Application for Subdivision and Landuse Consent

Selwyn District Council

24 Edward Street • Lincoln

June 2020

DAVIE LOVELL-SMITH

PLANNING SURVEYING ENGINEERING

Shaping the future since 1880

Form 9 - Application for Resource Consent
Under Section 88, Resource Management Act 1991

TO: Selwyn District Council

1. **Selwyn District Council** applies for the Subdivision and Land Use Consents described below.

   Consent to subdivide Lot 2 DP 430391 into 8 fee simple lots

   AND

   Land use consent is sought for undertaking earthworks associated with the subdivision and transport provisions

   AND

   Land use consent as a Controlled Activity under Section 9(3) under Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

   Full details of the proposed activity are contained in the attached Assessment of Environmental Effects, including the servicing to be provided to this subdivision.

2. The **names and addresses of the owner and occupier** (other than the applicant) of land to which the application relates are as follows:

   Selwyn District Council

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

Street Address:	24 Edward Street, Lincoln
Legal Description:	Lot 2 DP 430391
Record of Title:	518430
Total Land Area:	1.0072ha

4. There are no other activities that are part of the proposal to which this application relates.

5. Attached, is an assessment of the proposed activity's effect on the environment that –
   (a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and
   (b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and
   (c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

6. Attached is an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.

7. Attached is 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.

8. Attached is information that adequately defines the following:
   (a) the position of all new boundaries; and
   (b) the areas of all new allotments; and
   (c) the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips; and
   (d) the locations and areas of any existing esplanade reserves, esplanade strips, and access strips; and
   (e) the locations and areas of land below mean high water springs of the sea, or of any part of the bed of a river or lake, to be vested in the Crown or local authority under section 237A of the Resource Management Act 1991; and
   (f) the locations and areas of land to be set aside as new roads.

DATED: 24 June 2020 ……

(Signature of applicant or person authorised to sign on behalf)

Title and address for service:	Address for applicant **and for all Council fees**:
Selwyn District Council C/- Davie, Lovell-Smith P O Box 679 CHRISTCHURCH 8140 Attention: Alice Burnett Phone: (03) 379 0793 Email: alice.burnett@dls.co.nz	Selwyn District Council PO Box 90, Rolleston 7643 Attention: Douglas Marshall Phone: (03) 347 2701 Email: Douglas.Marshall@selwyn.govt.nz

Table of Contents

Appendices

Selwyn District Council: Assessment of Effects on the Environment

1. Introduction

Section 88(2)(b) of the Resource Management Act 1991 requires that any application for a resource consent should include an assessment of any actual or potential effects that the activity may have on the environment and the ways in which any adverse effects may be mitigated. Section 88(2)(b) requires that any assessment shall be in such detail as corresponds with the scale and significance of the actual or potential effects that the activity may have on the environment and shall be prepared in accordance with the Fourth Schedule to the Resource Management Act 1991. This assessment is made in accordance with those requirements.

2. Description of the Proposal

2.1 Background Information

The applicant has recently obtained land use consent to enable an office activity in the building which exists on the site (RC205041). An application to vary this consent will be submitted once this subdivision consent has been obtained. The subdivision is proposed to efficiently use surplus land not required to support the office activity approved under RC205041.

Prior to this the site has been used as temporary offices for Environment Canterbury, Lincoln Primary School and the Lincoln Country Club.

2.2 Subdivision Consent

Subdivision consent is sought to create eight fee simple titles at 24 Edward Street, Lincoln. Lots 1 – 6 will be used for residential activities, Lot 7 has the existing country club building on it which has been consented to be used as an office activity (RC205041) and Lot 8 will be vested to the Council as a Local Purpose Reserve (Access). A right of way will serve Lots 1 – 6.

Lots 1 – 6 vary in area from 653m^2 – 905m^2. Lot 7 will have a total area of 4,372m^2. Lot 8 will have a total area of 787m^2.

The subdivision layout is attached as Appendix A.

2.2.1 Infrastructure

Davie Lovell-Smith Ltd have prepared an Infrastructure Report (Appendix B).

Sewer:

All lots will be connected to Councils reticulated wastewater supply. Sewerage from the residential lots will be discharged into a new manhole constructed on the existing gravity sewer network located in Millpond Lane.

All new residential allotments will be provided with a 100mm diameter gravity lateral laid at least 1m into the net area of each lot. The sewer laterals will be at a depth to ensure that all new residential buildings can drain sewage via gravity. All new sewer mains to be vested will be 150mm uPVC and manholes will be 1050mm reinforced concrete. New sewer mains will be located in the centre of the ROW as per Selwyn District Council guidelines.

Stormwater:

All lots will be connected to Councils reticulated stormwater supply.

On individual sites, roof stormwater will be disposed of directly to ground via soak pits in accordance with the Building Act. All other stormwater emanating from roads, berms and lot frontages will be collected by sumps and pipes and directed to existing stormwater reticulation. The permeability of underlying soils is considered poor and as such kerb adaptors will be provided for lots 1 to 5 and a bubble up sump in the ROW kerb and channel will be provided for lot 6. All systems will be sealed to ensure no floating contaminants or rubbish can enter the soakage trenches.

Roads will provide the secondary overflow path for storm events greater than 2% AEP. Road contours will match the general overland flow direction from north to south.

Water:
All lots will be connected to Councils reticulated water supply.

A metered connection will be supplied at the boundary of each residential allotment in accordance with council requirements. All sites serviced via a ROW will have metered connections located in the road reserve and 32mm PE laterals installed to the net area of the lot. A fire hydrant will be installed near the entrance to the Right of Way to ensure firefighting water supply standards are met.

Power and Telecommunications:
Power and Telecommunications will be provided to all sites in line with utility and industry standards. Cables will be laid underground, including the existing lines along Millpond Lane. Where required, electricity kiosks will be installed on individual lots. Any electricity kiosk sites will be forwarded to Council for approval following the power design.

Existing power connections to the site will be incorporated into the proposed power design. A single connection will be provided at the boundary to each site and the system will be controlled by Orion upon completion.

Telecommunications will be installed as part of the Enable fibre network.

2.2.2 Roading, access and car parking

The width and length of Millpond Lane will not change as a result of this subdivision. For completeness the sealed width of Millpond Lane is 7m. A new 1.5m wide footpath is proposed as part of this subdivision. A small section of this footpath will be located on the western side of Millpond Lane until it crosses the road and runs down eastern side of Millpond Lane which will connect into the Edwards Road footpath.

The trees along the western side of Millpond Lane have over time, been pruned or have fallen over due to the existence of the powerline above them. As such they no longer exhibit ‘good form’ and will be removed and replaced with an appropriate variety of street tree to the satisfaction of the Councils Reserve Operations Manager.

The right of way (serving lots 1 – 6) is approximately 93m long with the width of the entrance from Millpond Lane being 7.04m which narrows slightly to 6.5m at the entrance of Lot 6. The right of way will have a sealed width of 5m and a legal width of 6.5m. No passing bay or turning area is provided.

The subdivision creates a 787m^2 local purpose reserve with a 2.5m wide shared path. The shared path will connect foot traffic and recreational users to existing shared paths and recreation areas within the surrounding areas.

10 car parks will be located at a 45° angle on the south east side of Millpond Lane. These car parks are for public use and are as an alternative to on-street parking.

There is adequate room for refuse trucks to drive up Millpond Lane and turn around in the carpark of Lot 7 to collect refuse bins from the residential properties in the lane. Refuse bins will be located on the footpath along the eastern boundary of Lot 1.

2.2.3 Geotechnical

The site is located within the areas identified by Ian McCohan as requiring a geotechnical report. As such KGA has prepared a geotechnical report for the proposed subdivision (Appendix C). Based on the geotechnical investigations the following recommendations should be considered for new dwellings at the proposed new Lots:

- Topsoil and made ground were identified to 0.5m depth at investigation points.
- An ultimate unfactored bearing capacity of 200kPa was encountered in the natural soil below the topsoil and made ground, as per the results of onsite Scala penetrometer testing.
- The local groundwater level was encountered at 2.6m depth.
- According to our assessment, the subject site is likely to behave as equivalent to a TC2 property as defined in the MBIE Guidance document for residential sites.

According to our assessment, TC2 style foundations (as per the MBIE Guidance document) as described in the following sections would be suitable for dwellings within the proposed new Lots; TC1 foundations would be suitable for any stand-alone garages. Further site-specific shallow soils testing will be required within the new dwelling locations once development details are known. Given this, it is a condition is proposed, reinforced by a consent notice on the new titles, to ensure that appropriate building foundations are designed. The proposed consent condition and consent notice wording is as follows:

> *"All residential building foundations are to be established in accordance with the KGA report titled "Geotechnical Engineering Investigation, Proposed Development, 24 Millpond Lane, Lincoln" dated 27 May 2020."*

2.2.4 Earthworks

Earthworks are required to:

- remove the existing car park area where the new residential lots, reserve and right of way is proposed
- construction of right of way
- installation of services
- enable the development of the residential lots

The site is relatively flat with small undulations. Earthworks of approximately 650m^3 will be carried out on the site to ensure that all future house sites will drain towards the street between the grades of 1/200 and 1/500. Subject to final earthworks design, the house sites will be elevated above the street by up to 0.3m.

All topsoil on site will be stockpiled and replaced on the land immediately following bulk earthworks. All disturbed topsoil will be re-sown with Selwyn District Council specified grass seed mixes. A balance of cut and fill will be maintained on site and removal of material from site will be kept to a minimum.

All earthworks will comply with NZS4431, Code of Practice. All works will comply with the Regional Councils Erosion and Sediment Control Guidelines. An Erosion and Sediment Control Management Plan will be compiled as part of the Engineering approval.

2.2.5 Reserves

As a consequence of the subdivision a number of mature trees will be removed from the area on the north western side of the site. Removal of these trees will be undertaken based on advice from a Selwyn District Council arborist.

3. Description of the Environment

3.1 The Site

The site is zoned Living 1 in the Selwyn District Plan. Millpond Lane is classified as a local road and Edward Street in this location is classified as an Arterial Road.

There is a large 1,200m^2 single storey building located in the south western area of the site. There are a number of mature trees which surround the car parking area with a direct connection to the Domain/Reserve. Trees line the eastern side of Millpond Lane which is the only entrance to the site for vehicles. Pedestrians can access the site via walkways from Moffat Drive and Ryelands Drive.

3.2 Surrounding Environment

The site is surrounded by residential activities. Lincoln township is located to the north west of the site with Lincoln University Campus beyond the township. L1 Creek runs directly to the west of the site.

Figure 1: Site location and surrounding environment. Source: Canterbury Maps

4. Selwyn District Plan

4.1 Zoning

The site is zoned Living 1 in the Selwyn District Plan. Millpond Lane is classified as local and Edward Street in this location is classified as an Arterial Road. The site is not subject to an Outline Development Plan.

4.2 Rules

The following is a compliance assessment of the proposal with the rules that are applicable to this application:

C12 LZ Subdivision

Rule		Compliance Comments
Access *12.1.3.1 Any allotment created, including a balance allotment, has legal access to a legal, formed road*	✓	Legal access to all allotments is achieved.
Corner Splays *12.1.3.2 The corner of any allotment at any road intersection shall be splayed with a rounded minimum radius of 3 metres.*	N/A	
Water *12.1.3.3-Any allotment created in: Castle Hill, Doyleston, Lake Coleridge Village, Leeston, Lincoln, Prebbleton, Rolleston, Southbridge, Springston, Tai* *Tapu, West Melton or is within a Living 3 Zone is supplied with reticulated water; and*	✓	All lots would be served by a reticulated water supply.
Effluent Disposal *12.1.3.4-Any allotment created in Prebbleton is supplied with reticulated effluent treatment and disposal facilities*	✓	All lots would be served by a reticulated effluent treatment and disposal system.

Solid Waste Disposal *12.1.3.5-Any allotment created is supplied with a facility or service to dispose of solid waste off the site*	✓	Council waste disposal services are available to dispose of solid waste off site.
Size and Shape *12.1.3.6-Any allotment created, including a balance allotment, contains a building area of not less than 15m x 15m….*	✓	All lots are able to accommodate building area of 15m x 15m.
12.1.3.7-Any allotment created, including any balance allotment, complies with the relevant allotment size requirements set out in Table C12.1 Living 1: Average Allotment Size Not Less Than 650m^2	✓	The lot sizes range between 653m^2 – 4,372m^2 The average lot size (excluding Lot 8 (used as reserve)) is 1,241.1m^2
Telephone and Power *12.1.4.7 Whether telecommunication and electricity connections shall be made available to any allotment; and, if not, the mechanism(s) used to alert prospective buyers of an allotment that these connections are not installed to.*	✓	Power and Telephone would be provided to all sites to utility company and industry standards.
Stormwater Disposal *12.1.4.8 The method(s) for disposing of stormwater; and* *12.1.4.9 Any adverse effects of stormwater disposal on any land drainage scheme which is administered by Selwyn District Council; and* *12.1.4.10 The quantity and rate of stormwater disposed into any land drainage scheme which is administered by SDC*	✓	Roof water would be disposed to ground via soak pits.

C2 Living Zone – Earthworks

Rule		Compliance Comments
Earthworks *2.1.1.6 Except where Rule 2.1.1.5 applies, any earthwork has:* *(a) a volume of not more than 2,000m^3 per project; and* *(b) a vertical cut face where no more than 5% of the total vertical cut is over 2 metres.*	✓	The proposed subdivision would require earthworks consisting of cut and fill in the order 650m^3

C5 Living Zone - Roading

Rule		Compliance Comments
5.2.1.6 The vehicle accessway is formed to the relevant standards in Appendix E13.2.1	×	All sites will have access to legal road. The right of way serves 6 sites but does not have a passing bay or turning area.

Overall, the following activities require resource consent;

- the subdivision complies with the standards in Rule 12.1.3 – **Restricted Discretionary Activity** under Rule 12- 12.1.1
- the right of way serves 6 sites but does not have a passing bay or a turning area – **Discretionary Activity** under Rule 5-5.2.3
-

5. National Environmental Standard for Assessing and Managing Contamination in Soil to Protect Human Health

The site is listed on Environment Canterbury's Listed Land Use Register as potentially having A17 - Storage tanks or drums for fuel, chemicals or liquid waste. According to the property file the fuel tank was removed from the site and soil samples were tested from the areas around the tank. Test results confirmed the site is below guideline values - industrial/commercial'. Malloch

Environmental Ltd has prepared a Preliminary Site Investigation Appendix D. The following are the conclusions made in the PSI;

Part of the site is listed on the ECan Listed Land Use Register Statement for 'A17 - Storage tanks or drums for fuel, chemicals or liquid waste'. A 4,500L underground diesel fuel tank was present on the subject site from the 1960s until its removal in 2011. A Detailed Site Investigation (DSI) undertaken at the time of its removal showed no significant hydrocarbon contamination has been caused by the tank. The DSI confirmed the laboratory Total Petroleum Hydrocarbon (TPH) results were well below the 'commercial/industrial' soil guideline values (SGVs) that were appropriate for the use of the land at that time. This investigation has now confirmed that the results are also well below the residential SGVs. Therefore, while the removed tank is a confirmed Hazardous Activities and Industries List (HAIL) activity, it has already been adequately investigated and it is considered highly unlikely that the tank poses a risk to human health in either a commercial or residential use. There is no evidence of HAIL activities or industries having occurred on the rest of the subject site, now or in the past.

The subject site is considered suitable for the proposed uses, including residential use, with no further investigations required. In terms of planning status at the time of writing of this report, the NESCS does apply to the site and resource consent under the NESCS would be required for subdivision and change of use as a controlled activity.

Based on the conclusions of the PSI resource consent is required as a controlled activity under Regulation 9(3) of the NES CS.

6. Assessment of Actual or Potential Effects on the Environment

The following assessment considers the effects of this development on the surrounding environment. The proposed subdivision and land use consent has been assessed as a Discretionary Activity.

6.1 Roading

Lots 1 - 6 will be served via a right of way with a sealed width of 5m and a legal width of 6.5m. The District Plan requires a right of way which serves more than three lots to have a passing bay and of a length which exceeds 50m to have a turning area. The proposed right of way runs parallel to the proposed lots and does not create sightline or safety issues for traffic and pedestrians. The right of ways will be privately owned which will limit the volume of traffic. The lots are of an appropriate size which will allow for on-site manoeuvring and therefore no turning area is required and any potential effects are mitigated.

The width and length of Millpond Lane will not change as a result of this subdivision. For completeness the sealed width of Millpond Lane is 7m. A new 1.5m wide footpath is proposed as part of this subdivision. A small section of this footpath will be located on the western side of Millpond Lane until it crosses the road and runs down eastern side of Millpond Lane which will connect into the Edwards Road footpath.

The trees along the western side of Millpond Lane have over time, been pruned or have fallen over due to the existence of the powerline above them. As such they no longer exhibit 'good form' and will be removed and replaced with an appropriate variety of street tree to the satisfaction of the Councils Reserve Operations Manager.

6.2 Services

All sites will be connected to Councils reticulated wastewater supply systems.

Roof stormwater will be disposed of directly to the ground via soak pits in accordance with the Building Act on individual sites. All other stormwater will be dealt with by the stormwater system designed as part of this subdivision application. Please refer to the Infrastructure report attached under Appendix B for more details.

Individual connections to power and telecommunication connections will be provided to proposed allotments where required.

All servicing and infrastructure will be constructed in accordance with Selwyn District Council standards and will be duly vested in Selwyn District Council.

The proposed infrastructure and servicing of the proposed development is consistent with other residential developments with all servicing being reticulated, resulting in less than minor effects.

