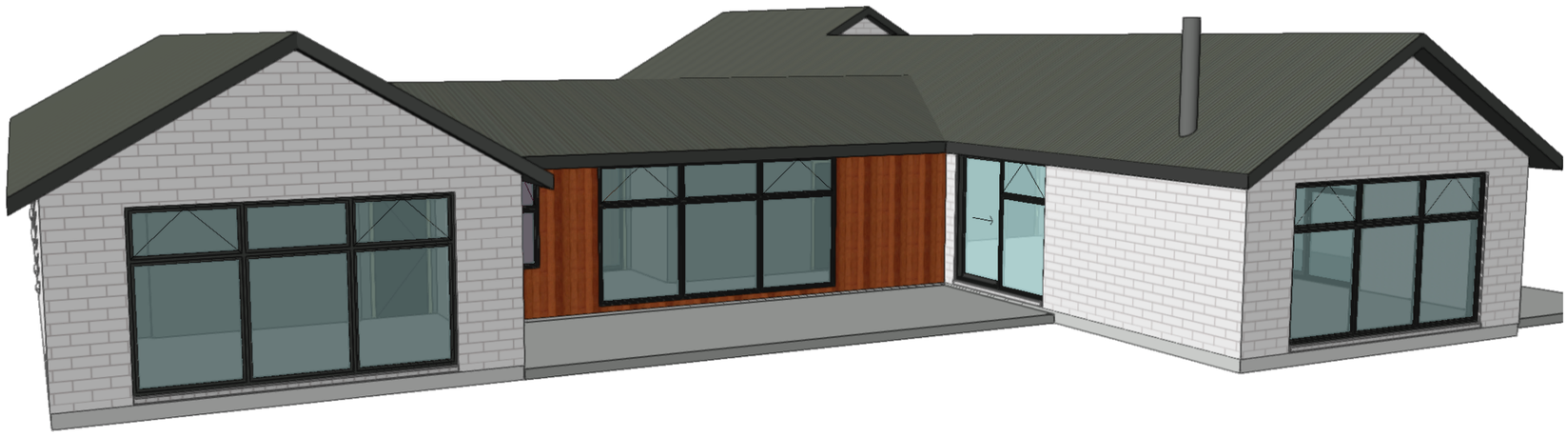
SHEET

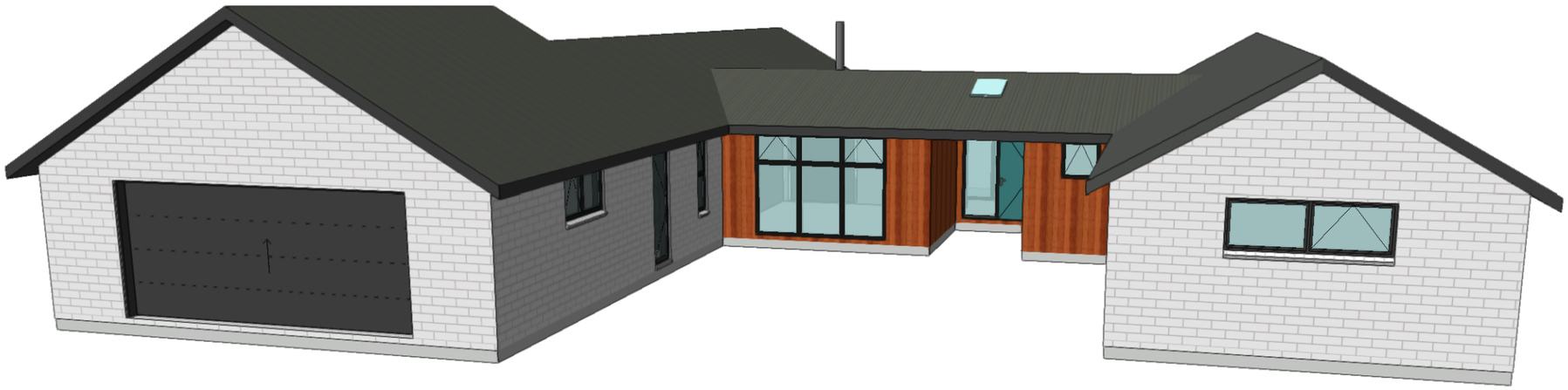
A02

REVISION

Floor Area (m2)	317
Residential Zone	Rural Env
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B







design.SR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Header

SCALE

n/a

DATE

03.08.2024

JOB #

DESIGNER

Simon Reeve

SHEET

A01

REVISION

PLOT DATE:

N
W E
S

The accompanying material has been released by Council from its information repositories.Council does not accept any responsibility for the initial and ongoing accuracy to the material. It is the responsibility of the recipient to make such checks as the recipient considers appropriate to ensure accuracy. Services layers are schematic only and actual positions and level should be confirmed from Councils's hard copy records.

Smart Map Print

1:1,000 25/12/2023

MARLBOROUGH DISTRICT COUNCIL SMART MAPS

design.SR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Site Plan

SCALE

1:1

DATE

03.08.2024

JOB #

DESIGNER

Simon Reeve

SHEET

A02

REVISION

PLOT DATE:

designSR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Floor Plan

SCALE

1:100

DATE

03.08.2024

JOB #

DESIGNER

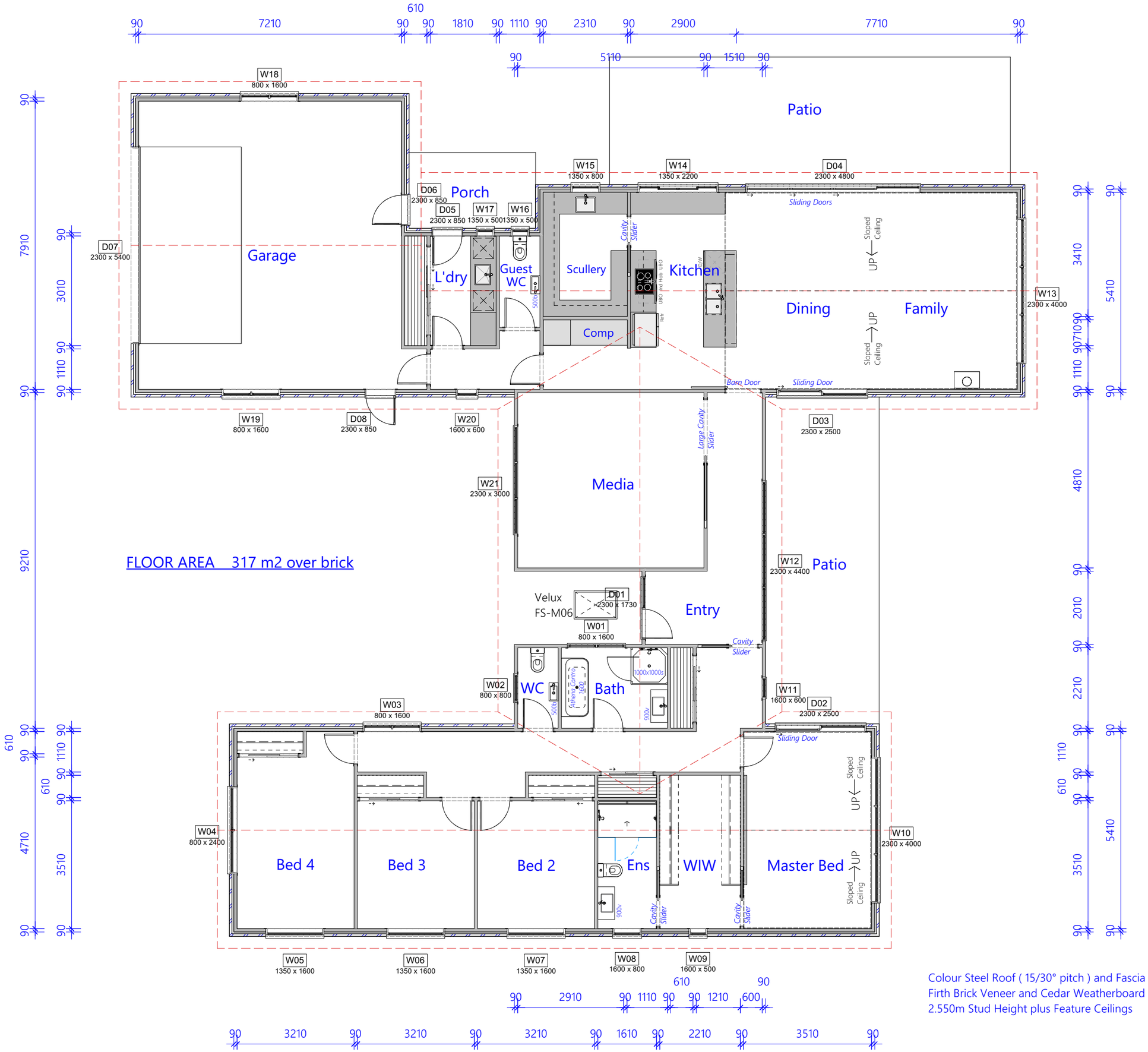
Simon Reeve

SHEET

A03

REVISION

PLOT DATE:



FLOOR AREA 317 m2 over brick

Colour Steel Roof (15/30° pitch) and Fascia Gutter
Firth Brick Veneer and Cedar Weatherboard
2.550m Stud Height plus Feature Ceilings

designSR
Designer - Simon Reeve
mob 027 2388 339
plantorque@xtra.co.nz

CLIENT
Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT
Proposed Dwelling

ADDRESS
Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING
Dimension Plan

SCALE
1:100

DATE
03.08.2024

JOB #

DESIGNER
Simon Reeve

SHEET
A04

REVISION

PLOT DATE:

NORTH Elevation

WEST Elevation

SOUTH Elevation

design.SR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Elevations 1

SCALE

1:100

DATE

03.08.2024

JOB #

DESIGNER

Simon Reeve

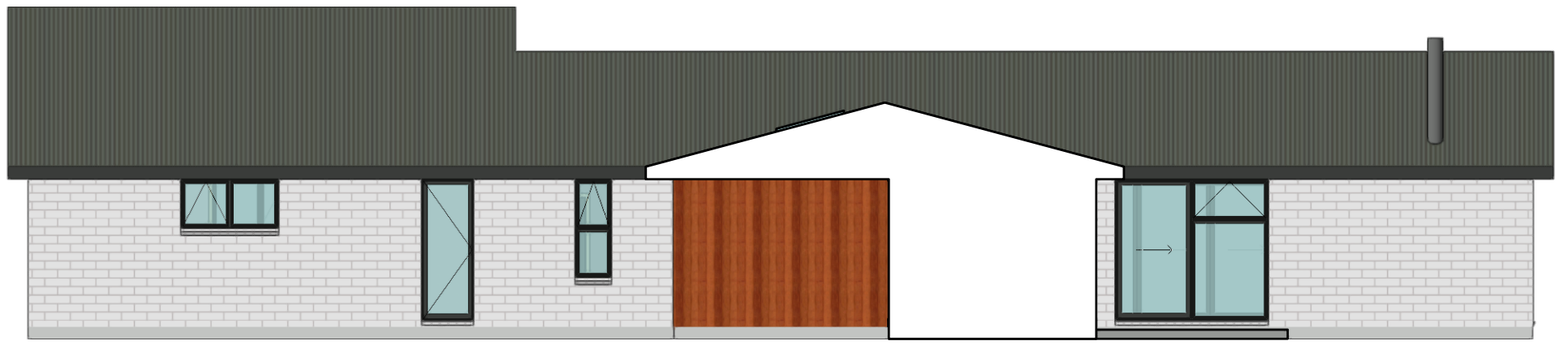
SHEET

A05

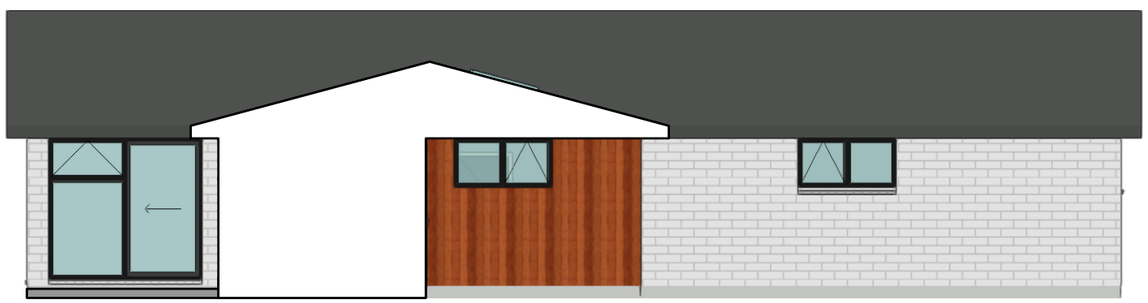
REVISION

PLOT DATE:

EAST Elevation



EAST Section Elevation



WEST Section Elevation

design.SR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Elevations 2

SCALE

1:100

DATE

03.08.2024

JOB #

DESIGNER

Simon Reeve

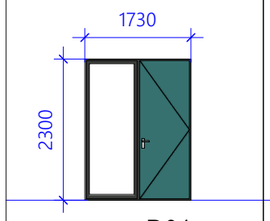
SHEET

A06

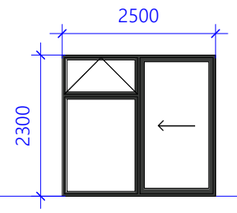
REVISION

PLOT DATE:

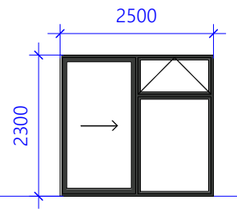
EXTERIOR DOOR and WINDOW SCHEDULE



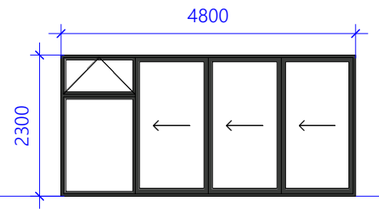
ID	D01
R/O Size	2316 x 1760
Glazed m2	1.55
Vented m2	1.82
FFL to Sill:	0



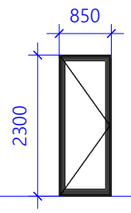
ID	D02
R/O Size	2316 x 2530
Glazed m2	4.41
Vented m2	3.36
FFL to Sill:	0



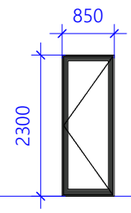
ID	D03
R/O Size	2316 x 2530
Glazed m2	4.41
Vented m2	3.36
FFL to Sill:	0



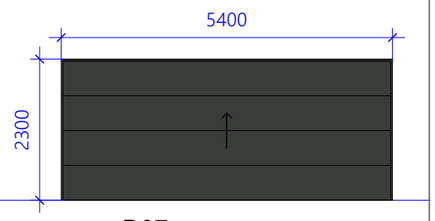
ID	D04
R/O Size	2316 x 4830
Glazed m2	8.65
Vented m2	8.58
FFL to Sill:	0



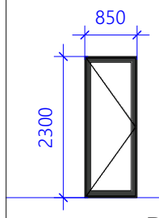
ID	D05
R/O Size	2316 x 880
Glazed m2	1.38
Vented m2	1.8
FFL to Sill:	0



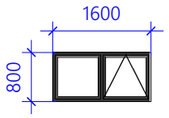
ID	D06
R/O Size	2316 x 880
Glazed m2	1.38
Vented m2	1.8
FFL to Sill:	0



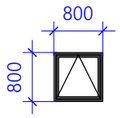
ID	D07
R/O Size	2316 x 5430
Glazed m2	0
Vented m2	12.12
FFL to Sill:	0



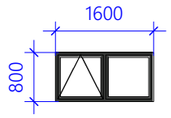
ID	D08
R/O Size	2316 x 880
Glazed m2	1.38
Vented m2	1.8
FFL to Sill:	0



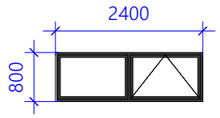
ID	W01
R/O Size	816 x 1630
Glazed m2	0.84
Vented m2	0.53
FFL to Sill:	1500



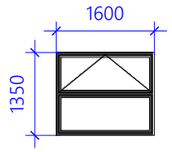
ID	W02
R/O Size	830 x 830
Glazed m2	0.41
Vented m2	0.52
FFL to Sill:	1500