6.3 Reserves and Cycleways

The proposed subdivision will remove a number of mature trees from the park like area on the north western side of the site. Removal of these trees will be undertaken based on advice from an arborist. While this land has been part of the existing site boundaries there could be a perception that the subdivision will reduce open spaces. The subdivision creates a 787m^2 local purpose reserve with a 2.5m wide shared path which will connect foot traffic and recreational users to existing shared paths in the surrounding areas. Prior to this, pedestrians would need to cross private land to access some of these areas. It is considered that the proposed subdivision creates positive effects for recreational users and contributes to the residential amenity of the surrounding environment.

6.4 Geotechnical

The site is located within the areas identified by Ian McCohan as requiring a geotechnical report. As such KGA has prepared a geotechnical report for the proposed subdivision (Appendix C). Based on the geotechnical investigations the following recommendations should be considered for new dwellings at the proposed new Lots:

- Topsoil and made ground were identified to 0.5m depth at investigation points.
- An ultimate unfactored bearing capacity of 200kPa was encountered in the natural soil below the topsoil and made ground, as per the results of onsite Scala penetrometer testing.
- The local groundwater level was encountered at 2.6m depth.
- According to our assessment, the subject site is likely to behave as equivalent to a TC2 property as defined in the MBIE Guidance document for residential sites.

According to our assessment, TC2 style foundations (as per the MBIE Guidance document) as described in the following sections would be suitable for dwellings within the proposed new Lots; TC1 foundations would be suitable for any stand-alone garages. Further site-specific shallow soils testing will be required within the new dwelling locations once development details are known. Given this, it is a condition is proposed, reinforced by a consent notice on the new titles, to ensure that appropriate building foundations are designed. The proposed consent condition and consent notice wording is as follows:

> *"All residential building foundations are to be established in accordance with the KGA report titled "Geotechnical Engineering Investigation, Proposed Development, 24 Millpond Lane, Lincoln" dated 27 May 2020."*

7. Policy Assessment

7.1 Selwyn District Plan

The following Objectives and Policies are considered relevant to the proposed development. An assessment of the development against these Objectives and Policies has been undertaken as follows:

Objective B3.4.1

The District's townships are pleasant places to live and work in.

Objective B3.4.3

"Reverse sensitivity" effects between activities are avoided.

Policy B3.4.2

To provide for any activity to locate in a zone provided it has effects which are compatible with the character, quality of the environment and amenity values of that zone.

Policy B3.4.3

To provide Living zones which:

- *are pleasant places to live in and provide for the health and safety of people and their communities;*
- *are less busy and more spacious than residential areas in metropolitan centres;*
- *have safe and easy access for residents to associated services and facilities;*
- *provide for a variety of living environments and housing choices for residents, including medium density areas identified in Outline Development Plans;*

The intentions of the objectives and policies listed above seek a living environment that is a pleasant place to live and work in, where a variety of activities are anticipated while maintaining the character and amenity values of the Living 1 zone. These objectives are supported by a range of policies seeking to maintain and enhance the aesthetic values of townships, while providing for any activity to locate in the living zone providing it has effects which are compatible with the character, quality of environment and amenity values of that zone.

The subdivision creates an additional 6 residential lots with areas consistent with the Living 1 zone in Lincoln. The local purpose reserve enhances the area by connecting pedestrians and foot traffic with existing shared path and open space areas for recreation and as an alternative mode of transport within and around Lincoln township.

8. Assessment against Part 2 of the RMA

The purpose of the Act (Part 2) is to promote the sustainable management of natural and physical resources. Section 5 imposes a duty on consent authorities to promote sustainable management while avoiding, remedying or mitigating adverse effects of activities on the environment. Section 6 addresses matters of national importance. It is considered that there no matters of national importance (Section 6) or Treaty of Waitangi issues (Section 8) which need to be taken into account in this instance.

There are no proposed discharges to water and no disturbance of indigenous flora and fauna. There are no heritage structures, sites or protected trees identified on the site. Consequently, the proposal is not considered to have an adverse effect on cultural values.

Section 7 lists various matters to which regard shall be had in achieving the purpose of the Act. The matters of particular relevance to this application are 7(b), 7(c) and 7(f). In considering these sections it is considered that the subdivision supports the purpose of the Act as it is a brownfield site which infills residential development within an existing residential area and the recreation reserve and amenity planting on either side of Millpond Lane are being retained.

It is therefore considered that the proposal supports the purpose of the Act as it represents an efficient use and development of the site without compromising amenity values or the quality of the environment.

9. Mitigation Measures and Proposed Conditions

We consider that there will be no significant adverse effects on the environment and therefore no mitigation measures are necessary or proposed, beyond those that are inherent to the proposal. To this end, we anticipate that the Council's standard conditions relating to subdivision will be applied to this development.

10. Identification of Persons Potentially Affected and Consultation

It is considered that no persons will be adversely affected as a result of this proposal and as such no consultation has been undertaken.

11. Consideration of Alternatives

The above assessment indicates that the proposal will not have any significant adverse effects on the environment; therefore an assessment of alternatives is not required.

12. Monitoring

It is considered that there would be no significant adverse effects on the environment and therefore no on-going monitoring of the proposal is required or proposed.

Appendix A: Subdivision Plan

Appendix B: Infrastructure Report

DAVIE LOVELL-SMITH

Infrastructure Report

Selwyn District Council – Millpond Lane, Lincoln

Millpond Lane, Lincoln

1. General

1.1. Introduction

It is proposed to subdivide the existing block labelled Lot 2 DP 430391. This block is 1.0072 Ha and fronts onto Millpond Lane, Lincoln. Currently the land is in existing car park and reserve. Millpond Lane also provides for a road connection to Lot 1 DP 430391 and to Lot 2 Deposited Plan 477453.

1.2. The Site

Resource Consent is sought to subdivide Lot 2 DP 430391 to create 6 residential lots with a Right Of Way (ROW) and retain the balance land in an individual lot. The proposed residential lot sizes vary between 650m^2 and 905m^2.

2. Site Conditions

2.1. Soils

A complete geotechnical investigation for the subdivision area was undertaken by KGA in May 2020. This geotechnical report details the soil profile beneath the site as topsoil over silt, sandy silt and silty sand to approximately 5m depth. Below this are sands and gravelly sands to at least 9m depth.

The site has been categorised TC2 and has been deemed suitable for residential development. The full geotechnical investigation has been provided as part of the resource consent application.

2.2. Soil Contamination

A preliminary site investigation has been undertaken for the site by Malloch Enviro. This investigation concludes;

The subject site is considered suitable for the proposed uses, including residential use, with no further investigations required. In terms of planning status at the time of writing of this report, the NESCS does apply to the site and resource consent under the NESCS would be required for subdivision and change of use as a controlled activity.

3. Earthworks

Earthworks of approximately 650m^3 will be carried out on the site to ensure that all future house sites will drain towards the street between the grades of 1/200 and 1/500. Subject to final earthworks design, the house sites will be elevated above the street by up to 0.3m.

All topsoil on site will be stockpiled and replaced on the land immediately following bulk earthworks. All disturbed topsoil will be re-sown with Selwyn District Council specified grass seed mixes. A balance of cut and fill will be maintained on site and removal of material from site will be kept to a minimum.

Sediment flow off the site will be controlled according to Regional Council requirements. The basis of the sediment control will be the Environment Canterbury Guidelines and the discharge during construction will either be dealt with in association with the overall discharge consent or will be maintained in a fully compliant state.

All dust created on the site will be controlled by water cart, dust suppression fencing or other such Council approved methods and construction methodologies.

A comprehensive erosion, dust and sediment control management plan will be submitted Selwyn District Council and Environment Canterbury for approval prior to the commencement of construction.

All bulk filling within lot areas will be compacted in accordance with NZS 4431:1989. All fill testing will be carried out by an independent laboratory and all fill place will be certified at the completion of works.

4. Roading

The proposed roading construction will formalise the roadside drainage in Millpond Lane by constructing a kerb and channel both sides of the existing carriageway. The ROW will incorporate a kerb and channel on one side to allow lots to discharge to the kerb and channel.

The Millpond Lane sealed width will be 7m. Millpond Lane will include a 1.5m wide footpath, along the east side of the road to connect to Edwards Road footpath. The footpath alignment will retain existing trees where practical. The ROW sealed width will be 5m and legal width will be 6.5m.

All kerb and channel, used within the development, will be Selwyn District Council kerb and channel. The ROW will be formed with kerb and channel and stormwater emanating from here will enter a sump located within the ROW. The sump will convey stormwater to the existing road stormwater reticulation. Reinforced kerb foundations will be used at the entrances to the ROW to ensure it will not fail under the increased traffic loading.

All wearing courses will be 35mm AC10 in accordance with NZTA M10. Some areas may include surfacing of either cobbled paving or exposed aggregate concrete.

A 2.5m shared path will run along the southern boundary of the right of way (within Lot 8) connecting pedestrians from Millpond Lane to the reserve and other pedestrian linkages along the L1 Creek.

All roading works will be constructed to the approved engineering drawings and relevant Council specifications.

5. Sewer Infrastructure

The proposed ROW sewage reticulation will discharge into a new manhole constructed on the existing gravity sewer network located in Millpond Lane. The sewer will be laid at minimum grades to assist in maintaining cover at the upstream end of the development.

All new residential allotments will be provided with a 100mm diameter gravity lateral laid at least 1m into the net area of each lot. The sewer laterals will be at a depth to ensure that all new residential buildings can drain sewage via gravity. All new sewer mains to be vested will be 150mm uPVC and manholes will be 1050mm reinforced concrete. New sewer mains will be located in the centre of the ROW as per Selwyn District Council guidelines.

The system will be constructed to Council standards and will be vested in Council. Any public sewer pipes over private land will be covered by easements in gross in favour of Council.

6. Stormwater Reticulation And Drainage

On individual sites, roof stormwater will be disposed of directly to ground via soak pits in accordance with the Building Act. All other stormwater emanating from roads, berms and lot frontages will be collected by sumps and pipes and directed to existing stormwater reticulation. The permeability of underlying soils is considered poor and as such kerb adaptors will be provided for lots 1 to 5 and a bubble up sump in the ROW kerb and channel will be provided for lot 6. All systems will be sealed to ensure no floating contaminants or rubbish can enter the soakage trenches.

It is envisaged that the operational phase stormwater discharge from the development into the existing stormwater network will fall under the Selwyn District Council global discharge consent CRC184822, confirmation will be sought from the consent holder. All stormwater infrastructure installed will be compliant with this consent.

Roads will provide the secondary overflow path for storm events greater than 2% AEP. Road contours will match the general overland flow direction from north to south.

All stormwater infrastructure will be designed to meet both regional and local council standards including Selwyn District Councils specified rainfall intensities.

7. Water Reticulation

A 63mm PE submain will connect to the existing 100mm diameter water main in Millpond Lane. This will service individual laterals servicing the lots.

A metered connection will be supplied at the boundary of each residential allotment in accordance with council requirements. All sites serviced via a ROW will have metered connections located in the road reserve and 32mm PE laterals installed to the net area of the lot. A fire hydrant will be installed near the entrance to the Right of Way to ensure firefighting standards are met.

The Selwyn District Council model will be used to ensure suitable water pressure and flow is available to service the site and pipes will be sized accordingly. The cost of any upsizing of pipes will be addressed in the road point strip valuations.

8. Services

Power and Telecommunications will be provided to all sites in line with utility and industry standards. Cables will be laid underground. Where required, electricity kiosks will be installed on individual lots. Any electricity kiosk sites will be forwarded to Council for approval following the power design.

Existing power connections to the site will be incorporated into the proposed power design. A single connection will be provided at the boundary to each site and the system will be controlled by Orion upon completion.

Telecommunications will be installed as part of the Enable fibre network.

9. Conclusion

This report has addressed the servicing of the proposed residential subdivision including earthworks, roading, stormwater disposal, sewage requirements, water supply, power and telecommunications.

The methodologies and proposals presented are based on standard engineering practice and the Selwyn District Council Engineering Code of Practice.

On the basis of our investigations, preliminary calculations and consultations with Council Officers, we have concluded that the infrastructure proposed for this development is sufficient to meet all future servicing requirements.

DAVIE LOVELL-SMITH

This Infrastructure Report has been:

Prepared by:

(Designer) Justin Finlay 03/06/2020

(Name/Sign/Date)

Reviewed by:

(Peer Reviewer) Jamie Verstappen 03/06/2020

(Name/Sign/Date)

DAVIE LOVELL-SMITH

Appendix C: Geotechnical Report

K200317-1

27 May 2020

Geotechnical Engineering Investigation
Proposed Development
24 Millpond Lane
Lincoln

Prepared For:

Selwyn District Council

2 Norman Kirk Drive

Rolleston 7614

KGA Geotechnical Group Limited

Supporting the Construction Industry since 1990

7A William Pickering Drive | Albany | Auckland

P O Box 302 361 | North Harbour | Auckland 0751

09 478 6655

Unit 3, 201 Opawa Road | Hillsborough | Christchurch

P O Box 7630 | Sydenham | Christchurch 8240

03 343 5302

www.kga.co.nz

REPORT ISSUE AUTHORISATION

Geotechnical Engineering Investigation
Proposed Development
24 Millpond Lane
Lincoln

Prepared by:

Elizabeth Creek
MSc (Geological Engineering)
Geotechnical Engineer

Reviewed by:

Robert Kamuhangire
BSc (Civil Hons), MSc, CEng, MICE, CMEngNZ, CPEng
Senior Geotechnical Engineer

Authorised by:

Abilio Nogueira
MSc (Engineering Geology)
Director

EXECUTIVE SUMMARY

Geotechnical Engineering Investigation

Proposed Development

24 Millpond Lane

Lincoln

SUB-SOIL CONDITIONS	**Lithology**	The sub-surface conditions comprise topsoil over silt, sandy silt and silty sand to approximately 5m depth. Below this are sands and gravelly sands to at least 9m		
	Soil Classification as per NZS 1170.5:2004	Class 'D' (Deep or soft soil sites)		
	Groundwater Depth	Encountered at 2.6m depth within the shallow soils testing		
	Bearing Capacity	An ultimate unfactored bearing capacity of at least 200kPa was found below the topsoil and made ground		
SEISMIC ASSESSMENT	**Vertical Displacement under Earthquake Ground Motions (Index Value)**	SLS	ULS	
		5mm to 45mm	25mm to 60mm	
	Liquefaction Severity Number (LSN) Index Value	SLS	ULS	
		1 to 8	**7 to 12**	
	Horizontal Movement	**Lateral Spreading**	**Lateral Stretch**	
		Minor (up to 100mm)	Minor (up to 50mm)	
	Seismic Technical Categorisation	**MBIE**	N/A Urban Non-Residential	
		Site Specific	TC2	
FOUNDATION OPTIONS	This report is a geotechnical assessment in terms of suitability of the land for subdivision and general recommendations regarding proposed development. Details of proposed building development were not known at the time of writing this report and further coordination will be required to conduct site-specific shallow investigations and confirm foundation design for each new Lot.			
REPORT DISTRIBUTION	The site has been assessed as suitable for subdivision from a geotechnical point of view, and a Statement of Professional Opinion is included within Appendix E. A full copy of this report must be provided to all relevant parties involved in the project. This should include, but not be limited to, owner, architectural designers, engineers (civil and structural) and the earthworks/building contractor.			
CONSENT	This report has been prepared for Subdivision Consent purposes and is insufficient for Building Consent.			

CONTENTS

Attachments:

Sheet 1	Site Plan
Sheets 2A to 2F	Hand Auger and Scala Penetrometer Logs
Sheets 3A to 3C	CPT Logs

Appendix A:	Third Party Documents
Appendix B:	Site Photographs
Appendix C:	Background Information Documents
Appendix D:	Liquefaction Analyses
Appendix E:	Statement of Professional Opinion: Suitability of Site for Subdivision

1. INTRODUCTION

At the instruction of Selwyn District Council (SDC), we have undertaken a geotechnical engineering investigation on the property at 24 Millpond Lane in Lincoln. The work was carried out in accordance with our Agreement dated 12 May 2020.

As part of the ground investigation, we have undertaken a detailed site and environs walkover inspection, and referenced available information from the New Zealand Geotechnical Database (NZGD), Environment Canterbury (ECan) and Selwyn District Council (SDC) websites. We have conducted a subsurface investigation comprising hand auger boreholes with associated Scala penetrometer tests and cone penetrometer testing in order to assess ground conditions and likely behaviour of the ground, as well as to provide guidance on the proposed subdivision development.

The investigation was carried out with reference to the Ministry of Business, Innovation & Employment (MBIE) Guidance - Version 3, dated December 2012 - “Repairing and rebuilding houses affected by the Canterbury earthquakes” and subsequent updates.

This report presents our findings and conclusions. It has been prepared in support of a Subdivision Consent application, and to provide geotechnical information for use in assessing preliminary foundation options for future site development. This report is not sufficient for building foundation design as part of a Building Consent application, though we seek to provide preliminary guidance on foundation options for the future development of the property.

2. SITE DESCRIPTION

The property is legally described as Lot 2, DP 430391 and has an area of 1.0072 hectares. The property is irregular in shape and is located on the western side of Millpond Lane. It is bounded by the L-I Creek to the west and south, and is otherwise surrounded by residential properties, as shown on our Site Plan, attached as Sheet 1. The depth of the creek is unknown, but water level was at least 4m below site levels at the time of our site visit on 15 May 2020. The site and nearby surroundings are near level.