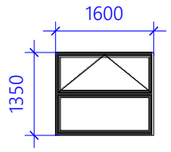
ID	W03
R/O Size	830 x 1630
Glazed m2	0.84
Vented m2	0.53
FFL to Sill:	1500



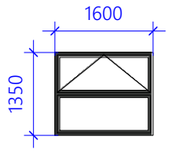
ID	W04
R/O Size	830 x 2430
Glazed m2	1.36
Vented m2	0.82
FFL to Sill:	1500



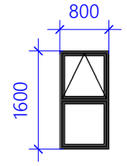
ID	W05
R/O Size	1380 x 1630
Glazed m2	1.54
Vented m2	0.93
FFL to Sill:	950



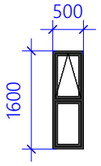
ID	W06
R/O Size	1380 x 1630
Glazed m2	1.54
Vented m2	0.93
FFL to Sill:	950



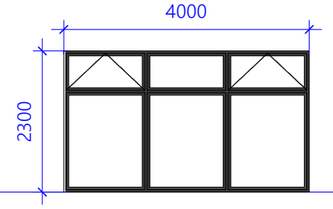
ID	W07
R/O Size	1380 x 1630
Glazed m2	1.54
Vented m2	0.93
FFL to Sill:	950



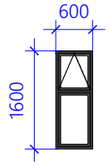
ID	W08
R/O Size	1630 x 830
Glazed m2	0.84
Vented m2	0.53
FFL to Sill:	700



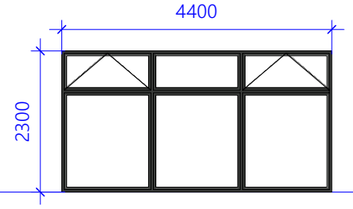
ID	W09
R/O Size	1630 x 530
Glazed m2	0.45
Vented m2	0.31
FFL to Sill:	700



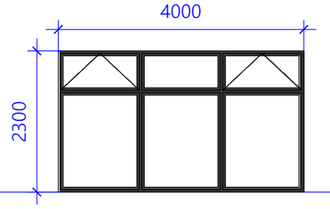
ID	W10
R/O Size	2316 x 4030
Glazed m2	7.27
Vented m2	1.54
FFL to Sill:	0



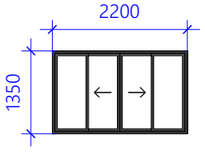
ID	W11
R/O Size	1630 x 630
Glazed m2	0.58
Vented m2	0.31
FFL to Sill:	700



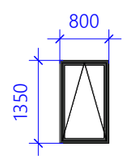
ID	W12
R/O Size	2316 x 4430
Glazed m2	8.08
Vented m2	1.7
FFL to Sill:	0



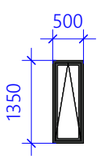
ID	W13
R/O Size	2316 x 4030
Glazed m2	7.27
Vented m2	1.54
FFL to Sill:	0



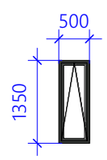
ID	W14
R/O Size	1380 x 2230
Glazed m2	2.24
Vented m2	1.3
FFL to Sill:	950



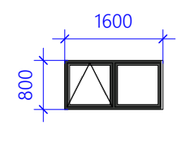
ID	W15
R/O Size	1380 x 830
Glazed m2	0.76
Vented m2	0.91
FFL to Sill:	950



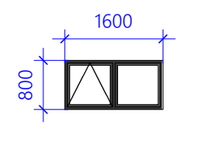
ID	W16
R/O Size	1380 x 530
Glazed m2	0.4
Vented m2	0.53
FFL to Sill:	950



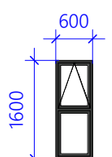
ID	W17
R/O Size	1380 x 530
Glazed m2	0.4
Vented m2	0.53
FFL to Sill:	950



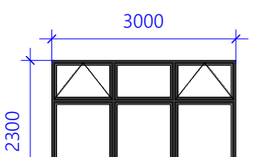
ID	W18
R/O Size	830 x 1630
Glazed m2	0.84
Vented m2	0.53
FFL to Sill:	1500



ID	W19
R/O Size	830 x 1630
Glazed m2	0.84
Vented m2	0.53
FFL to Sill:	1500



ID	W20
R/O Size	1630 x 630
Glazed m2	0.58
Vented m2	0.38
FFL to Sill:	700



ID	W21
R/O Size	2316 x 3030
Glazed m2	5.25
Vented m2	1.14
FFL to Sill:	0

design.SR

Designer - Simon Reeve

mob 027 2388 339

plantorque@xtra.co.nz

CLIENT

Ryan and Charlene McDONALD RESIDENCE CONCEPT

PROJECT

Proposed Dwelling

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Window Schedule

SCALE

1:100

DATE

03.08.2024

JOB #

DESIGNER

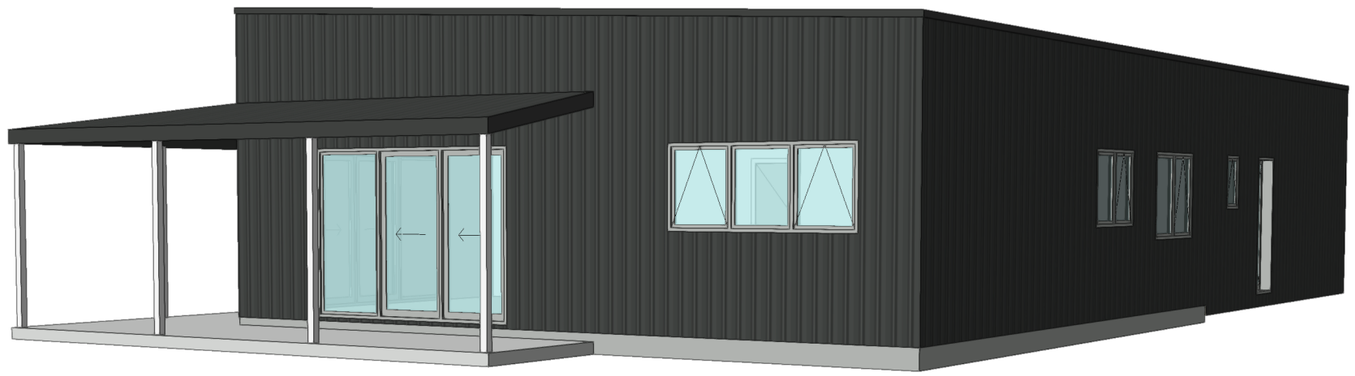
Simon Reeve

SHEET

A09

REVISION

PLOT DATE:



design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT

McDONALD - CONCEPT

PROJECT

Proposed Shed and Flat

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Header

SCALE

1:1

DATE

11.05.2024

JOB #

DESIGNER

Simon Reeve

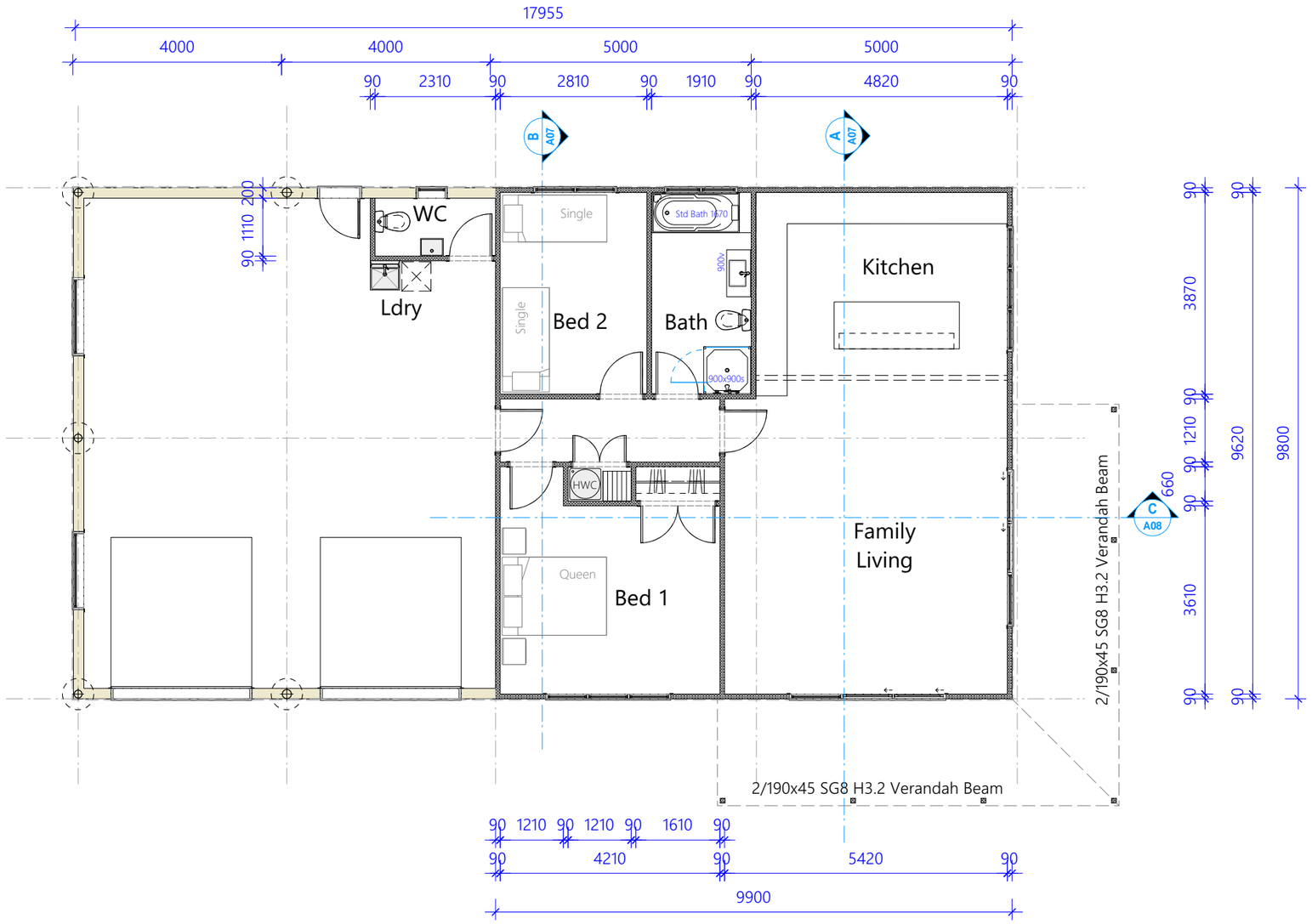
SHEET

A01

REVISION

Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:



design.SR

Designer - Simon Reeve

mob 027 2388 339
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Licensed Building Practitioner
Design 2 BP120616

CLIENT
McDONALD - CONCEPT

PROJECT
Proposed Shed and Flat

ADDRESS
Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING
Dimension Plan

SCALE
1:100

DATE
11.05.2024

JOB #

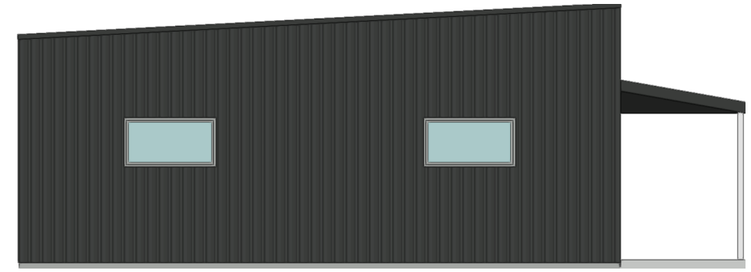
DESIGNER
Simon Reeve

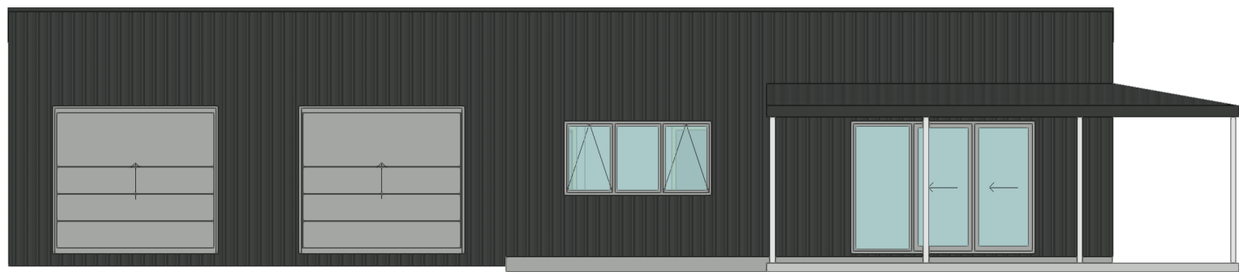
SHEET
A04

REVISION

Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:





design.SR

Designer - Simon Reeve

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Licensed Building Practitioner
Design 2 BP120616

CLIENT

McDONALD - CONCEPT

PROJECT

Proposed Shed and Flat

ADDRESS

Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING

Elevations

SCALE

1:100

DATE

11.05.2024

JOB #

DESIGNER

Simon Reeve

SHEET

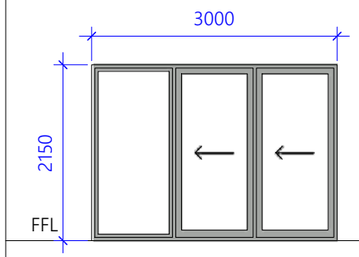
A05

REVISION

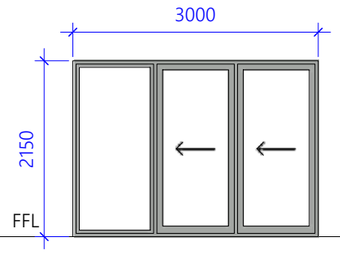
Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:

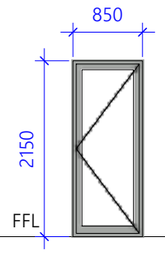
EXTERIOR DOOR and WINDOW SCHEDULE



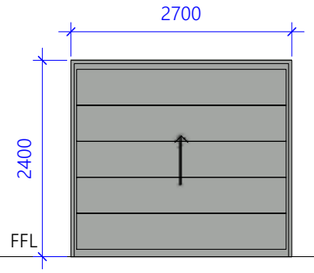
ID	D01
R/O Size	2166 x 3030
Glazed m2	4.81
Vented m2	3.92
FFL to Sill:	0



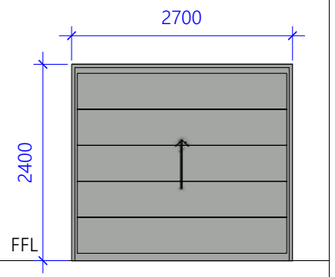
ID	D02
R/O Size	2166 x 3030
Glazed m2	4.81
Vented m2	3.92
FFL to Sill:	0



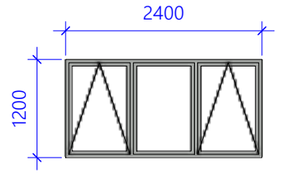
ID	D03
R/O Size	2166 x 880
Glazed m2	1.2
Vented m2	1.59
FFL to Sill:	0



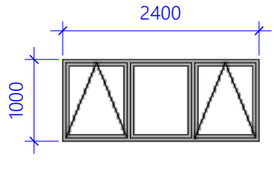
ID	D04
R/O Size	2416 x 2730
Glazed m2	0
Vented m2	6.18
FFL to Sill:	0



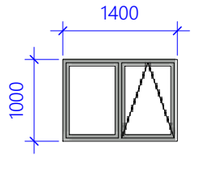
ID	D05
R/O Size	2416 x 2730
Glazed m2	0
Vented m2	6.18
FFL to Sill:	0



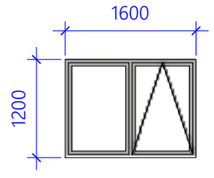
ID	W01
R/O Size	1230 x 2430
Glazed m2	2.08
Vented m2	1.67
FFL to Sill:	950



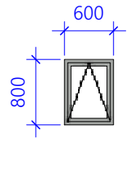
ID	W02
R/O Size	1030 x 2430
Glazed m2	1.68
Vented m2	1.37
FFL to Sill:	1150



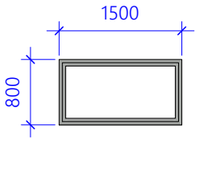
ID	W03
R/O Size	1030 x 1430
Glazed m2	0.94
Vented m2	0.59
FFL to Sill:	1150



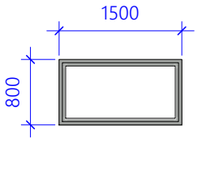
ID	W04
R/O Size	1230 x 1630
Glazed m2	1.37
Vented m2	0.83
FFL to Sill:	950



ID	W05
R/O Size	830 x 630
Glazed m2	0.28
Vented m2	0.37
FFL to Sill:	1350



ID	W06
R/O Size	830 x 1530
Glazed m2	0.86
Vented m2	0
FFL to Sill:	1350



ID	W07
R/O Size	830 x 1530
Glazed m2	0.86
Vented m2	0
FFL to Sill:	1350

design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT
McDONALD - CONCEPT

PROJECT
Proposed Shed and Flat

ADDRESS
Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING
Window Schedule

SCALE
1:75

DATE
11.05.2024

JOB #

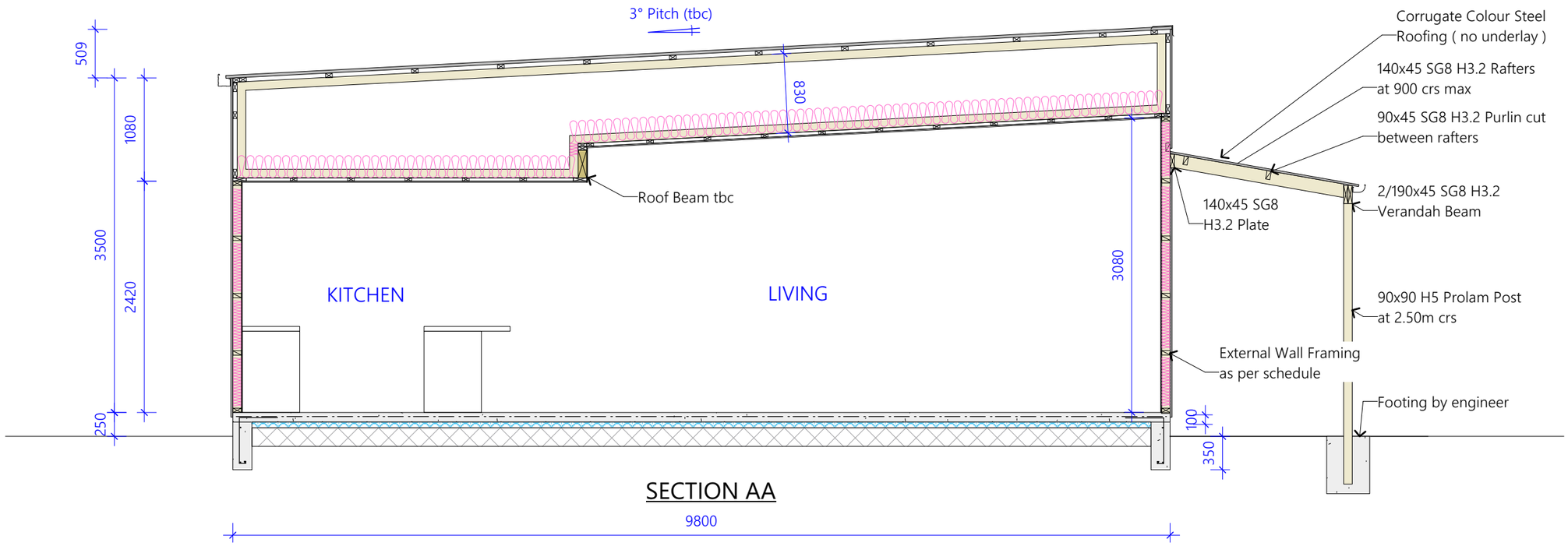
DESIGNER
Simon Reeve

SHEET
A06

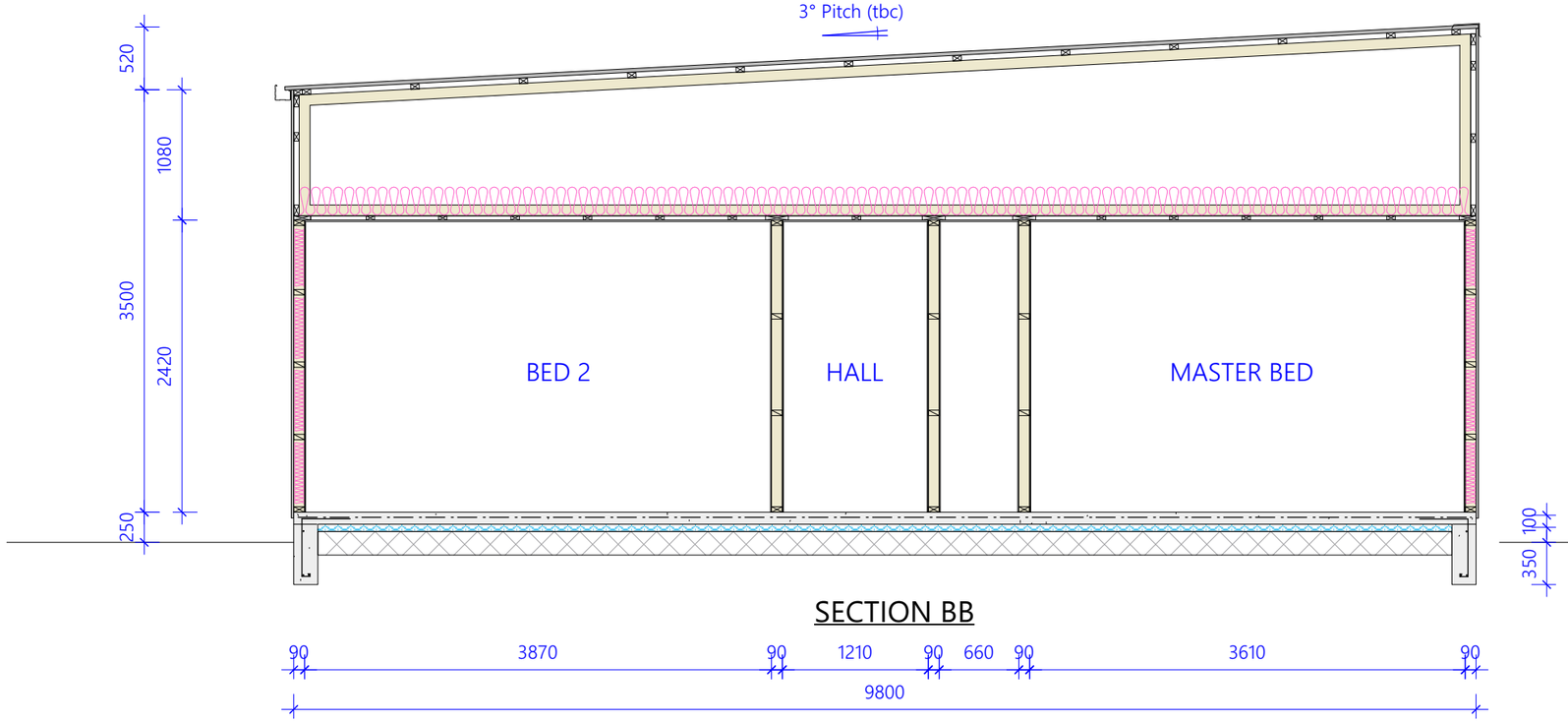
REVISION

Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:



SECTION AA



SECTION BB

EXTERIOR STUDS and STUD CENTRES

up to 2.40m	1/90x45 SG8 at 600 crs
2.41 - 2.70m	1/90x45 SG8 at 400 crs or 2/90x45 SG8 at 600 crs
2.71 - 3.00m	2/90x45 SG8 at 600 crs
3.01 - 3.60m	2/90x45 SG8 at 300 crs or 2/90x45 SG10 at 400 crs

design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT
McDONALD - CONCEPT

PROJECT
Proposed Shed and Flat

ADDRESS
Wairau Bar Road
Spring Creek

Lot x DP xxxxxx

DRAWING
Cross Section Framed

SCALE
1:1

DATE
11.05.2024

JOB #

DESIGNER
Simon Reeve

SHEET
A07

REVISION

Floor Area (m2)	x
Residential Zone	Rural 3/4
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

PLOT DATE:

Written Approval of Person(s) Likely to be Adversely Affected

MARLBOROUGH DISTRICT COUNCIL
ISO 9001
Document Number:
RAF0001-CI2273

Section 95E(3), Resource Management Act 1991
Form 8A Resource Management (Forms, Fees and Procedure) Regulations 2003

PLEASE READ THE ATTACHED IMPORTANT INFORMATION BEFORE YOU COMPLETE AND SIGN THIS FORM OR RETURN IT TO COUNCIL VIA THE ELECTRONIC EMAIL ADDRESS YOU HAVE NOMINATED ABOVE FOR SERVICE

Resource Consent Application Number

U ☐☐☐☐☐☐

This is written approval for the following activity that is the subject of a resource consent application

Resource Consent Application Details *[To be completed by the applicant(s)]*

Applicant's Name: *[Full Legal Name]*	RW Mac Holdings Limited
Description of activity(s) applied for:	To construct a new four bedroom dwelling within 25m of the eastern side boundary
Site location details: *[Street Address]*	318 Wairau Bar Road
[Legal Description]	Lot 1 DP 571054

Affected Persons Details *[To be completed by person(s) or organisation giving approval]*

Full Name(s) of Person or Organisation:	BRIGHAM MACDONALD LYNLEY MARIE MACDONALD			
	Owner(s) ✓	Occupier(s) *[tick which applies]*		Other Affected Person(s)
	[Both the owner, occupier or other affecter person must provide written approval. A separate form may be used.]			
Property details of affected persons: *[Street Address and Legal Description, e.g. Lot and DP number, Record of Title number, etc]*	336 WAIRAU BAR ROAD, BLENHEIM			
Contact details:	Electronic address for service:	macdonaldpartnership@gmail.com		
Postal address:	336 WAIRAU BAR ROAD, R.D.3, BLENHEIM 7273			
	Phone: *[Daytime]* —		Phone: *[Mobile]*	0212840083

If you are an owner of the property please list the full names and contact details of ALL other registered owners

OR

If you are an occupier of the property please list the full names and contact details of ALL other occupiers aged over 18 years who live at the property

Affected Person's Written Approval and Declaration

I confirm:

1. I have been given, read and understood the full application for resource consent, which includes an assessment of effects on the environment, site plans and the following documents:

Document Name	Date of Document	Number of Pages of Document	Version of Document (if amended) / Reference Number
Application	6/12/24	25	
Site Plan	5/12/24	1	
House Plans	3/8/24	7	
Shed Plans	11/5/24	5	
Engineering Report	10/24	128	

**Copy of first page of each document attached to this approval form.*

2. I have read and understood the Notes to Affected Person attached to this form.
3. I do not oppose the proposed application (as detailed in the application form referred to above) and give written approval in terms of the provisions of the Resource Management Act 1991.
4. In signing this written approval or returning it by way of my nominated electronic email address for service, I understand that the consent authority **must** decide that I am no longer an affected person, and the consent authority **must not** have regard to any adverse effects on me (section 104(3)(a)(ii) and 104(4) of the Resource Management Act 1991).
5. I understand that I may withdraw my written approval by giving written notice to the consent authority before the hearing, if there is one, or, if there is not, before the application is determined.
6. Where I have signed this written approval I authorise the applicant to give this written approval to the Marlborough District Council; and
7. I have read and understand the information contained in which is detailed below, 'Important Notes for Affected Persons'.

☐

Signed: _____ Name and Organisation Name: BRIGHAM MACDONALD

or

Person authorised to sign on behalf of owners/occupiers of the property: _____

Full name of authorised person: _____

Date: 7/12/2024

A signature is not required if you give your written approval by electronic means

- **All parties with an interest in the affected property must sign or be signed for "on behalf of"**
- **If you are completing this form on behalf of a trust or company please provide additional evidence that you have signing authority.**

Important Information to Applicants:

It is very important that a full and accurate description of the activity is stated. If this description does not cover all aspects of the proposal, the Council may require you to amend this form and reobtain all the approvals.

Further if you amend your proposal during the course of processing you will be required to seek further written approval from the affected person. This will be done by way of a further copy of this form with the amended documents clearly identified in the relevant table on page 2 of this form.

Please ensure that a copy of all documents referred to in the table is provided to the affected person.

Please also ensure that a photocopy of the first page of each document referred to in the table is attached to this form so that they may be easily identified.

The affected person is not required to initial or sign the copies provided to them or the photocopies of the first pages attached. They are required to sign this form however or provide it electronically from their nominated email address for service as evidence they have read and understood those documents and further unconditionally do not oppose your proposal.

Please seek advice from a Council Environmental Planner if you are unsure whether this part of the form has been filled in correctly.

You should only sign this form if you support or have no opposition to the granting of the resource consent for the application referred to above.

If you do not understand any part of this process, please contact an Environmental Planner at the Marlborough District Council as signing this form will prevent Council from having regard to any effects of the activity on you or your property.

Both the owner and occupier must provide written approval. A separate form may be used.

Owner includes all trustees of any trust owning a property and all members of any body corporate authorised to manage a property. It will include all members of any partnership or syndicate owning the property. It will also include any person(s) or entity that has entered into an agreement to purchase or lease the property. When signing you must also provide evidence to confirm you have authority to sign on this entity's behalf.

Important Information to Affected Persons

The applicant has sought your written approval as they wish to undertake an activity for which they must have resource consent and they believe you are an affected person. If granted, a resource consent will set limitations as to the scope of the activity and conditions to manage any adverse effects that arise from the activity. Where a proposed activity affects another person they may be deemed a special legal status (affected person) under the Resource Management Act 1991.

An affected person may participate in the resource consent application process by lodging a submission with Council. This action provides them a new legal status (submitter) which enables them to be heard at any hearing and to make their concerns and views known to Council.

In either case, as an affected person or as a submitter, Council must consider the adverse effects upon that person when determining whether to grant the consent and what conditions should be used to monitor and manage the adverse effects.

It is important to note that although the applicant may consider you an affected person, the power to determine who is an affected person lies with the Environmental Planner processing your application. They must determine whether you are or are not an affected person in accordance with the terms and process set out within the Resource Management Act 1991.

An applicant will often seek the written approval of a person to confirm that they understand the activity proposed in the resource consent application and that they do not oppose it. If the affected person provides this approval Council cannot consider any adverse effect upon them when determining whether to grant the consent and what conditions to include. The affected person will also not be involved in the application process from that point and has no right to be heard.

There are two exceptions to the ceasing of any further involvement once a written approval has been provided to Council by an affected person:

(a) The affected person withdraws their written approval prior to the hearing or determination of the application in which case any adverse effect upon them must be considered by Council when determining the application; or

(b) If the applicant amends the application the affected person will be notified of the application, provided a copy of both the original documents and with the amended versions replaced. They will be invited to give written approval again. Effectively it is as if the process starts afresh with their prior written approval no longer being valid.

Upon receiving a request to sign a written approval Council recommends you:

(a) Read all of the documents provided and ensure they are listed and described correctly on the written approval form.

(b) Discuss with the applicant or their agent any concerns or questions you have. You may also call Council to discuss with the Environmental Planner your concerns or questions.

(c) If you are satisfied that either the proposal will not result in adverse effects for you or your property, or you find those adverse effects acceptable, you may choose to sign the written approval or return it electronically from the email address nominated as your email service address.

(d) If you choose not to sign the form or return it to Council electronically you should inform the applicant or their agent that you do not intend to do so.

It is important to note that any written approval provided cannot be conditional, that is, you cannot include restrictions, limitations, variations or requests for some action etc in return.

If the consent authority determines that the activity is a deemed permitted boundary activity under section 87BA of the Resource Management Act 1991, your written approval cannot be withdrawn if this process is followed instead.

Lastly, there is no requirement to provide your written approval or give an explanation to anyone, including the applicant or Council, as to why you choose not to.

View Instrument Details

Instrument No	12528631.2
Status	Registered
Date & Time Lodged	22 November 2022 11:39
Lodged By	Healey, Karen Mary Ellen
Instrument Type	Consent Notice under s221(4)(a) Resource Management Act 1991

Affected Records of Title	Land District
1033330	Marlborough
1033331	Marlborough

Annexure Schedule Contains 1 Pages.