3. EXISTING STRUCTURE AND PROPOSED DEVELOPMENT

The property is currently occupied by an existing structure at the southern portion of the property, and a carpark within the northeastern portion. The northwestern portion comprises a grassed lawn with mature trees.

According to a conceptual plan by Davie Lovell-Smith titled 'Site Plan – For Discussion Purposes' (ref: P19698, dated: April 2020), it is proposed to subdivide the property and create six new residential Lots in the northern portion of the property; henceforth, we refer to this area as 'the site'. We have included these plans in Appendix A, and expect that foundation design will be determined based on the findings of this report.

4. BACKGROUND INFORMATION

4.1 Sources Consulted

The following third party information sources were consulted and referred to in this report:

- New Zealand Geotechnical Database (NZGD)
- Environment Canterbury (ECan)
- Selwyn District Council (SDC)

A summary of our understanding of the information contained in the reports is presented below. We note that the below summary of information is intended to present facts contained in third party sources and does not constitute interpretation or endorsement by KGA.

4.2 New Zealand Geotechnical Database (NZGD) & Environment Canterbury (ECan)

The NZGD and ECan website were searched for geotechnical information in the form of relevant well/borehole logs and CPT data, but no nearby testing was found.

The ECan website indicates that the site is overlaying 'unconfined/semiconfined aquifers'. According to ECan Liquefaction Susceptibility mapping (available on Canterbury Maps), liquefaction was not recorded onsite during the September 2010 or February 2011 earthquake events.

The site is located outside the NZGD observation boundaries and hence no information about liquefaction, groundwater depth, ground cracks or lateral movement was available at the time of writing this report.

Based on ground motion data by O'Rourke et al as presented on the NZGD, the site experienced a PGA of 0.36g during the September 2010 earthquake event.

4.3 Selwyn District Council (SDC) – Flooding Risk

With regard to flooding risk: according to the SDC District Plan, potential rainfall flood depths for a 200-year average recurrence interval are 0.32m at the location of the proposed new Lots. Please refer to the flood mapping excerpt from ECan maps located within Appendix C of this report.

A full flood assessment is beyond the scope of this report, and the SDC should be consulted to comment on minimum floor level requirements for any proposed new structures.

4.4 Environment Canterbury (ECan) – Listed Land Use Register

Environment Canterbury has identified sites where hazardous activities and industries have been located throughout Canterbury, and maintains the Listed Land Use Register (LLUR) database which alerts about potential contamination before site works commence. After consultation of the database regarding the site, the following information was obtained: "The Listed Land Use Register has information relating to this land parcel." The HAIL activity identified by the LLUR is "A17 – Storage tanks or drums for fuel, chemicals or liquid waste', regarding a removed underground diesel fuel storage tank from near the structure at the southern end of the property. According to the associated environmental investigation, the 4500 litre storage tank was used to store heating fuel and was removed in 2011. The investigation results indicate that hazardous substances are present in this location, but below applicable guideline values (industrial/commercial).

In light of the existing information, we recommend that a specialist geo-environmental consultant is engaged to review the potential for contamination at the site of the proposed new Lots, and advise on remediation strategies (if required) prior to further site development.

5. SITE OBSERVATIONS

The following was noted during our site walkovers on 15 and 23 May, 2020:

- The development area of site is generally flat.
- A footpath and retaining wall are present along the western portion of the site. The footpath is adjacent to the site at the northwestern end and veers of as per the DLS site plan.
- Steep slope to river beyond the footpath (approximately 4m from site boundary).
- The creek bank is approximately 5m to the west of the subject site, and 30m to the south.

KGA has not been supplied with a structural assessment of the existing structure at the southern end of the property at the time of writing this report. However, according to our onsite observations, it would appear the structure performed adequately during the major events of the CES.

Photographs from our site visits are included within Appendix C.

6. GEOLOGY

The GNS Science published geology of the Christchurch Area shows the site is underlain by grey river alluvium comprising gravel, sand, and silt, beneath plains or low-level terraces. These deposits can range from veneers of sediment up to many tens of meters thick.

7. GROUND INVESTIGATION

Deep and shallow ground investigation was undertaken onsite for subsoil identification and bearing capacity purposes. The subsurface conditions on site were explored by drilling five hand auger boreholes (HA01 to HA05), performing six Scala penetrometer tests (SP01 to SP05) within the borehole locations, and three cone penetrometer tests (CPT-01 to CPT-03) as shown in Table 1. The shallow drilling services were provided by KGA on 15 May 2020, with the CPT undertaken by Ground Investigation Ltd on the same date. A description of the testing is given in the following sections.

Table 1: Schedule of Exploratory Holes

Test Type	Test Ref.	Depth (m)	Reason for Termination	Date of Test
Hand Auger	HA01	0.6	Refusal	15 May 2020
	HA02	3.0	Target Depth	
	HA03	0.3	Refusal	
	HA04	3.0	Target Depth	
	HA05	2.7	Hole Collapse	
Scala Penetrometer	SP01	3.0	Target Depth	15 May 2020
	SP02			
	SP03			
	SP04			
	SP05			
CPT	CPT-01	9.0	Refusal	15 May 2020
	CPT-02	5.6		
	CPT-03	8.7		

The exploratory borehole locations were selected to provide representative indications of the subsurface ground conditions within the area being assessed. The locations of the exploratory holes are indicated on our Site Plan, attached as Sheet 1. We note that due to the presence and thickness of hardfill within the carpark area, our hand auger boreholes were moved to the northern boundary within the grassed areas. We also increased the number of CPTs from those initially scheduled in order to provide testing coverage within the carpark.

7.1 Scala Penetrometer Tests and Hand Auger Boreholes

The Scala penetrometer probe consists of a hand operated dynamic cone penetrometer and is used to evaluate the penetration resistance of a soil. A 9kg hammer weight is dropped over a distance of 510mm driving a 20mm diameter cone into the ground. The number of hammer blows is recorded for each 50mm of penetration. Testing is in accordance with Test 6.5.2:1988 of NZS 4402.

Hand auger boreholes were drilled in conjunction with the Scala penetrometer testing using a 50mm diameter hand auger and a soil description log in accordance with the NZGS Guidelines “Field description of soil and rock” is presented for each borehole. Scala Penetrometer testing was carried out at nominal 1.0m depth intervals with hand auger boreholes drilled over the Scala test points to the same depth to reduce the friction on the rod for subsequent testing.

The hand auger boreholes and Scala penetrometer tests were scheduled to be taken to 3.0m depth or to a depth where effective refusal was reached, whichever was shallower. The logs of the hand auger boreholes and Scala penetrometer probes are provided as Sheets 2A to 2F.

7.2 Cone Penetrometer Testing

The CPT work was undertaken by Ground Investigation Ltd with a 1.1 tonne Pagani TG63-150, using a cone of 10cm^2 cross-sectional area, and a 150cm^2 friction sleeve area. Continuous measurement of pore water pressure was undertaken during testing (u2). Tests were undertaken in accordance with A.S.T.M. Standard D 5778-12 procedure. The test target depth was to a minimum depth of 10m or refusal, whichever came first. The CPT logs are attached as Sheets 3A to 3C

7.3 Subsurface Conditions

The subsurface ground conditions encountered are briefly described and summarised in Table 2. For a full detailed description, reference should be made to the borehole and CPT logs included within the Attachments. In order to prepare a subsurface model of the site, the subsurface conditions encountered have been inferred between our boreholes. It must be accepted that the conditions are likely to vary between each borehole location, particularly when the distance between boreholes is large.

Table 2: Subsurface Conditions

Geotechnical Unit		Depth to Base (m)	Description	Scala Penetrometer Reading (blows per 100mm)	CPT q_t Value (MPa)
1	TOPSOIL & MADE GROUND	0.3 – 0.5	TS: Organic silt with mottling *MG: gravel	TS: 1 – 2 MG: --	--
2	SILT, Sandy SILT, Silty SAND **	4.6 – 5.8	Interbedded silt, sandy silt, and silty sand; loose to dense	2 – 8	1 – 8
3	SAND & Gravelly SAND **	9.0+	Dense to very dense sand and gravelly sand; minor lenses of silty sand (medium dense)	--	15 – 40+

** The gravel thickness within the carpark was approximately 300mm to 400mm based on CPT investigations*

*** Unit and/or depth interpreted from onsite CPTs with no physical sample recovery below hand auger termination depth*

7.4 Groundwater

Groundwater was encountered at 2.6m and 2.7m depth during our shallow site testing, and was estimated between 3.6m and 3.9m depth within the CPT locations. Groundwater levels can and will vary with changes in weather patterns, particularly following periods of prolonged wet or dry weather.

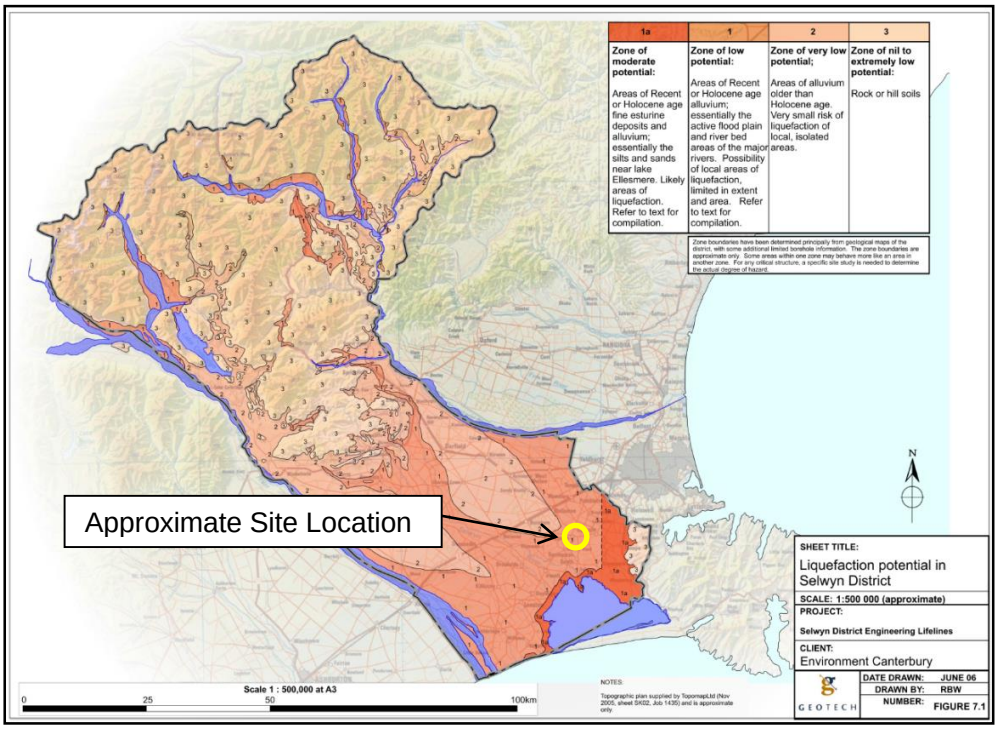
8. LIQUEFACTION ASSESSMENT

8.1 General

As part of the ground investigation, we have examined an existing report prepared by Geotech Consulting Ltd for Environment Canterbury named "Selwyn District engineering lifelines project: Earthquake hazard assessment (Yetton and McCahon, 2006)". The purpose of this report is to present a district-scale map to define areas of different liquefaction susceptibility within Selwyn District.

Figure 1 shows a map of Selwyn District that is included in the above report, indicating zones of relative liquefaction susceptibility.

Figure 1: Map of Selwyn District, Liquefaction Potential



Source: "Selwyn District engineering lifelines project: Earthquake hazard Assessment"

We note that the site study area falls within Zone 1, designated as a “Zone of low potential”. The report points out that the Zone boundaries are approximate, and the underlying geology is more complex than the map implies.

8.2 Liquefaction Analyses

In order to better assess the liquefaction potential of the proposed development site, liquefaction analyses were completed for both SLS and ULS design criteria, using the onsite CPT data. Calculations were performed over the full investigation depth as the MBIE ‘Index’ depth of 10.0m was not achieved.

This section presents two parameters commonly used to assess the liquefaction vulnerability; the liquefaction induced settlements and the Liquefaction Severity Number (LSN).

The seismic design requirements adopted for use in the analyses are defined in Part C of the MBIE Guidelines “Repairing and rebuilding houses affected by the Canterbury earthquakes” with the recent update regarding Boulanger & Idriss (2014) liquefaction analysis methodology. These are:

- Buildings of normal use (Importance Level 2).
- Deep or soft soil sites (Class D).
- Magnitude M7.5 EQ event and peak Ground Acceleration (PGA) of 0.13g and magnitude M6.0 EQ event and peak Ground Acceleration (PGA) of 0.19g for annual exceedance probabilities of 1/25 (SLS1 and SLS2) – considering the highest calculated total volumetric strain from either scenario adopted.
- Magnitude M7.5 EQ event and 0.35g for annual exceedance probabilities of 1/500 (ULS).
- Boulanger and Idriss (2014) methodology for liquefaction triggering.
- Zhang et al. (2002) volumetric densification calculation.

The in situ groundwater level was considered to exist at 2.5m below ground level (bgl), and the groundwater level during earthquake used for the calculation was assumed at 2.0m bgl.

8.3 Calculated Settlement

We have analysed the CPT data using the current software 'CLiq' and a copy of the output from the analyses has been included within Appendix D. The software includes for normalisation of the data for overburden pressure and is considered to provide improved indications of liquefaction potential. The results are presented in Table 3.

Table 3: Liquefaction Induced Global Settlements Analysis Results

Test	Calculation Limit Depth (m)	Calculated Vertical Settlement (mm)		
		SLS1	SLS2	ULS
CPT-01	Full Depth (9.0)	25 (TC2)	45 (TC2)	60 (TC2)
CPT-02	Full Depth (5.6)	< 5 (TC1)	5 (TC1)	30 (TC2)
CPT-03	Full Depth (8.7)	5 (TC1)	10 (TC1)	25 (TC1)

Under SLS seismic demands, the above calculated settlements generally fall within TC1 and TC2 categorisation as defined by the MBIE Guidance; however, we note that the CPTs were terminated above the MBIE Index depth of 10.0m. The analyses suggest that the sands and silty sands below the water table are liquefiable under ULS seismic events, and a relatively stiff 2m thick crust is present at the surface. We note that CPT-01 at the eastern end of the proposed new development indicates liquefaction within the sands and gravels below 6m depth at SLS levels of seismicity; however, little to no liquefaction is predicted at the remaining two CPT locations during SLS level events. We point out that CPT-02 was terminated (due to refusal) above 6m bgl, and additional liquefaction is possible below this depth.

Post-earthquake general observations show that the empirical calculation of the settlement is uncertain with perhaps a ± 50% margin to the numbers given in Table 3. We therefore recommend that engineering judgment is applied when interpreting the computed settlements.

We point out that the settlements presented in Table 3 describe the settlements of the ground not occupied by a building, occurring due to dissipation of excess pore water pressure generated during earthquake shaking. Additional settlements may also occur due to yield of the liquefied soils under foundation loading, soil loss of volume (liquefaction ejecta) and lateral spreading, but these components are very difficult to predict. Subsurface conditions may vary across the site, making accurate prediction of future settlements even more difficult.

8.4 Liquefaction Severity Number (LSN)

The Liquefaction Severity Number (LSN) is a calculated parameter developed by Tonkin & Taylor (on behalf of the Earthquake Commission) in 2013 for use in Christchurch and presented in more detail in the Liquefaction Vulnerability Study report (T&T, 2013).

Unlike the settlement parameter, the LSN assessment includes for the thickness of the non-liquefiable crust (largely controlled by depth to groundwater level) and depth at which the liquefaction will occur. We have analysed the CPT data using the current software 'CLiq' and the calculated LSN values are presented in Table 4.

Table 4: Liquefaction Severity Number (LSN) values at MBIE index

Test	LSN values	
	SLS2	ULS
CPT-01	8	12
CPT-02	1	8
CPT-03	3	7

Key to LSN Values	
LSN Values	*Expression of Liquefaction*
0 – 10	*Little to none*
10 – 20	*Minor*
20 – 30	*Moderate*
30 – 40	*Moderate to severe*
40 – 50	*Major*
50+	*Severe*

The LSN values presented in Table 4 refer to a land performance with 'little to none' expression of liquefaction expected for SLS level events, and 'little to none' to 'minor' expression of liquefaction for ULS level events.

9. SITE DESIGNATION AND POTENTIAL FOR LATERAL SPREADING

The site is classified as Class "D" – (Deep or soft soil) for structural purposes in the New Zealand design standards (NZS 1170.5:2004).

According to ECan Liquefaction Susceptibility mapping (available on Canterbury Maps), liquefaction was not recorded onsite during the September 2010 or February 2011 earthquake events.

The overall property is located within 5m of a steep slope to the L-I Creek to the east and south. However, the proposed subdivision Lots are at least 5m to the east and 30m to the north of the steep banks. No indications of cracking near the proposed new Lots were observed during our site walkover; however, evidence may have been obscured in the time elapsed between the CES and the writing of this report (approximately 9 years). Furthermore, our CPT analyses indicate a 2m stiff 'crust' is present above the groundwater. Based on these considerations, we consider that the subject site presents potential for minor global lateral movement (up to 100mm) and lateral stretch (up to 50mm) of the ground across the site.

The property is situated in an "Urban/Nonresidential" area as per the MBIE mapping available on the NZGD, and is surrounded by property mapped as TC1. Our analyses suggest that TC2 classification (as per the MBIE Guidance) is appropriate for the subject site under SLS and ULS level seismic demands.

10. GEOTECHNICAL CONSIDERATIONS FOR NEW DWELLINGS

10.1 Geotechnical Considerations

Based on our investigation results and observations, the following recommendations should be considered for new dwellings at the proposed new Lots:

- Topsoil and made ground were identified to 0.5m depth at investigation points.
- An ultimate unfactored bearing capacity of 200kPa was encountered in the natural soil below the topsoil and made ground, as per the results of onsite Scala penetrometer testing.
- The local groundwater level was encountered at 2.6m depth.
- According to our assessment, the subject site is likely to behave as equivalent to a TC2 property as defined in the MBIE Guidance document for residential sites.

According to our assessment, TC2 style foundations (as per the MBIE Guidance document) as described in the following sections would be suitable for dwellings within the proposed new Lots; TC1 foundations would be suitable for any stand-alone garages. Further site-specific shallow soils testing will be required within the new dwelling locations once development details are known. KGA would be pleased to provide this service.

11. SUITABILITY OF SITE FOR SUBDIVISION

Section 106 of the Resource Management Act (RMA) states that a consent authority may refuse to grant subdivision consent, or may grant conditional subdivision consent, if it considers that:

- There is a significant risk from natural hazards
- Sufficient provision has not been made for legal and physical access to each allotment to be created by the subdivision.

Our assessment of the subject site against the requirements of Section 106 is presented in Table 5.

Table 5: Assessment of the site against the RMA requirements

Hazard	Potential Susceptibility	
	Current (Section 106, 1A)	Post Development (Section 106, 1Ac)
Erosion	No evidence of erosion or gullying across site.	Provided stormwater is discharged in a controlled manner and appropriate engineering design is implemented, erosion is unlikely to worsen due to development or have significant adverse effects on the development.
Falling Debris	The site is flat and located away from any hills, with no risk of falling debris.	--
Slippage / lateral movement	The site presents a minor potential for global horizontal movement and lateral stretch.	The development will not have any effect that could worsen the existing potential for horizontal movement on site.
Subsidence	Potential liquefaction hazard is present on site.	Significant damage is unlikely to occur to the proposed development provided building foundations are appropriately designed as per recommendations in Section 10 of our geotechnical report.
Inundation	The site is not within a flood management area as per the Selwyn District Plan. The SDC should be contacted to comment on floor level requirements.	Provided stormwater discharge is appropriately managed, any finished floor level requirements are respected, and/or advise is sought from an experienced civil engineer, we consider that the risk of inundation will not exacerbated by developing the land and may be appropriately managed.

Based on these considerations, we believe on reasonable grounds that the site is suitable for the proposed subdivision in terms of geotechnical constraints. A Statement of Professional Opinion on the suitability of land for subdivision is presented in Appendix D. It should be noted that other natural hazards (such as tsunamis) not specifically included in Table 5 are outside of the scope of works for our geotechnical investigation.

12. FURTHER WORKS

This report is a geotechnical assessment in terms of suitability of the land for subdivision and general recommendations regarding proposed development. Details of proposed building development were not known at the time of writing this report and further coordination will be required to conduct site-specific shallow investigations and confirm foundation design for each new Lot.

13. LIMITATIONS

Our report was prepared in line with the current MBIE Guidance. To satisfy the requirements of the Building Code and the New Zealand Standard “NZS 1170 - Structural Design Actions”, foundations must be designed so that the building must remain functional under SLS level loads; minor damage is acceptable provided the damage is readily repairable, and the building does not collapse under ULS level loads, but could suffer moderate to significant structural damage.

Desk study data was obtained from several investigation and modelling study sources made available to the public and engineering industry post the Canterbury earthquake sequence. Acknowledgment is given regarding the free use of the New Zealand Geotechnical Database, Selwyn District Council and Environment Canterbury websites. The data is used in good faith and no responsibility can be taken for the accuracy or completeness of the data.

Our report was prepared in the context defined in Section 1.0 and must not be relied upon by any other party other than that for whom it was prepared and their project team. It has been compiled with respect to the brief given to us, and must not be relied upon in any other context or recreated for any other purpose. We point out that our conclusions are based on desk study material, a visual surface inspection of the site, third party investigation data from nearby sites and discrete exploratory hole positions. Ground conditions may vary between investigation points.

REFERENCES

Boulanger, R. W., Idriss, I. M. (2014). CPT and SPT Based Liquefaction Triggering Procedures. Center for Geotechnical Modelling, Department of Civil & Environmental Engineering, College of Engineering, University of California at Davis, April 2014. Report No. UCD/CGM-14/01.

Canterbury Maps. (2014). Canterbury Maps Viewer. Retrieved from https://mapviewer.canterburymaps.govt.nz/?webmap=0c3ca2ccfe1145c5849dc39864590d0b

Day. R.W. (2001). Geotechnical Earthquake Engineering Handbook: London, United Kingdom: McCraw-Hill.

Forsyth, P.J., Barrell, D.J.A., & Jongens, R. (2008). Geology of the Christchurch area. Institute of Geological and Nuclear Sciences 1:250 000 map 16. Lower Hutt, New Zealand: Institute of Geological & Nuclear Sciences Limited.

Geotech Consulting Ltd. (2006). Liquefaction Potential in Selwyn District, Figure 7.1

Ministry of Business, Innovation & Employment. (2012). Repairing and rebuilding houses affected by the Canterbury earthquakes (Version 3). Wellington, New Zealand.

New Zealand Geotechnical Database. (2016). NZGD. Retrieved from http://www.nzgd.org.nz

New Zealand Geotechnical Society. (2005). Field description of soil and rock - Guideline for the field classification and description of soil and rock for engineering purposes.

New Zealand Geotechnical Society and Ministry of Business, Innovation & Employment. (2017). Earthquake Geotechnical Engineering Practice, Module 6: Earthquake resistance retaining wall design. Wellington, New Zealand.

Selwyn District Council. (2016). Selwyn District Plan. Retrieved from https://www.selwyn.govt.nz

Standards New Zealand. (1988). Determination of the penetration resistance of a soil (NZS 4402:1988). Wellington, NZ: Standards New Zealand.

Standards New Zealand. (2011). Timber Framed Buildings (NZS 3604:2011). Wellington, NZ: Standards New Zealand.

Tonkin & Taylor Ltd. (2013). Liquefaction Vulnerability Study. Retrieved from: http://www.eqc.govt.nz/sites/public_files/documents/liquefaction-vulnerability-study-final.pdf

ATTACHMENTS

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

1) Areas and dimensions are approximate only and are subject to final survey and deposit of plans.

2) Service easements to be created as required.

3) This plan has been prepared for discussion purposes only. No liability is accepted if the plan is used for any other purposes.

Total Area : 1.0070ha

Comprised in: C.F.R.518430

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Millpond Lane , Lincoln

SHEET TITLE:

Site Plan

DRAWING STATUS

For Discussion Purposes

SCALE : 1:500@A3 DATE : April 2020

CAD FILE : J:\19698\P19698 Site Plan R1.dwg

REVISION : **R0**

DRAWING No : **P19698**

SHEET No: 1 OF 1

APPENDIX A

Third Party Documents

FIELD TESTING LOCATION PLAN

Job No.: K200317
Sheet: 1
Ground Level: 0
Date: 15/05/20

Client:	Project:	Location:	Coordinates (NZTM):
Selwyn District Council.	Geotechnical Investigation.	24 Millpond Land, Lincoln.	E 1,558,796.35 N 5,167,680.42

Key:

- Hand Auger and Scala Location
- Scala Location
- Cone Penetrometer location
- Cone Penetrometer location and Piezometer installation point
- Borehole Location
- Trial Pit
- Red Line indicates property boundary
- HADCP sourced from NZGD
- CPT sourced from NZGD
- DCP sourced from NZGD
- Borehole sourced from NZGD

N

Notes: 1. Locations and features and exploratory holes approximate only.
2. Aerial photograph sourced from Google Earth.
3. Co-ordinates may not be a true representation of the site plans locations and are only accurate to +/- 1m.
4. Not to scale.

HAND AUGER AND SCALA LOG

Job No.:	**K200317**
Hole No.:	**HA01/SP01**
Date:	15/05/2020
Logged By:	GA
Sheet:	2A

Client: Selwyn District Council.

Project: Geotechnical Investigation.

Location: 24 Millpond Land, Lincoln.

Coordinates: E 1558744.3, N 5167678.3 **Ground Level:** -

RL	Subsurface Conditions	Depth (m)	Groundwater	Geological Unit	Graphic Log
	Organic sandy SILT, trace rootlets, brown, dry, non-plastic, dilatant; sand, fine to medium; organics, amorphous.		Groundwater Not Encountered	TOPSOIL	TS
	0.20m: rootlets absent.				
	0.25m: light brown mottling.				
	SILT, some sand, light brown, dry, non-plastic, slow-dilatancy; sand, fine to medium.			ALLUVIUM	
	0.50m: trace tree roots.	0.5			
	0.60m: End of hole (refusal, inferred tree roots)				
		1.0			
		1.5			
		2.0			
		2.5			

Scala Penetrometer (blows / 50mm)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

1, 2, 3, 4, 3, 4, 3, 4, 5, 6, 6, 6, 6, 6, 5, 6, 2, 3, 2, 3, 2, 3, 3, 3, 3, 3, 3, 3, 3, 4, 3, 4, 2, 3, 2, 3, 2, 2, 2, 3, 3, 3, 3, 3, 5, 5, 4, 4, 4, 4, 4, 4, 4, 5, 3, 4, 3, 3, 3, 3

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS. Co-ordinates are in NZTM unless otherwise specified.

Water

- Standing Water Level
- Water Level At Time Of Drilling
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

KGA GEOTECHNICAL

Produced with Core-GS

Printed: 25/05/2020 2:33:23 p.m.

HAND AUGER AND SCALA LOG

Job No.:	**K200317**
Hole No.:	**HA02/SP02**
Date:	15/05/2020
Logged By:	GA
Sheet:	2B

Client: Selwyn District Council.

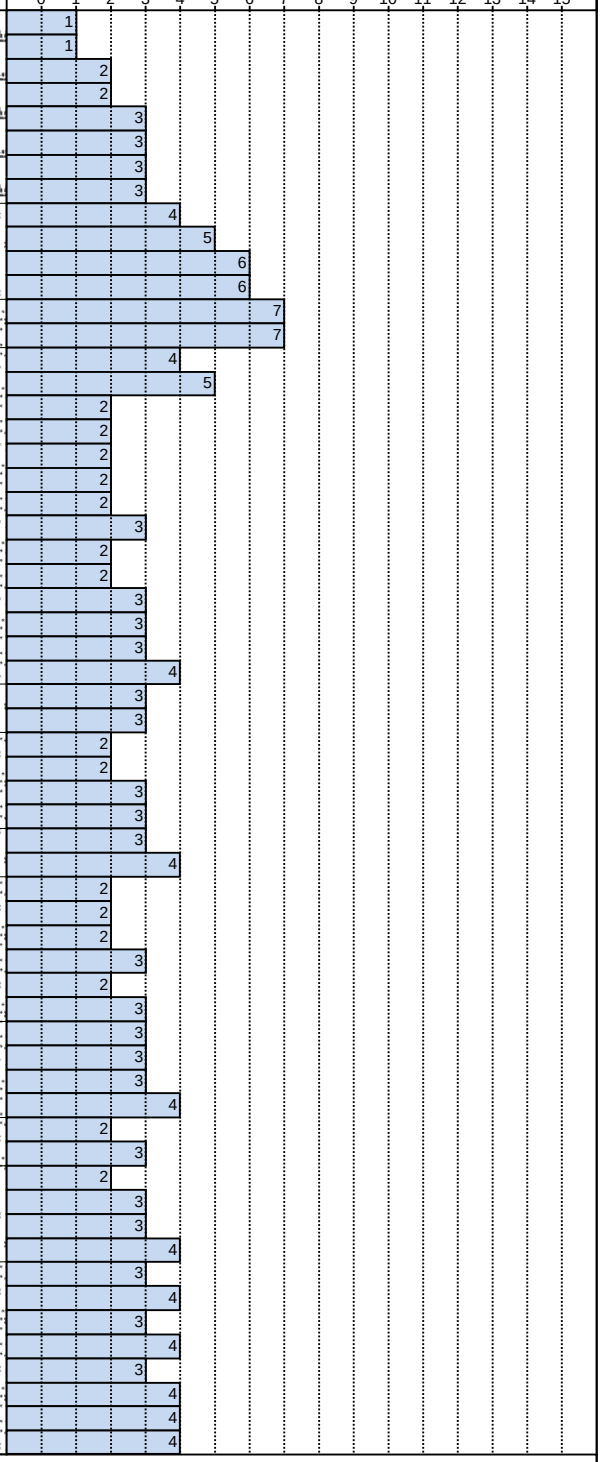
Project: Geotechnical Investigation.

Location: 24 Millpond Land, Lincoln.

Coordinates: E 1558748.7, N 5167666.8 **Ground Level:** -

RL	Subsurface Conditions	Depth (m)	Groundwater	Geological Unit	Graphic Log
	Organic SILT, some sand, trace rootlets, light brown, dry, non-plastic, slow-dilatancy; sand, fine to medium; organics, amorphous.			TOPSOIL	
	0.20m: rootlets absent.				
	SILT, some sand, brown, moist, non-plastic, slow-dilatancy; sand, fine.	0.5			
	Sandy SILT, light brown, dry, non-plastic, dilatant; sand, fine to medium.				
	Silty SAND, light brown. Dense, dry, poorly graded; sand, fine to medium.				
	0.80m: medium dense.				
		1.0			
	1.30m: dense.				
	SILT, some sand, light brown with orange mottling, moist, non-plastic, slow-dilatancy; sand, fine to medium.				
	Sandy SILT, light brown with brownish orange mottling, dry, non-plastic, dilatant; sand, fine to medium.	1.5	Groundwater Not Encountered	ALLUVIUM	
	SILT, some sand, light brown, dry to moist, non-plastic, slow-dilatancy; sand, fine.				
	Sandy SILT, light brown, dry, non-plastic, dilatant; sand, fine to medium.				
		2.0			
	Silty SAND, light brown. Medium dense, dry to moist, poorly graded; sand, fine to medium.				
	2.20m: dense.				
	Sandy SILT, reddish brown, moist, non-plastic, dilatant; sand, fine to medium.				
	SILT, some sand, light brown, moist, non-plastic, slow-dilatancy; sand, fine.	2.5			
	Sandy SILT, brownish grey with orange mottling, moist, non-plastic, dilatant; sand, fine to medium.				
	3.00m: End of hole (target depth).				

Scala Penetrometer (blows / 50mm)



Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS. Co-ordinates are in NZTM unless otherwise specified.

Water

- Standing Water Level
- Water Level At Time Of Drilling
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

KGA GEOTECHNICAL

Produced with Core-GS

Printed: 25/05/2020 2:33:25 p.m.

HAND AUGER AND SCALA LOG

Job No.:	**K200317**
Hole No.:	**HA03/SP03**
Date:	15/05/2020
Logged By:	GA
Sheet:	2C

Client: Selwyn District Council.

Project: Geotechnical Investigation.

Location: 24 Millpond Land, Lincoln.

Coordinates: E 1558774.0, N 5167692.0 **Ground Level:** -

RL	Subsurface Conditions	Depth (m)	Groundwater	Geological Unit	Graphic Log	Scala Penetrometer (blows / 50mm)
	Organic sandy SILT, trace rootlets, light brown, dry, non-plastic, dilatant; sand, fine to medium; organics, amorphous.		dwater Not Encoun	TOPSOIL	TS	2
					TS	2
					TS	3
					TS	4
					TS	5
					TS	5
	0.30m: End of hole (too dense to auger).					4
		0.5				5
						5
						5
						5
						5
						5
						5
						5
						5
						5
						6
						5
		1.0				6
						4
						5
						3
						3
						3
						4
						4
						5
						5
		1.5				5
						5
						5
						4
						5
						3
						3
						3
						4
						3
		2.0				4
						3
						4
						5
						6
						6
						6
						6
						6
						6
						6
		2.5				5
						5
						5
						5
						4
						5
						3
						3
						2
						3

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS. Co-ordinates are in NZTM unless otherwise specified.

Water

- Standing Water Level
- Water Level At Time Of Drilling
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

KGA GEOTECHNICAL

Produced with Core-GS

Printed: 25/05/2020 2:33:28 p.m.

HAND AUGER AND SCALA LOG

Job No.:	**K200317**
Hole No.:	**HA04/SP04**
Date:	15/05/2020
Logged By:	GA
Sheet:	2D

Client: Selwyn District Council.

Project: Geotechnical Investigation.

Location: 24 Millpond Land, Lincoln.

Coordinates: E 1558807.8, N 5167705.3 **Ground Level:** -

RL	Subsurface Conditions	Depth (m)	Groundwater	Geological Unit	Graphic Log	Scala Penetrometer (blows / 50mm)
	Organic SILT, minor sand, trace rootlets, brown, moist, non-plastic, non-dilatant; sand, fine to medium; organics, amorphous.			TOPSOIL		
	0.20m: rootlets absent.					
	0.40m: light brown mottling.					
	SILT, minor sand, light brown, moist, non-plastic, non-dilatant; sand, fine.	0.5				
	0.70m: some fine to medium sand, slow-dilation.					
	Sandy SILT, light brown, moist, non-plastic, dilatant; sand, fine to medium.	1.0	Groundwater Not Encountered	ALLUVIUM		
	SILT, minor sand, light brown with orange mottling, moist, non-plastic, non-dilatant; sand, fine.	1.5				
	1.50m: some fine to medium sand, slow-dilation.					
	1.70m: minor sand, non-dilatant.					
	1.80m: moist to wet.					
	Sandy SILT, light brown, moist, non-plastic, dilatant; sand, fine to medium.					
	2.00m: brownish orange mottling, moist to wet.	2.0				
	SILT, minor sand, light brown with orange mottling, moist to wet, non-plastic, non-dilatant; sand, fine.					
	Sandy SILT, light brown, wet, non-plastic, dilatant; sand, fine to medium.	2.5				
	2.80m: wet to saturated.					
	3.00m: End of hole (target depth).					