Signature

Signed by Stephanie Anne Ginders as Territorial Authority Representative on 15/11/2022 03:03 PM

***** End of Report *****

ISO 9001:2008
Document Number:
RAD0111-CI2075

MARLBOROUGH DISTRICT COUNCIL

CONSENT NOTICE

Pursuant to Section 221
Resource Management Act 1991

IN THE MATTER OF	Records of Title 1033330 & 1033331 (Marlborough Registry)
AND	
IN THE MATTER	of Subdivision Consent U210653

Pursuant to Section 220(1) of the Resource Management Act 1991 the Marlborough District Council imposed the following condition on the Subdivision Consent for the subdivision of those parcels of land comprised in Records of Title MB53/77 and MB50/261 (Marlborough Registry).

The following condition is to apply to **Lots 1 and 2 Deposited Plan 571054:**

1. The owners, potential purchasers and/or occupiers of Lots 1 and 2 should be aware that the location is within a Rural Environment Zone and may experience a lower level of amenity that what could be experienced in other zones from reverse sensitivity conflicts associated with rural activities. The effect of these farming activities may include, but not limited to, loud noise and vibration at any time of the day and night, from farm machinery, bird scarers, livestock, dust, spray, and odours.

Dated at Blenheim this 28th day of July 2022

.....
AUTHORISED OFFICER
For Marlborough District Council

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD

Guaranteed Search Copy issued under Section 60 of the Land Transfer Act 2017

R.W. Muir
Registrar-General
of Land

Identifier	**1033330**
Land Registration District	**Marlborough**
Date Issued	22 November 2022

Prior References
MB50/261

Estate	Fee Simple
Area	8431 square metres more or less
Legal Description	Lot 1 Deposited Plan 571054
Registered Owners	

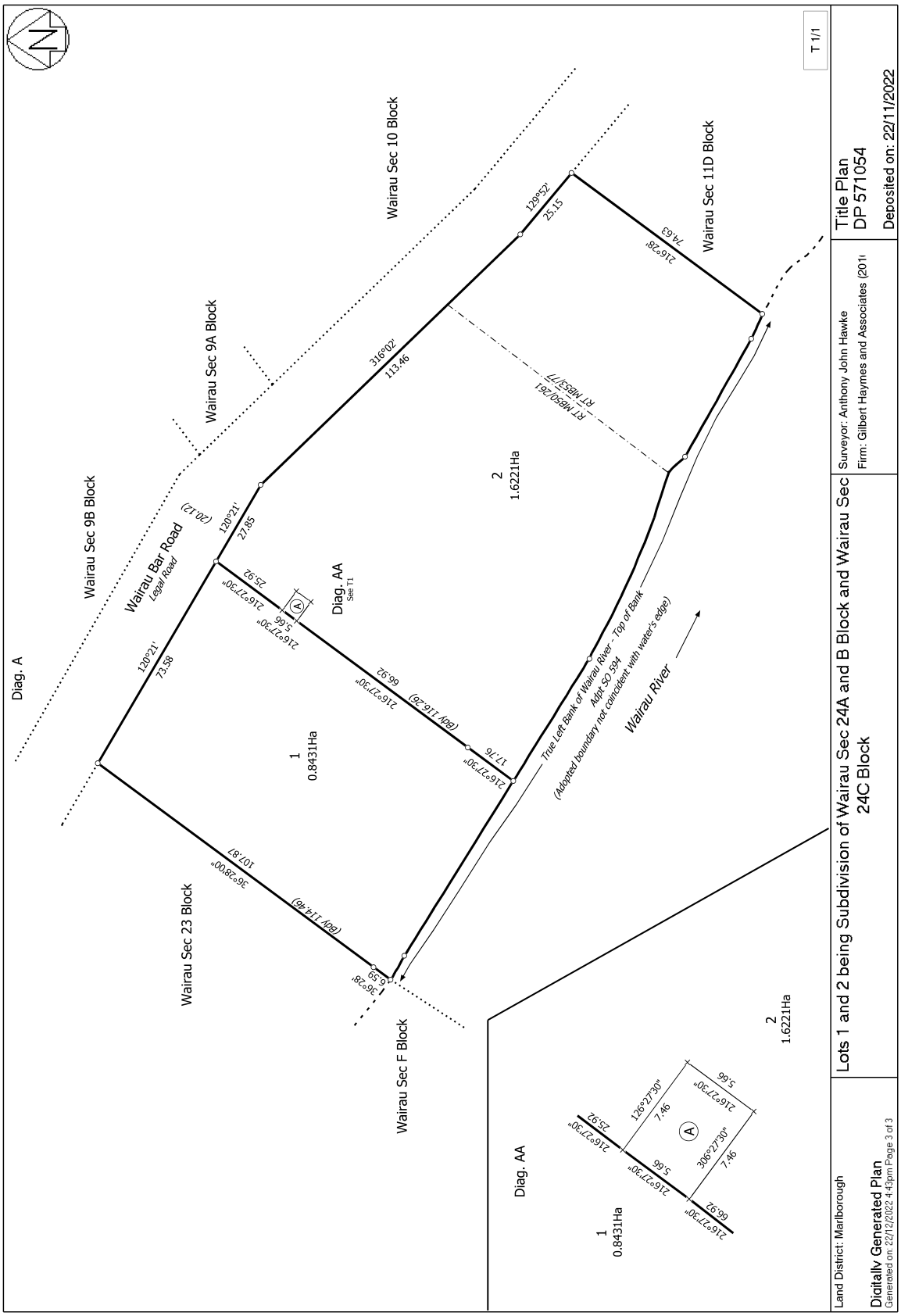
RW Mac Holdings Limited

Interests

12528631.2 Consent Notice pursuant to Section 221 Resource Management Act 1991 - 22.11.2022 at 11:39 am

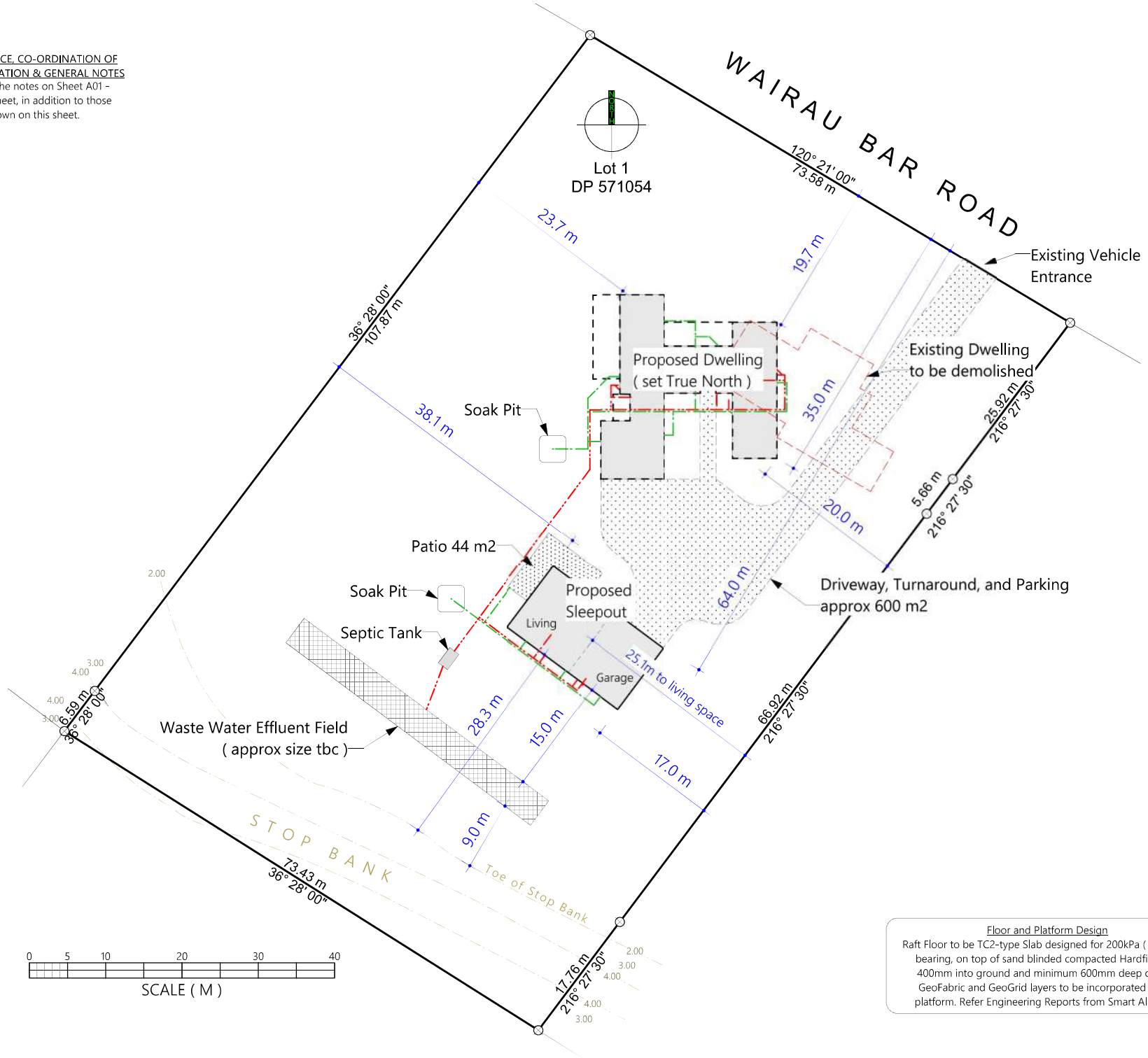
Appurtenant hereto is a right to convey water created by Easement Instrument 12528631.3 - 22.11.2022 at 11:39 am

The easements created by Easement Instrument 12528631.3 are subject to Section 243 (a) Resource Management Act 1991


Lots 1 and 2 being Subdivision of Wairau Sec 24A and B Block and Wairau Sec 24C Block
Title Plan DP 571054
Deposited on: 22/11/2022
Surveyor: Anthony John Hawke
Firm: Gilbert Haymes and Associates (201
Land District: Marlborough
Digitally Generated Plan
Generated on: 22/12/2022 4:43pm Page 3 of 3
T 1/1
Wairau Sec 10 Block
Wairau Sec 11D Block
Wairau Sec 9A Block
Wairau Sec 9B Block
Wairau Bar Road
Legal Road
(20.12)
Diag. A
Diag. AA
See T1
Wairau Sec 23 Block
Wairau Sec F Block
Wairau River
True Left Bank of Wairau River - Top of Bank
Adpt SO 594
(Adopted boundary not coincident with water's edge)
1
0.8431Ha
2
1.6221Ha
316°20'
113.46
120°21'
27.85
120°21'
73.58
129°52'
25.15
216°28'
74.63
216°27'30"
25.92
5.66
66.92
17.76
(Bdy 116.26)
(Bdy 114.46)
101.87
36°28'00"
6.59
RT MB50/261
RT MB53/177
126°27'30"
7.46
306°27'30"

COMPLIANCE, CO-ORDINATION OF DOCUMENTATION & GENERAL NOTES

Refer to the notes on Sheet A01 - Header Sheet, in addition to those shown on this sheet.



Floor and Platform Design

Raft Floor to be TC2-type Slab designed for 200kPa (ultimate) bearing, on top of sand blinded compacted Hardfill base, 400mm into ground and minimum 600mm deep overall. GeoFabric and GeoGrid layers to be incorporated within platform. Refer Engineering Reports from Smart Alliances.

design.SR

Designer - Simon Reeve

mob 027 2388 339
plantorque@xtra.co.nz

Licensed Building Practitioner
Design 2 BP120616

CLIENT

Ryan and Charlene McDONALD RESIDENCE

PROJECT

Proposed Residence and Sleepout

ADDRESS

318 Wairau Bar Road
Spring Creek

Lot 1 DP 571054
0.8431 ha

DRAWING

Site Plan

SCALE

1:500

DATE | JOB #

19.01.2025

DESIGNER

Simon Reeve

SHEET | REVISION

A02

Floor Area (m2)	317
Residential Zone	Rural Env
Wind Zone	High
Wind Region	A
Earthquake Zone	3
Exposure Zone	B

To: Marlborough District Council
PO Box 443
Blenheim 7240

ISO 9001
Document Number:
RAF0010-CI2753

SUBMISSION ON APPLICATION FOR A RESOURCE CONSENT

1. Submitter Details

Name of Submitter(s) in full .....

Electronic Address for Service *(email address)* .....

Postal Address for Service *(or alternative method of service under section 352 of the Act)* .....

.....

.....

Primary Address for Service *(must tick one)*

Electronic Address *(email, as above)* ☐ or, Postal Address *(as above)* ☐

Telephone (day) ..... Mobile .....

Contact Person *(name and designation, if applicable)* .....

.....

2. Application Details

Application Number U.....

Name of Applicant *(state full name)* .....

Application Site Address .....

Description of Proposal .....

.....

.....

3. Submission Details *(please tick one)*

I/we support all or part of the application ☐

I/we oppose all or part of the application ☐

I/we are neutral to all or part of the application ☐

☐ I am a trade competitor for the purposes of section 308B of the Resource Management Act 1991

☐ I am directly affected by an effect of the subject matter of the submission that:

a) adversely affects the environment; and

b) does not to relate to trade competition or the effects of trade competition

☐ I am NOT directly affected by an effect of the subject matter of the submission that:

a) adversely affects the environment; and

b) does not to relate to trade competition or the effects of trade competition

☐ I am NOT a trade competitor for the purposes of section 308B of the Resource Management Act 1991

The specific parts of the application that my/our submission relates to are *(give details, using additional pages if required)*

The reasons for my/our submission are *(use additional pages if required)*

The decision I/we would like the Council to make is *(give details including, if relevant, the parts of the application you wish to have amended and the general nature of any conditions sought. Use additional pages if required)*

---

4. Heard in Support of Submission at the Hearing

I/we wish to speak in support of my/our submission ☐

I/we do not wish to speak in support of my/our submission ☐

OPTIONAL: Pursuant to section 100A of the Resource Management Act 1991 I/we request that the Council delegate its functions, powers, and duties required to hear and decide the application to one or more hearings commissioners who are not members of the Council. *(Please note that if you make such a request you may be liable to meet or contribute to the costs of commissioner(s). Requests can also be made separately in writing no later than 5 working days after the close of submissions.)* ☐

5. Signature

Signature ..... Date .....

Signature ..... Date .....

6. Important Information

- Council must receive this completed submission before the closing date and time for receiving submissions for this application. The completed submission may be emailed to mdc@marlborough.govt.nz.
- The closing date for serving submissions on the consent authority is the 20th working day after the date on which public or limited notification is given. If the application is subject to limited notification, the consent authority may adopt an earlier closing date for submissions once the consent authority receives responses from all affected persons.
- You must serve a copy of your submission on the applicant as soon as is reasonably practicable after you have served your submission on the consent authority.
- Only those submitters who indicate that they wish to speak at the hearing will be sent a copy of the section 42A hearing report.
- If you are making a submission to the Environmental Protection Authority, you should use form 16B.
- If you are a trade competitor, your right to make a submission may be limited by the trade competition provisions in Part 11A of the Resource Management Act 1991.
- If you make a request under section 100A of the Resource Management Act 1991, you must do so in writing no later than 5 working days after the close of submissions and you may be liable to meet or contribute to the costs of the hearings commissioner or commissioners. You may not make a request under section 100A of the Resource Management Act 1991 in relation to an application for a coastal permit to carry out on activity that a regional coastal plan describes as a restricted coastal activity.
- Please note that your submission (or part of your submission) may be struck out if the authority is satisfied that at least 1 of the following applies to the submission (or part of the submission):
  - it is frivolous or vexatious;
  - it discloses no reasonable or relevant case;
  - it would be an abuse of the hearing process to allow the submission (or the part) to be taken further;
  - it contains offensive language;
  - it is supported only by material that purports to be independent expert evidence, but has been prepared by a person who is not independent or who does not have sufficient specialised knowledge or skill to give expert advice on the matter.

7. Privacy Information

The information provided on this form is required to process your submission under the Resource Management Act 1991. Personal information provided by you through this submission will be held and protected by Council in accordance with the Privacy Act 2020. Your name, contact details and the content of your submission **will** be made available to the applicant and the public via Council's property Files Online. You can access and correct personal information by contacting the Council or by emailing privacy@marlborough.govt.nz

For more information, please see the Council's Privacy Statement.

By **submitting this form,** you are authorising Council to publish the information provided by you in your objection, including your name and the content of your submission.