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS. Co-ordinates are in NZTM unless otherwise specified.

Water

- Standing Water Level
- Water Level At Time Of Drilling
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

Other Comments

KGA GEOTECHNICAL

Printed: 25/05/2020 2:33:29 p.m.

HAND AUGER AND SCALA LOG

Job No.:	**K200317**
Hole No.:	**HA05/SP05**
Date:	15/05/2020
Logged By:	GA
Sheet:	2E

Client: Selwyn District Council.

Project: Geotechnical Investigation.

Location: 24 Millpond Land, Lincoln.

Coordinates: E 1558827.4, N 5167707.2 **Ground Level:** -

RL	Subsurface Conditions	Depth (m)	Groundwater	Geological Unit	Graphic Log
	Organic SILT, minor sand, trace rootlets, dark brown, moist, non-plastic, non-dilatant; sand, fine to medium; organics, amorphous.			FILL/TOPSOIL	
	0.10m: trace fine to medium, sub-rounded, sandstone gravel.				
	0.15m: rootlets absent.				
	0.40m: light brown mottling.	0.5			
	Sandy SILT, light brown with orange mottling, moist, non-plastic, dilatant; sand, fine to medium.	1.0		ALLUVIUM	
	Silty SAND, light brown. Medium dense, moist, poorly graded; sand, fine to medium.				
	1.30m: loose.				
	SILT, minor sand, light brown with orange mottling, moist, non-plastic, non-dilatant; sand, fine.	1.5			
	1.50m: some fine to medium sand, slow-dilation.				
	Sandy SILT, light brown, moist to wet, non-plastic, dilatant; sand, fine to medium.				
	SILT, some sand, light brown, moist, non-plastic, slow-dilatancy; sand, fine to medium.	2.0			
	1.90m: minor fine sand, orange mottling, non-dilatant.				
	Fine to medium SAND, some silt, light brown. Medium dense, moist to wet, poorly graded.				
	2.35m: brown, wet to saturated.				
	2.50m: minor silt, saturated.	2.5	15/05/2020		
	2.60m: dense.				
	2.70m: End of hole (hole collapse)				

Scala Penetrometer (blows / 50mm)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

1 2 1 2 2 3 1 2 1 2 1 2 1 2 1 2 1 2 1 1 2 2 1 1 1 1 1 1 1 2 1 1 2 2 3 3 3 2 1 2 1 2 1 2 3 3 4 4 6 6 6 6 6 6

Notes & Abbreviations

Soils logged in accordance with 'The guidelines for the classification and description of soil and rock for engineering purposes' December 2005, NZGS. Co-ordinates are in NZTM unless otherwise specified.

Water

- Standing Water Level
- Water Level At Time Of Drilling
- Out Flow / In Flow

Shear Vane

Corrected as per NZGS Guidelines
Vane No.:
UTP = Unable To Penetrate
+ = Peak Exceeded
- = No Result

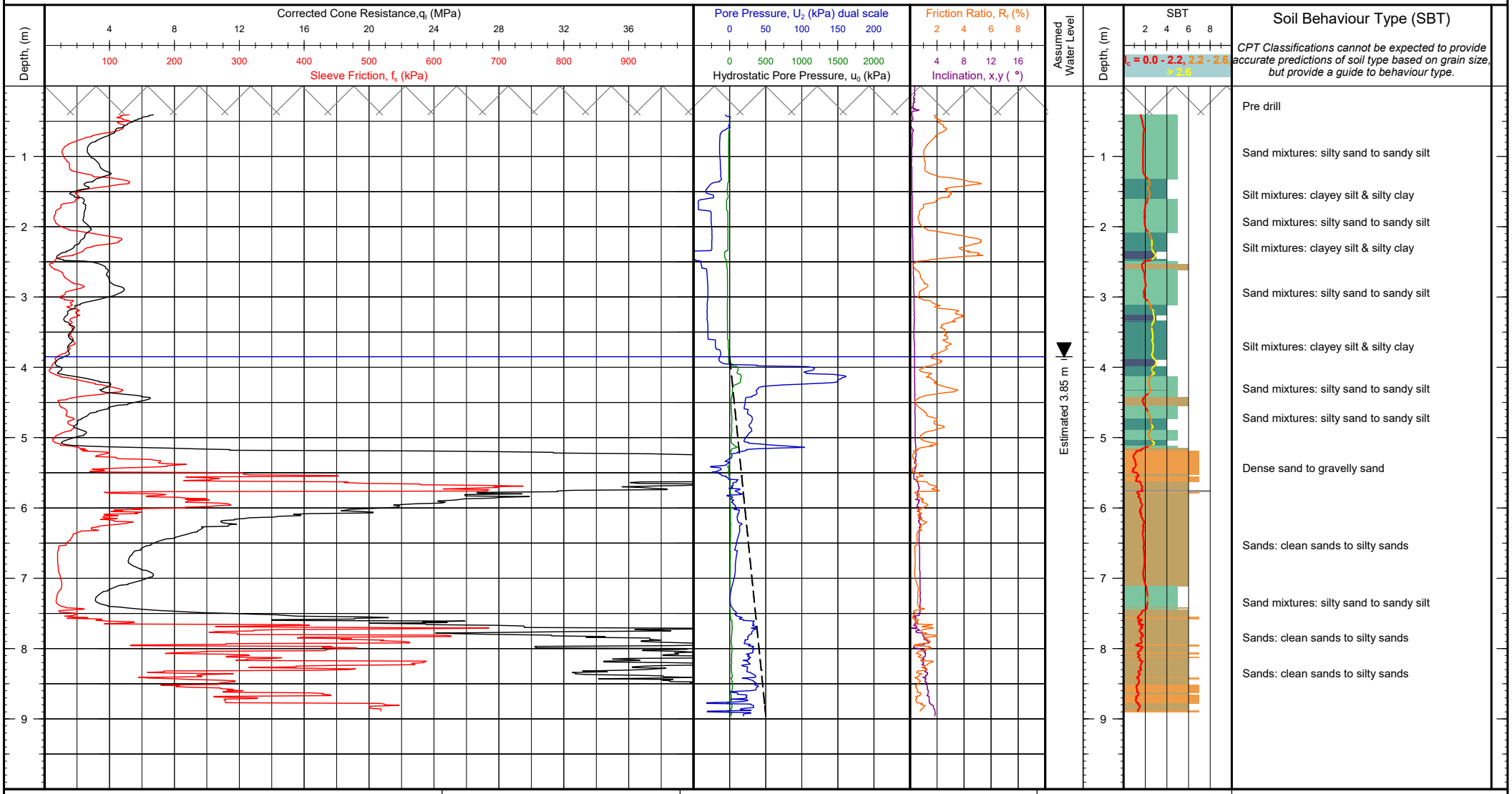
Other Comments

KGA GEOTECHNICAL

Produced with Core-GS

Printed: 25/05/2020 2:33:31 p.m.

CONE PENETRATION TEST (CPT) LOG



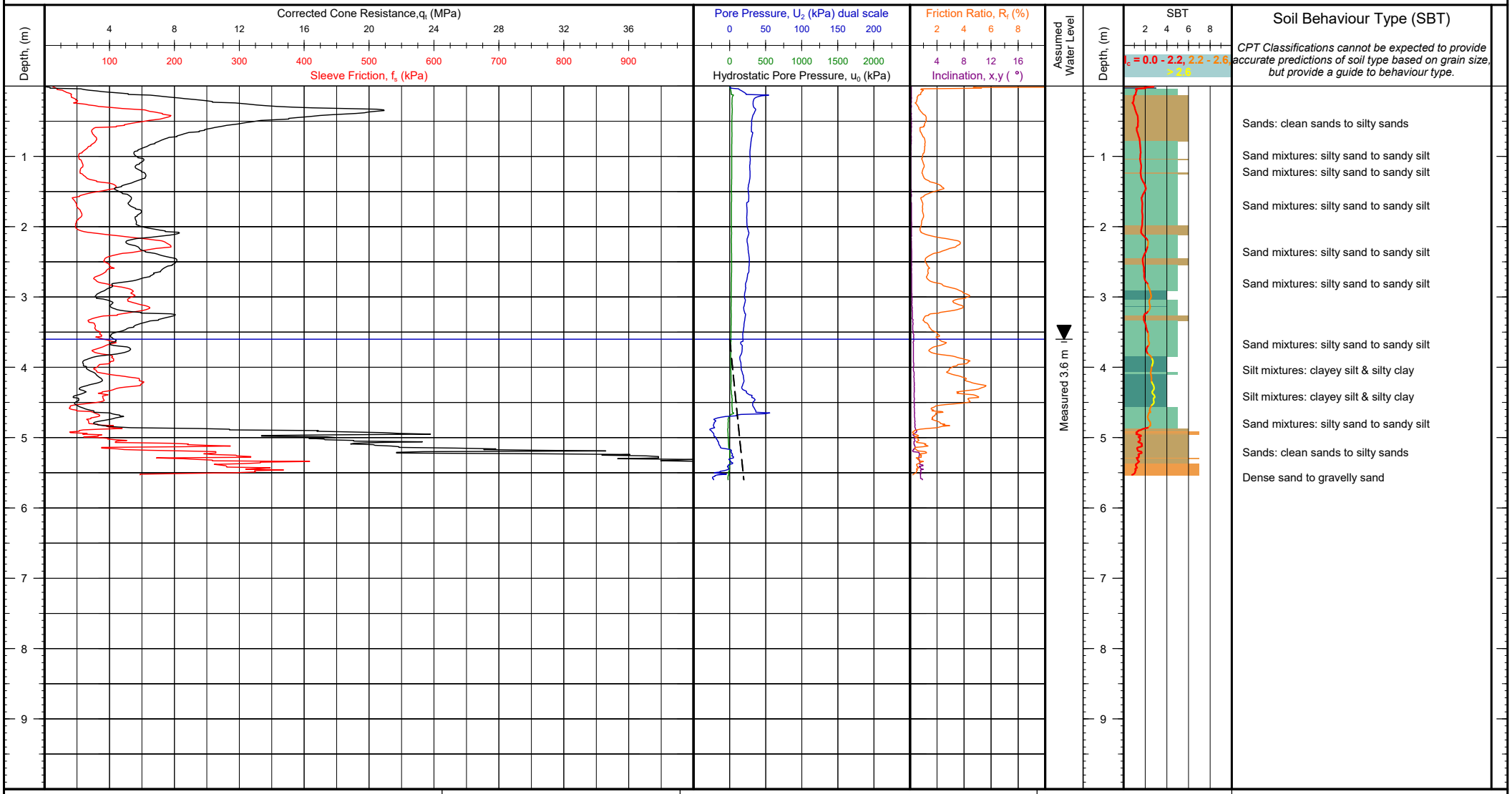
Client:	KGA Geotechnical	**Operator:**	John Cresswell	**NZTM 2000 N, E (m):**	5167697.37, 1558841.43	**Elevation (m):**	Unknown
Project:	24 Millpond Lane	**Cone Ref:**	MKJ300	**WGS84 (deg):**	-43.642579,172.489689	**Date of Test:**	15/05/2020
Location:	Halswell, Lincoln	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	8.96
Engineer:	Alice Sai Louie	**Area Ratio:**	0.8	**Surveyor:**		**Pre Drill (m):**	0.40 m
Contractor:	Ground Investigation Ltd.	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance	**G.I. Job Ref:**	200418

Client Job Ref:

Test Number: **CPT-01**

Comments:

CONE PENETRATION TEST (CPT) LOG



Client:	KGA Geotechnical	**Operator:**	John Cresswell	**NZTM 2000 N, E (m):**	5167659.35, 1558726.00	**Elevation (m):**	Unknown
Project:	24 Millpond Lane	**Cone Ref:**	MKJ300	**WGS84 (deg):**	-43.642915,172.488255	**Date of Test:**	15/05/2020
Location:	Halswell, Lincoln	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	5.60
Engineer:	Alice Sai Louie	**Area Ratio:**	0.8	**Surveyor:**		**Pre Drill (m):**	N/A
Contractor:	Ground Investigation Ltd.	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

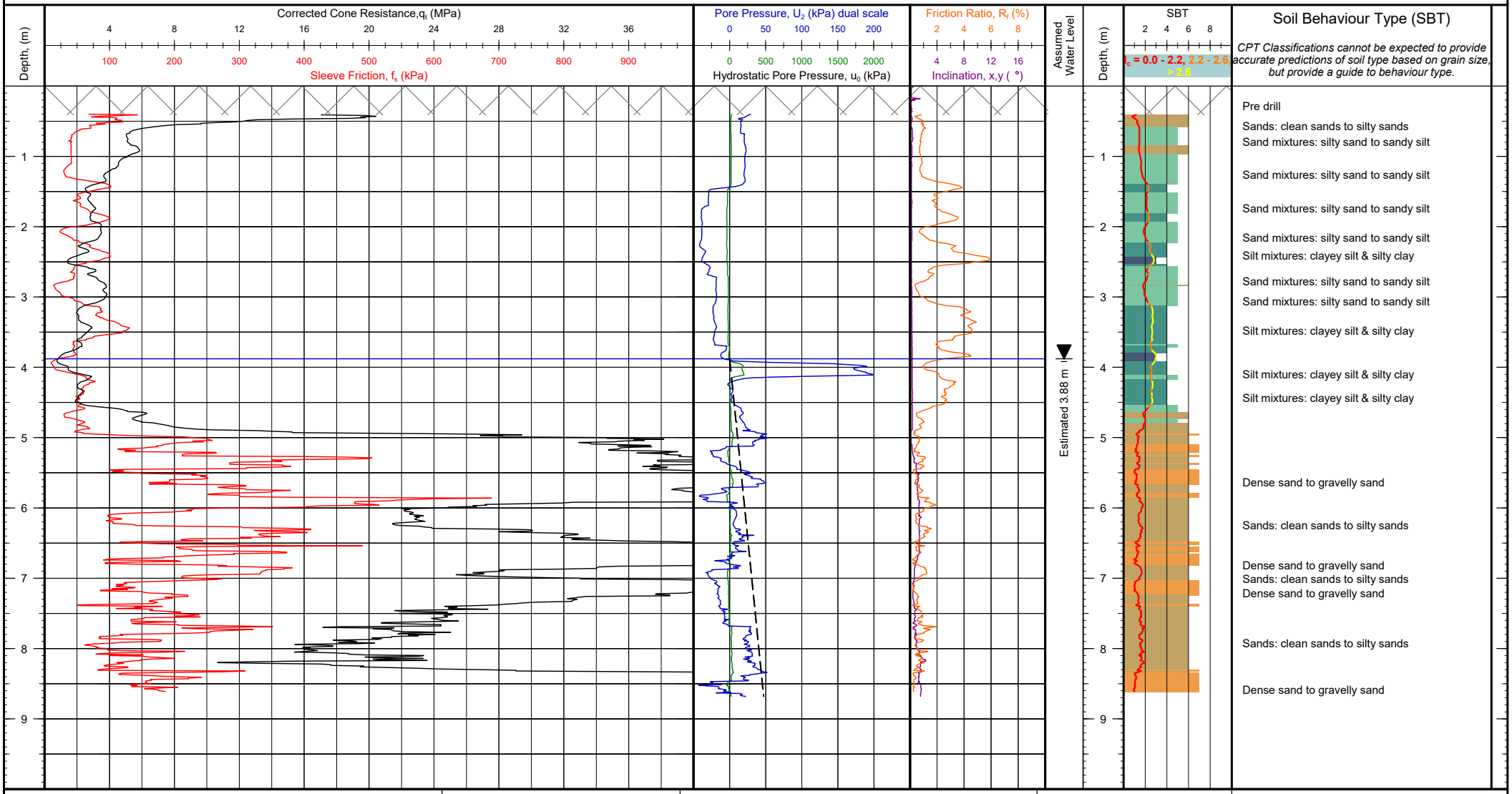
Client Job Ref:

Test Number: **CPT-02**

G.I. Job Ref: 200418

Comments:

CONE PENETRATION TEST (CPT) LOG



Client:	KGA Geotechnical	**Operator:**	John Cresswell	**NZTM 2000 N, E (m):**	5167682.96, 1558809.90	**Elevation (m):**	Unknown
Project:	24 Millpond Lane	**Cone Ref:**	MKJ167	**WGS84 (deg):**	-43.642707,172.489297	**Date of Test:**	15/05/2020
Location:	Halswell, Lincoln	**Cone Type:**	10cm^2 Compression	**Location Method:**	Handheld GPS	**Depth (m):**	8.68
Engineer:	Alice Sai Louie	**Area Ratio:**	0.8	**Surveyor:**		**Pre Drill (m):**	0.40 m
Contractor:	Ground Investigation Ltd.	**Filter Type:**	u_2	**Termination Reason:**	High cone end resistance		

Client Job Ref:

Test Number: **CPT-03**

G.I. Job Ref: 200418

Comments:

APPENDIX B

Site Photographs

Site Photographs:

View east from northwestern corner of site

View southeast from northwestern corner of site

View south from northwestern corner of site

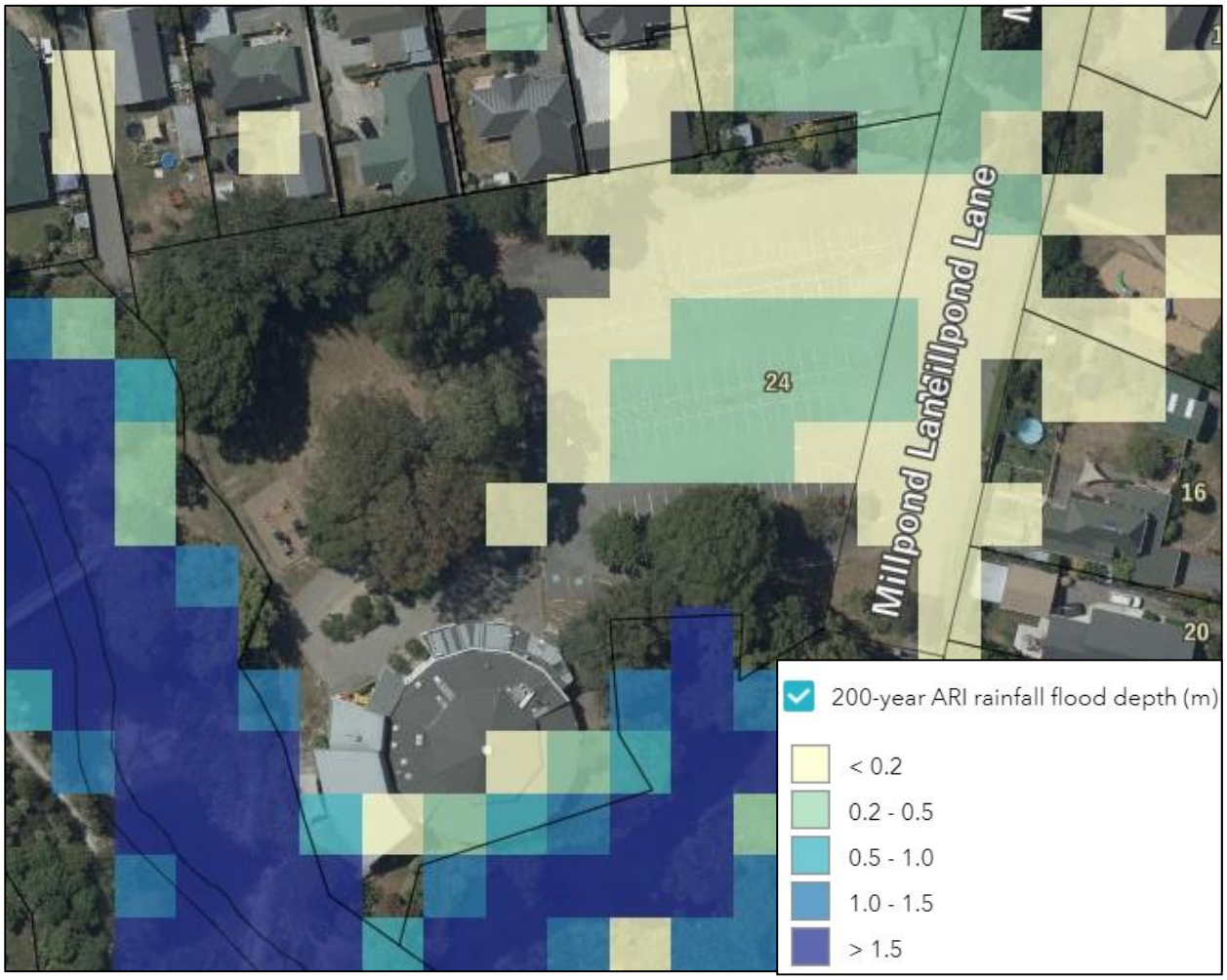
View northeast from southwestern corner of parking area

View south along L-I Creek from beyond northwestern corner of site

APPENDIX C

Background Information Documents

Flood Mapping Excerpt



Notes:

1. Aerial photograph sourced from ECan online mapping

LLUR Extract:

Listed Land Use Register (LLUR)

Search

24 Edward Street, Lincoln, Selwyn District

(Having trouble finding your address?)

Property Search Results

	Legal Description	Titles	Valuation No	
24 EDWARD STREET				
1	Lot 2 DP 430391	518430	2404156500	✖

OVERVIEW | FINDING YOUR ADDRESS | SEARCH SUMMARY

Thank you for your enquiry.

The Listed Land Use Register has information relating to this land parcel.

If you would like a property statement and / or a site management plan, please fill in your details below.

Records Found

HAIL Activities

No.	HAIL Type
ACT 9781	A17 - Storage tanks or drums for fuel, chemicals or liquid waste

Sites

No.	Site Category	Site Name
SIT 9735	Below guideline values - Industrial/Commercial	24 Edward Street, Lincoln

Investigations

No.	Type	Investigation Title	Report Date
INV 9409	DSI	Report on the removal of an underground diesel fuel storage tank at 24 Edward Street, Lincoln	Dec 23, 2011

APPENDIX D

Liquefaction Analyses

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

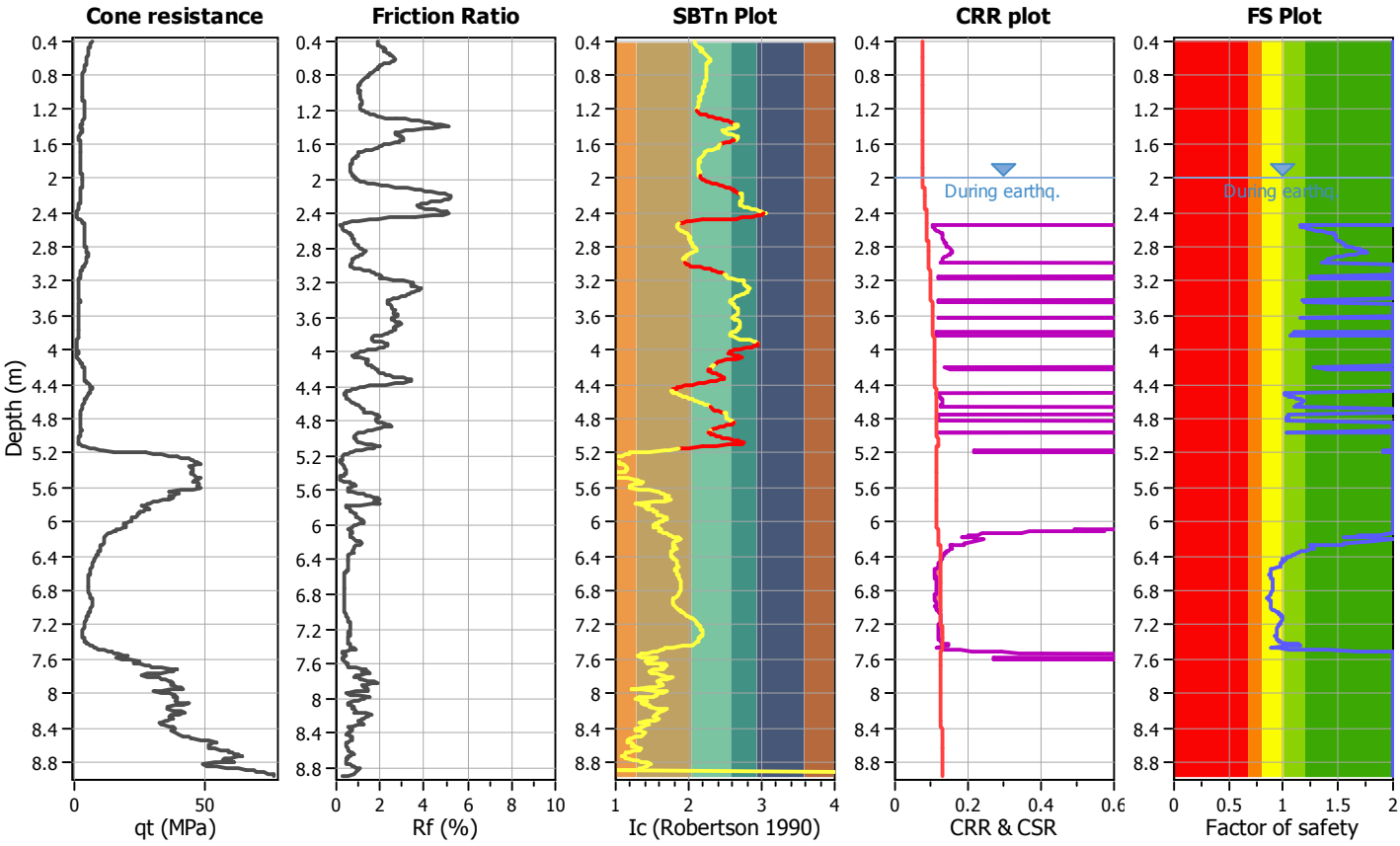
LIQUEFACTION ANALYSIS REPORT

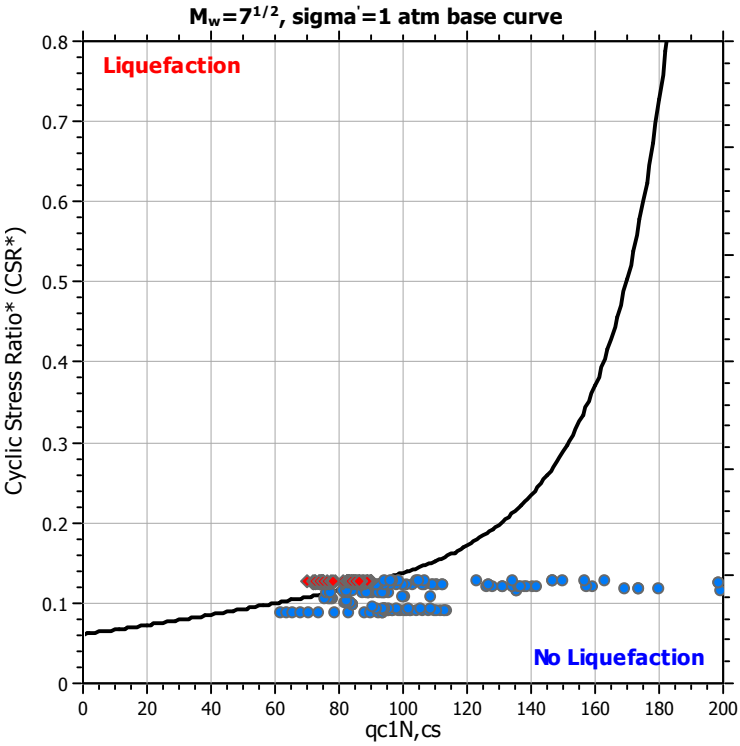
Project title : K200317 **Location : 24 Millpond Lane**

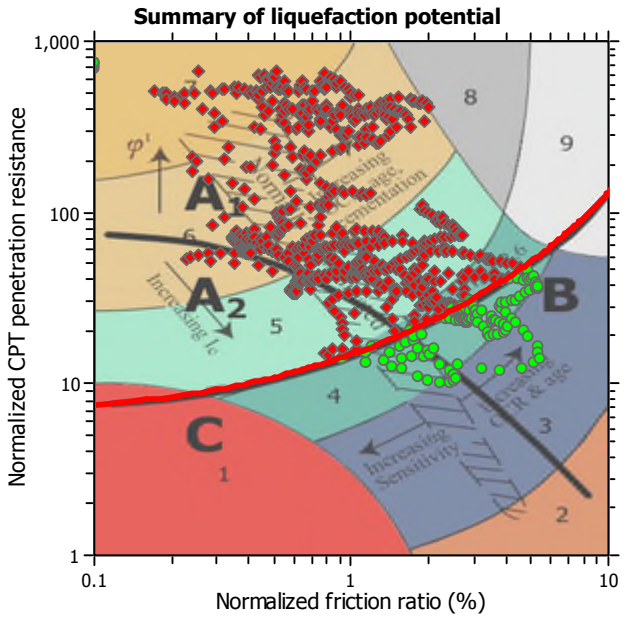
CPT file : CPT-01 SLS1

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

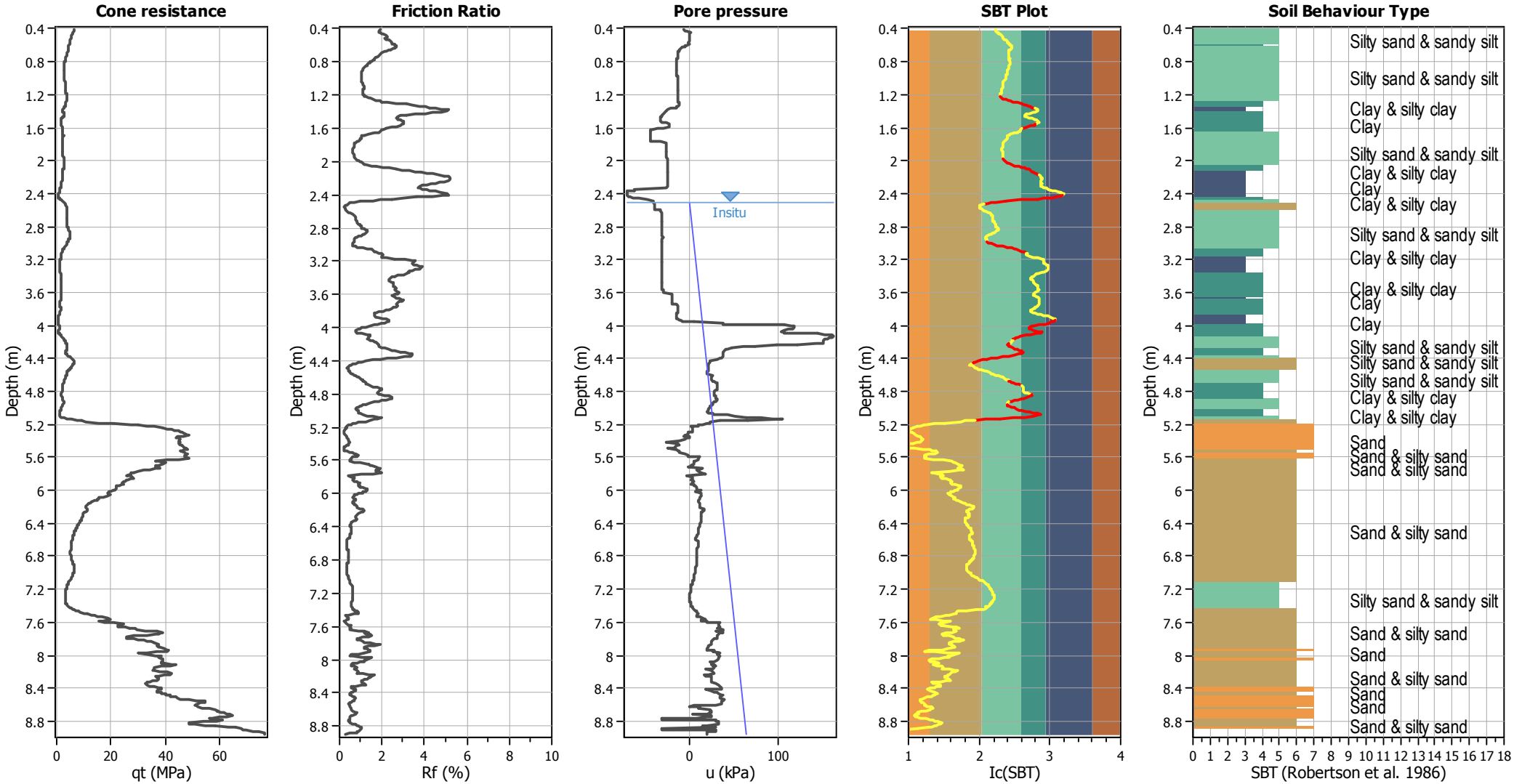






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



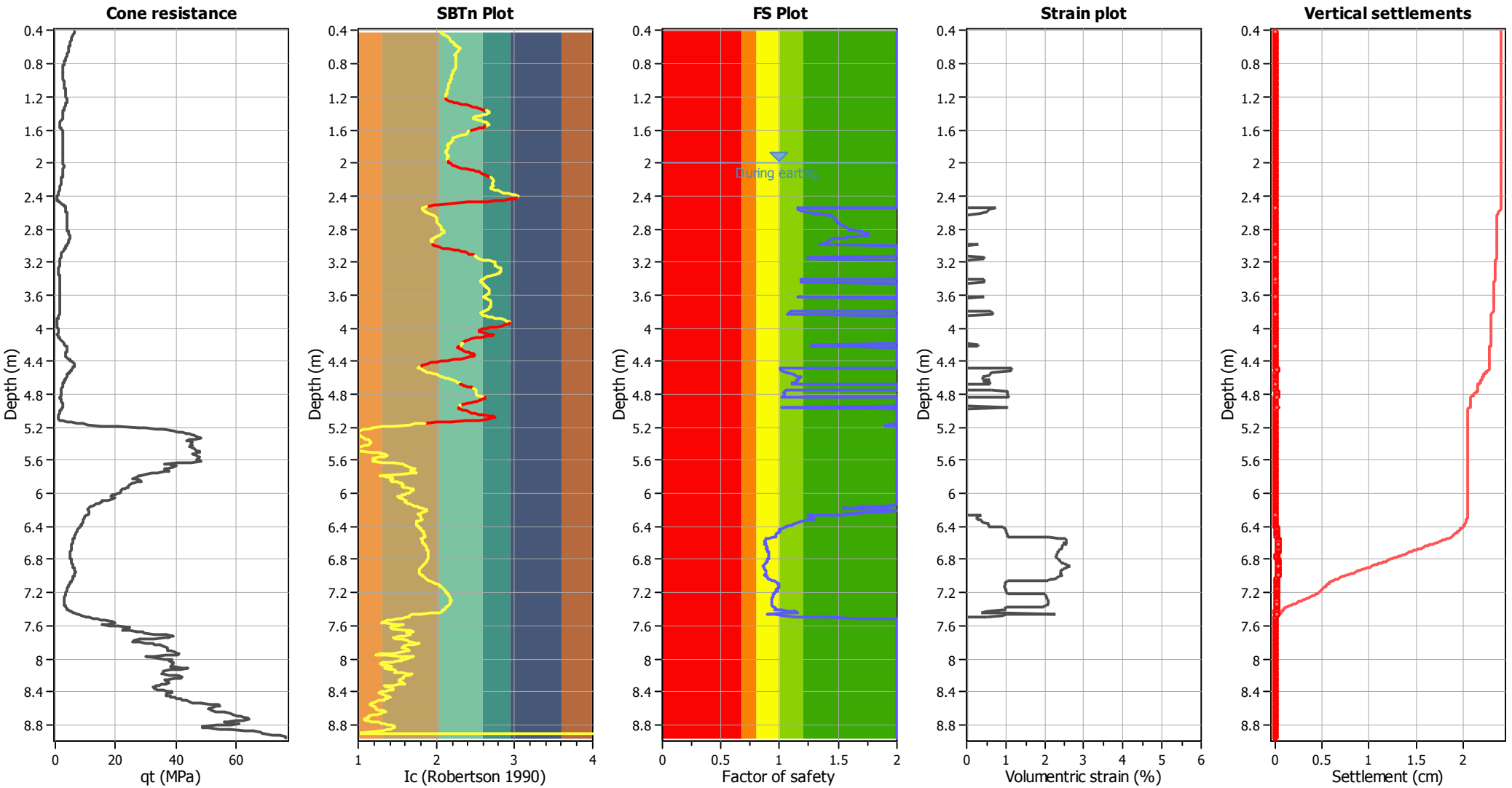
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

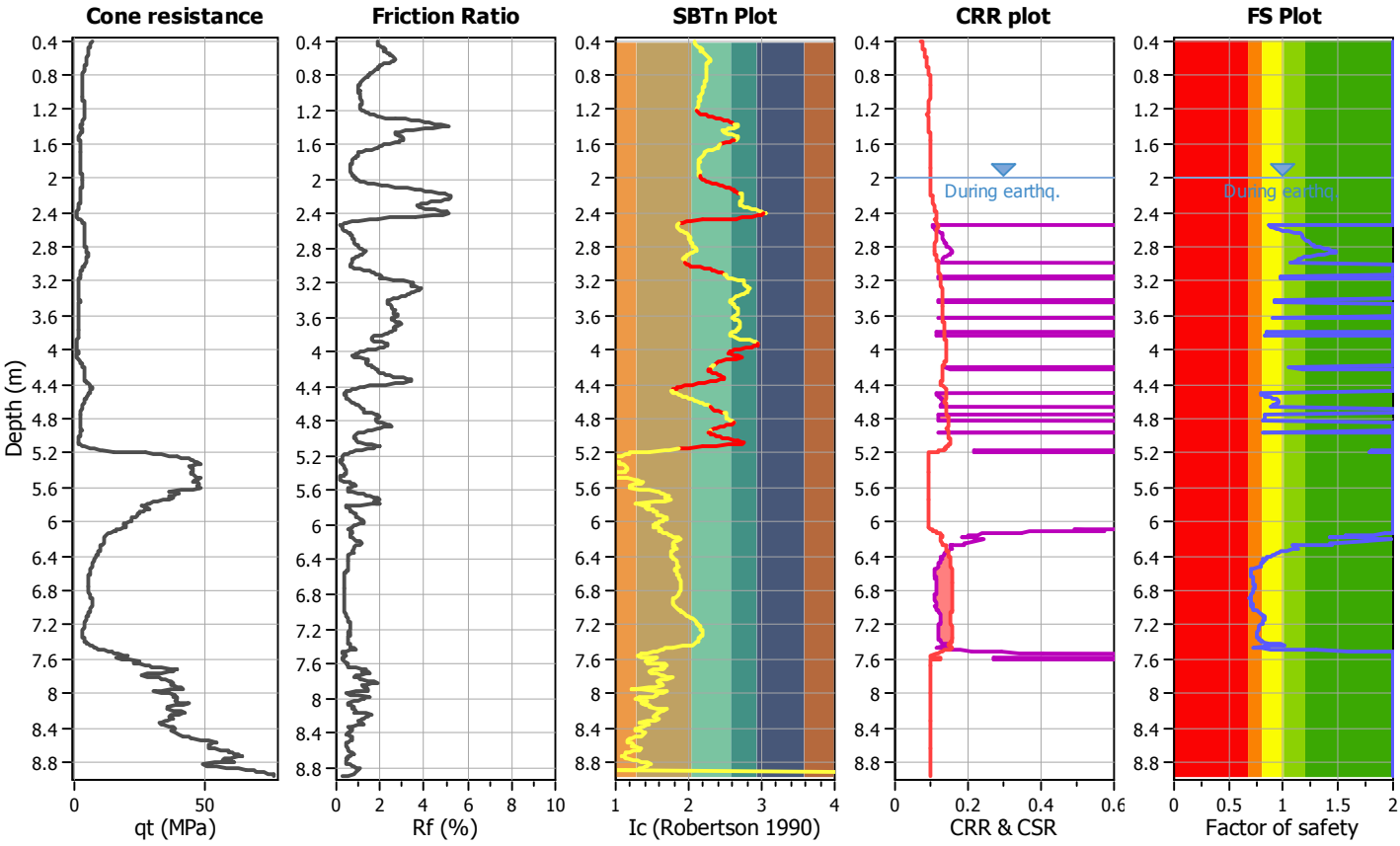
LIQUEFACTION ANALYSIS REPORT

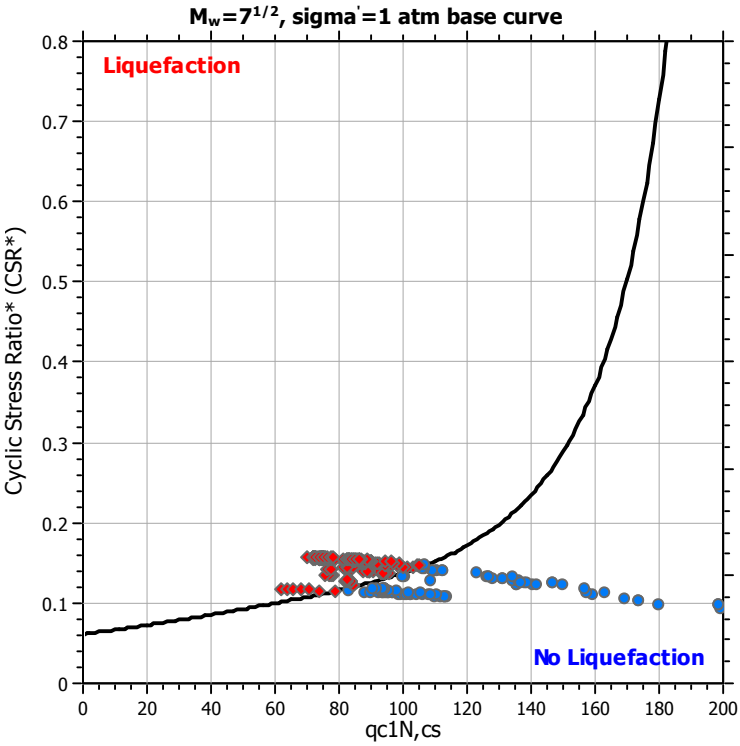
Project title : K200317 **Location : 24 Millpond Lane**

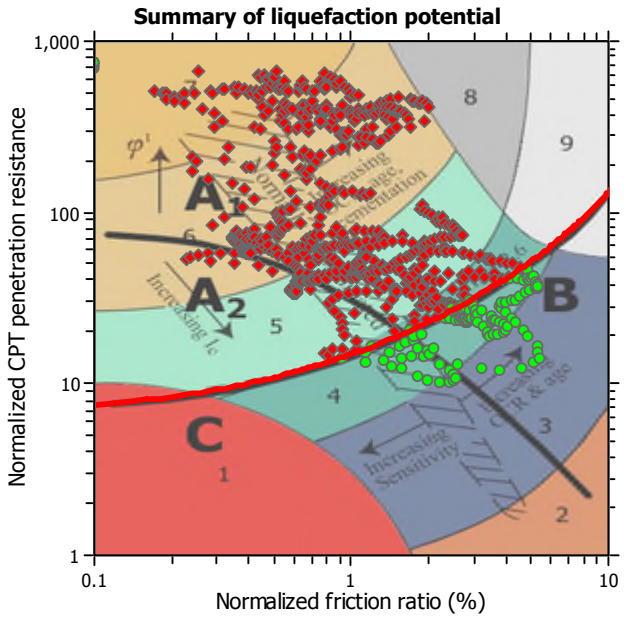
CPT file : CPT-01 SLS2

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

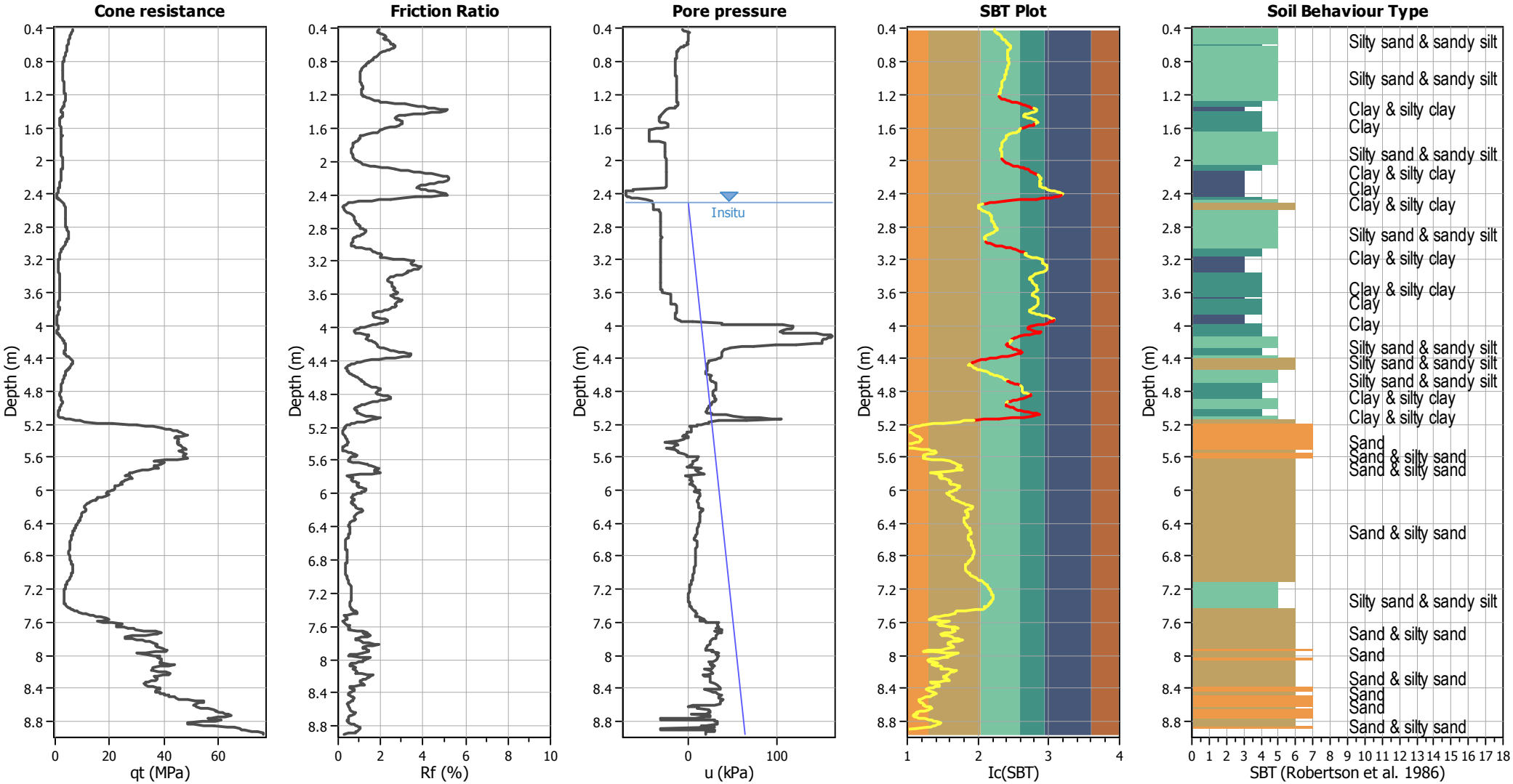






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



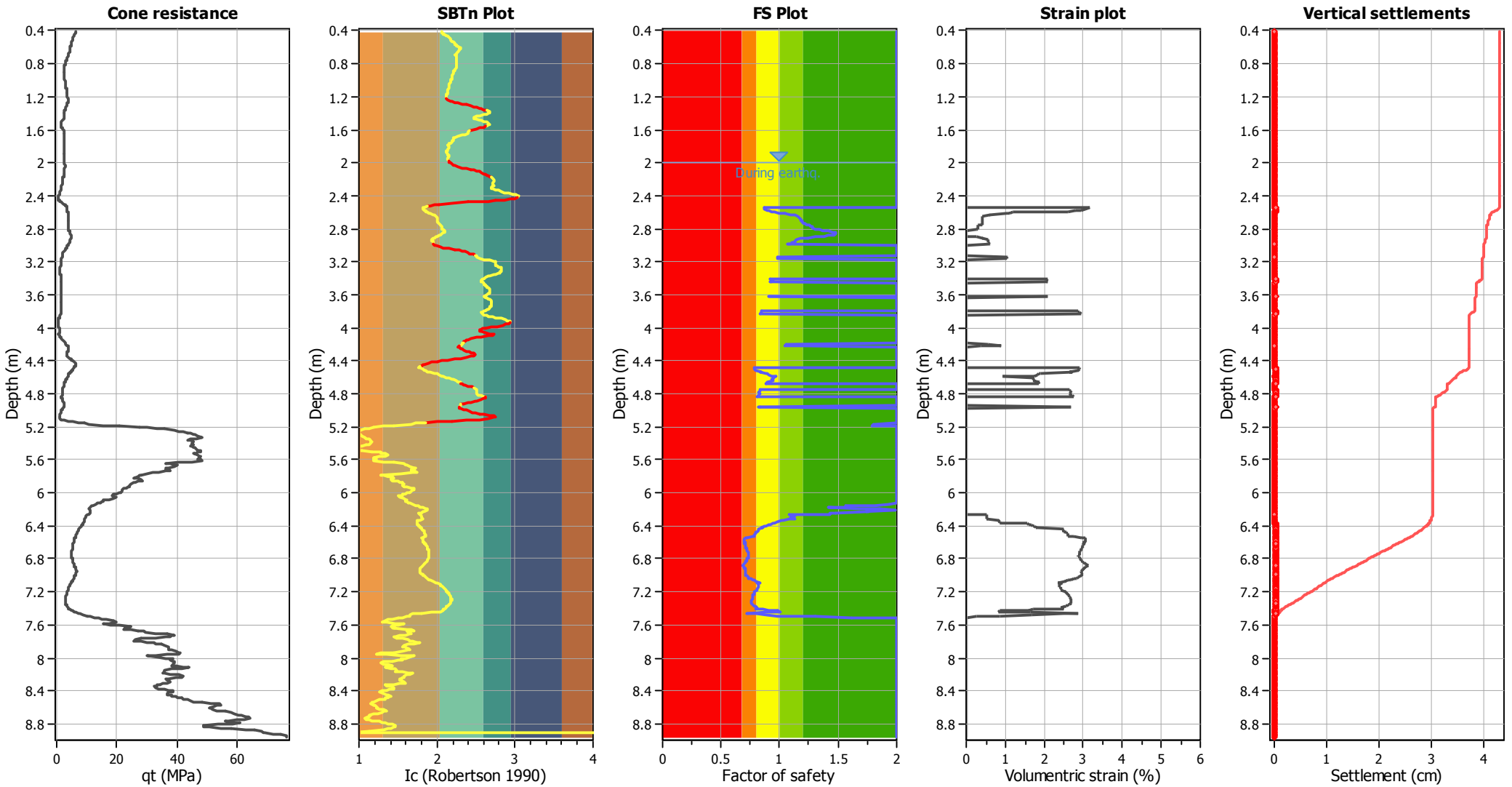
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

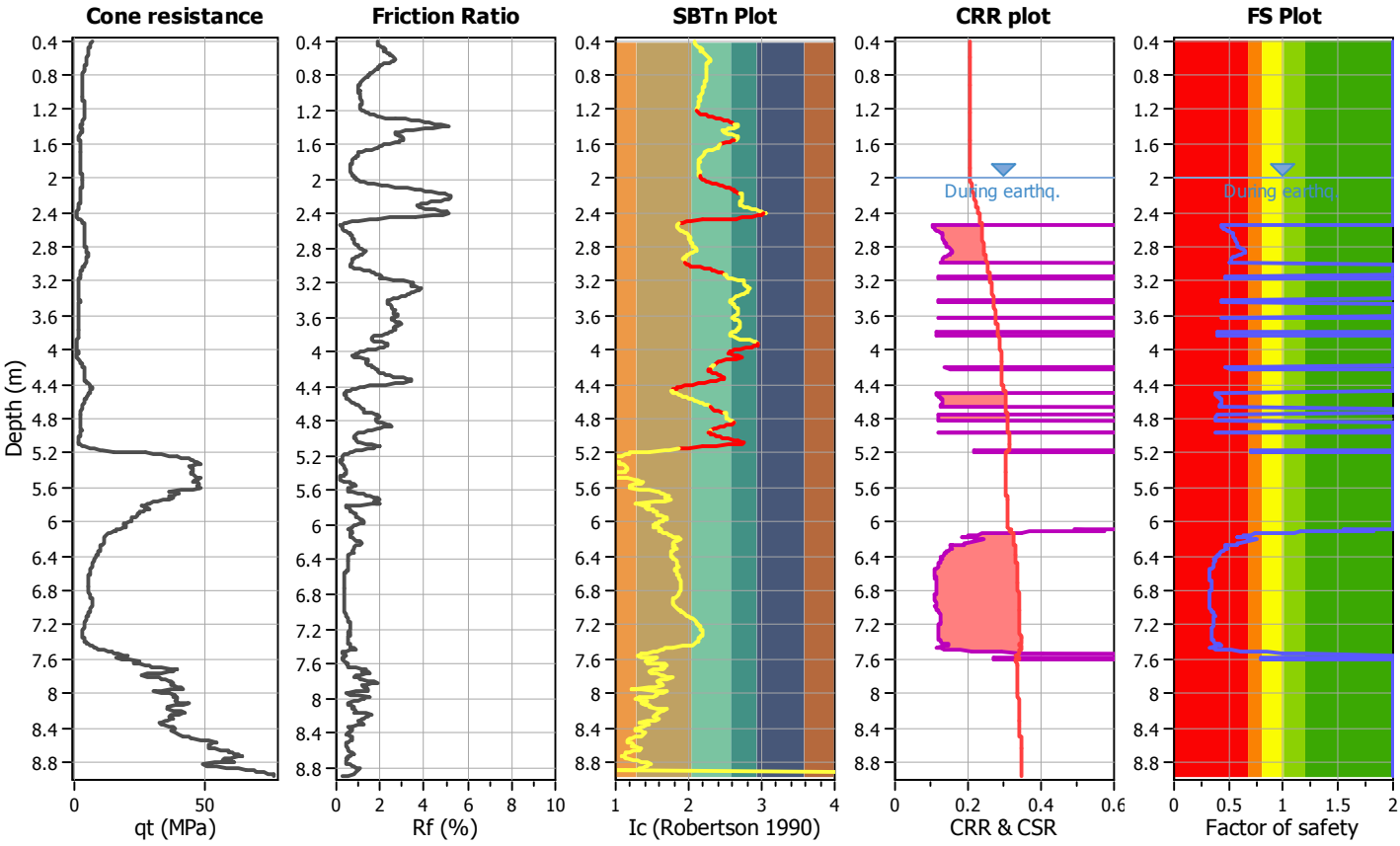
LIQUEFACTION ANALYSIS REPORT

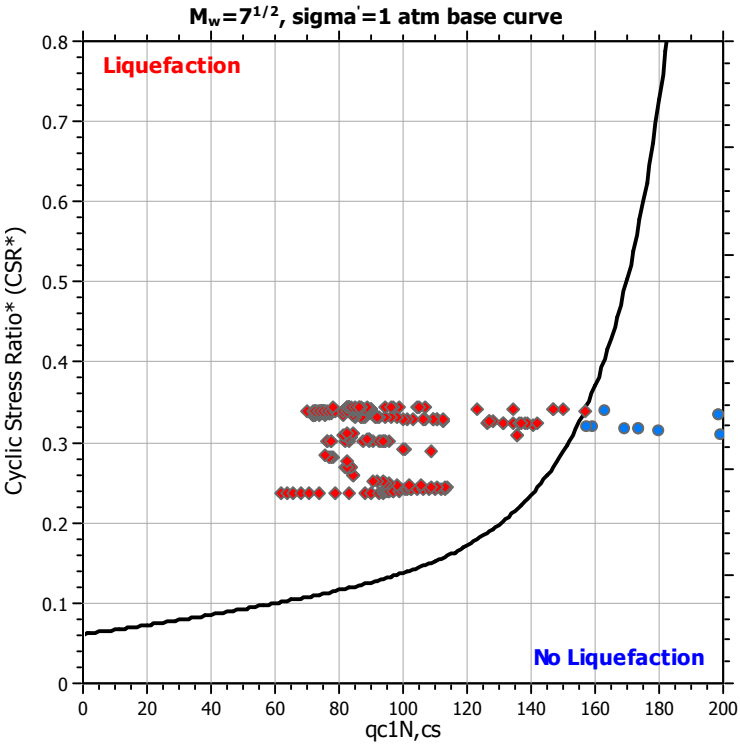
Project title : K200317 **Location : 24 Millpond Lane**

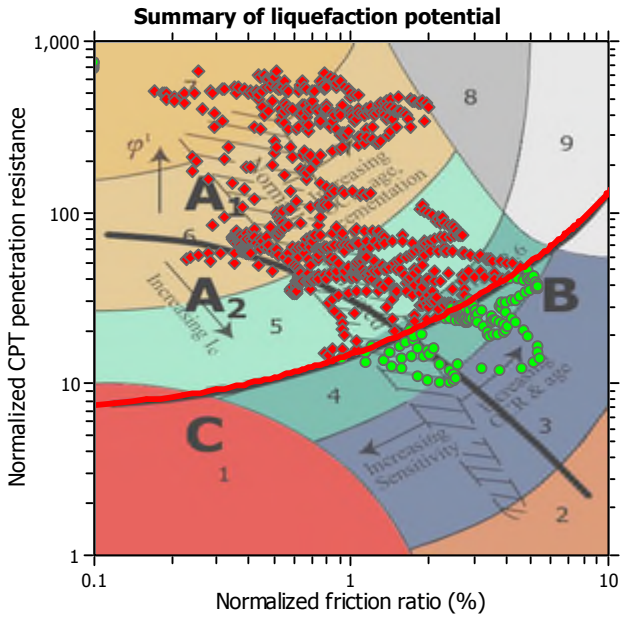
CPT file : CPT-01 ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

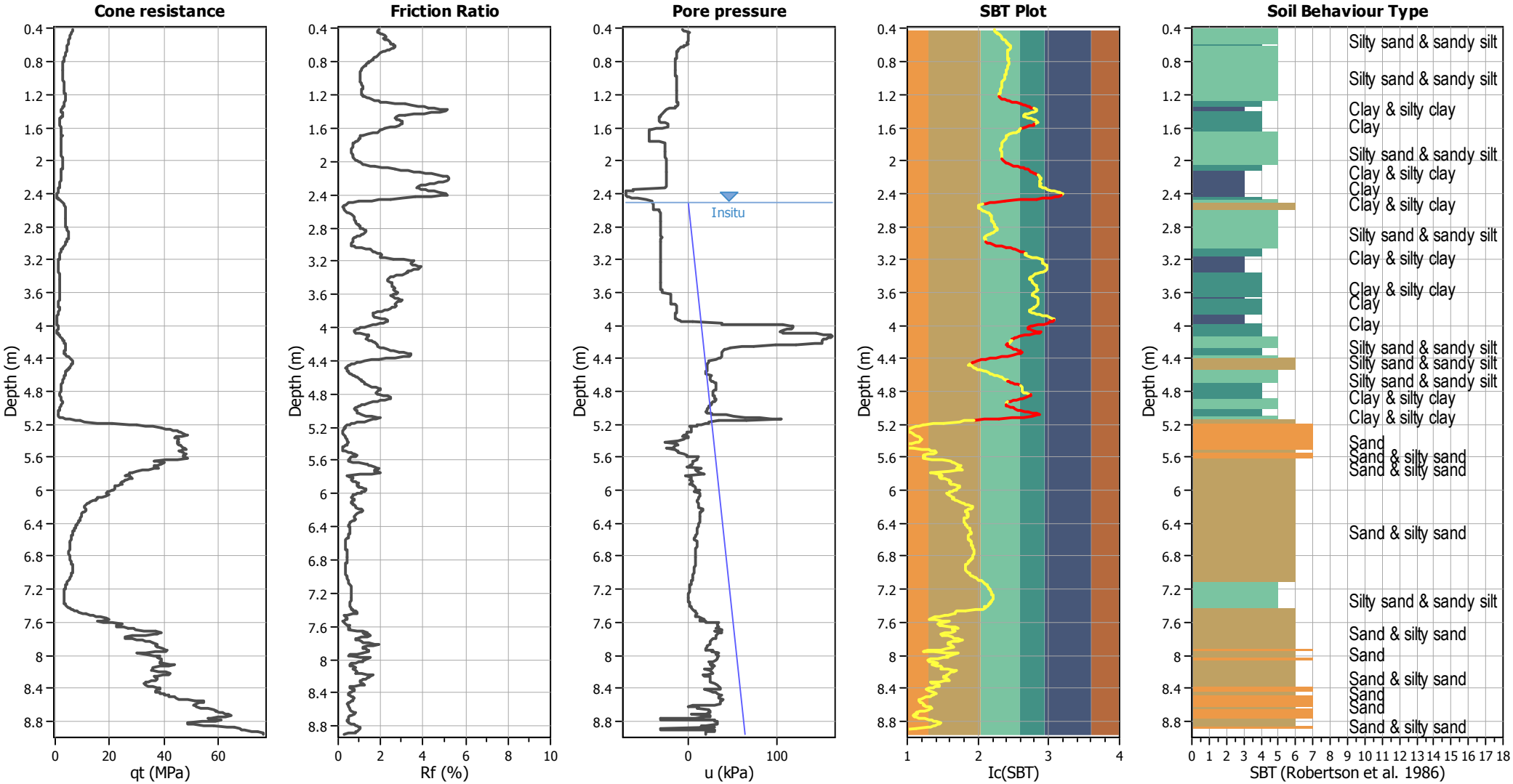






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



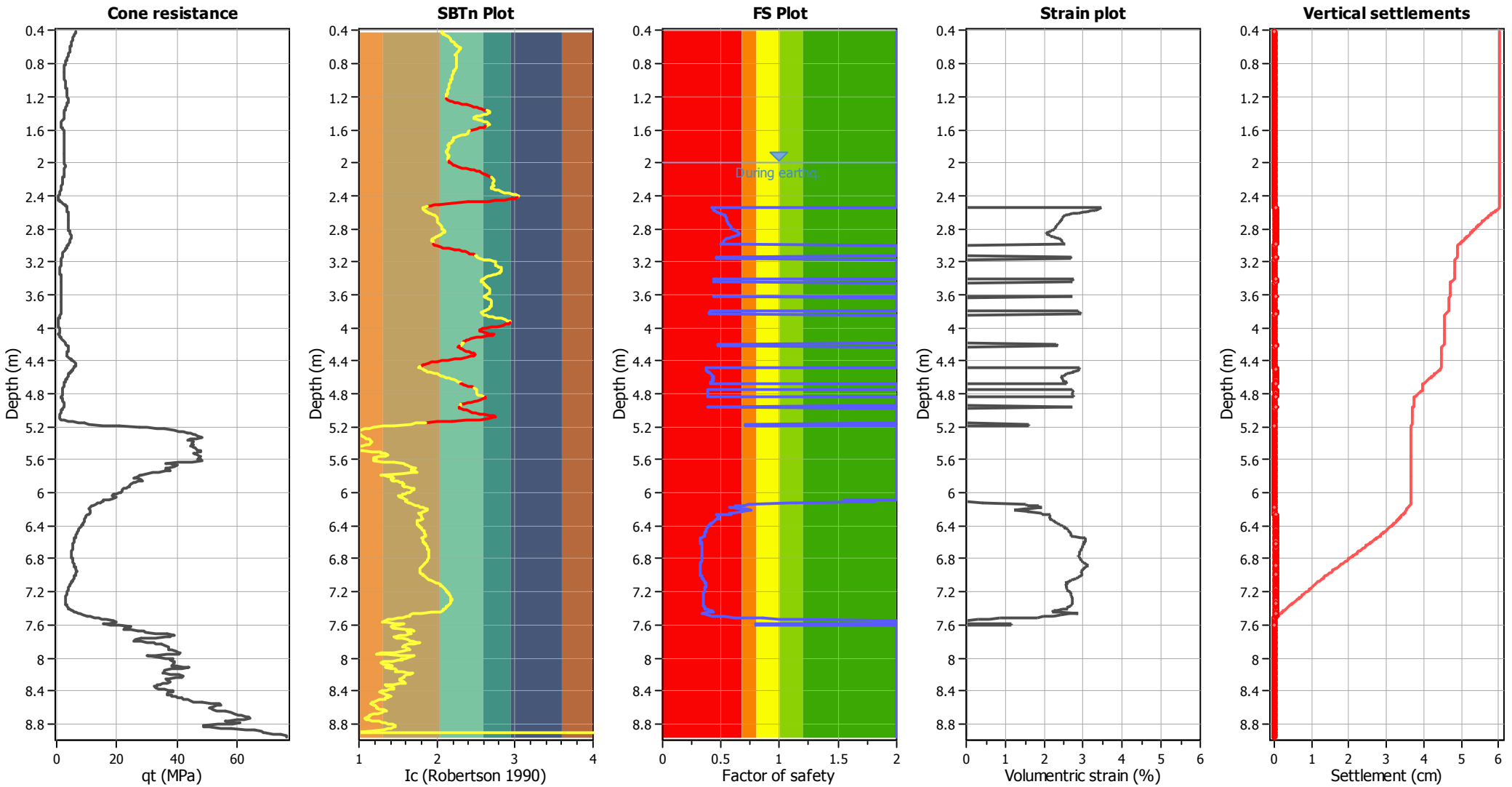
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

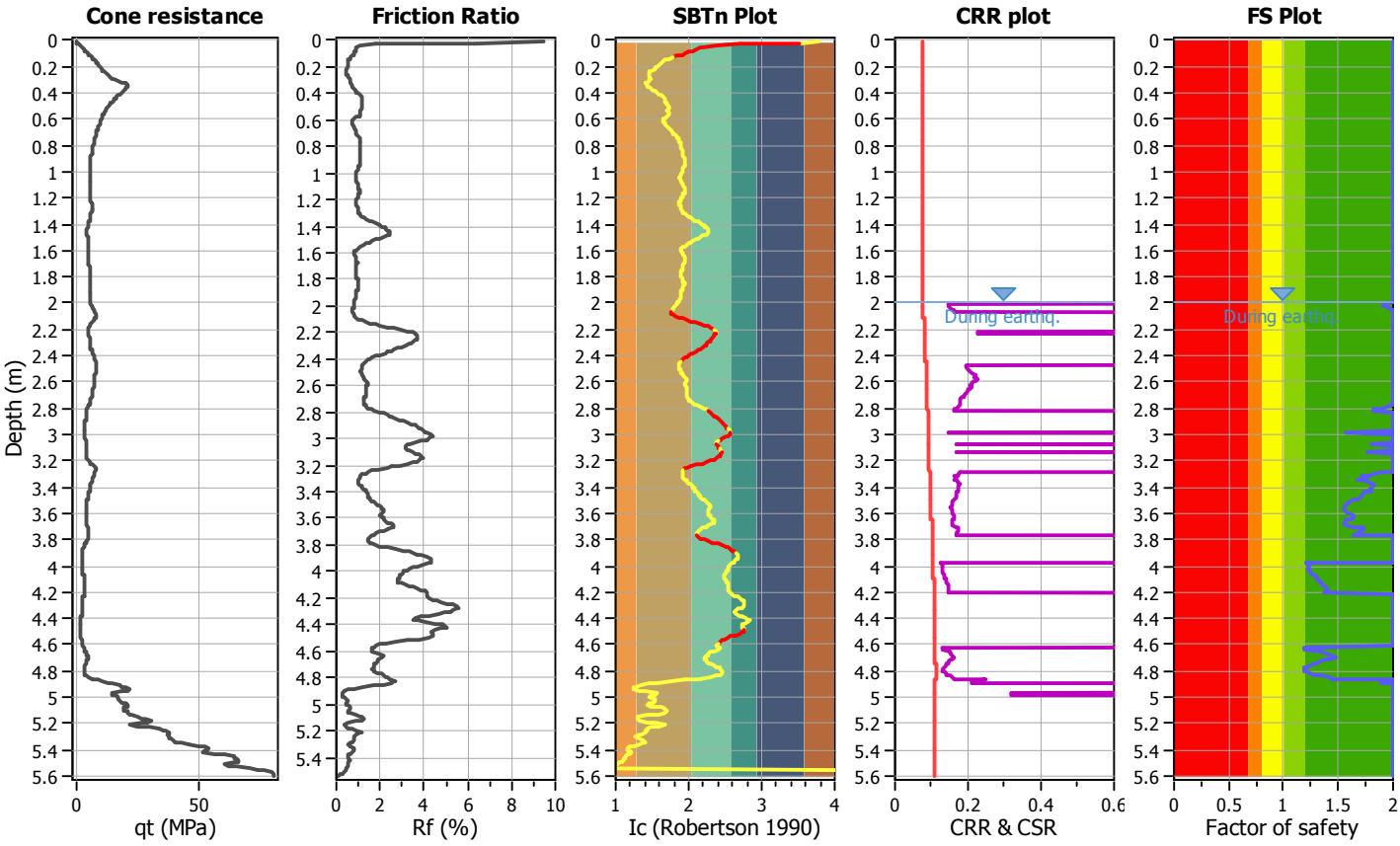
LIQUEFACTION ANALYSIS REPORT

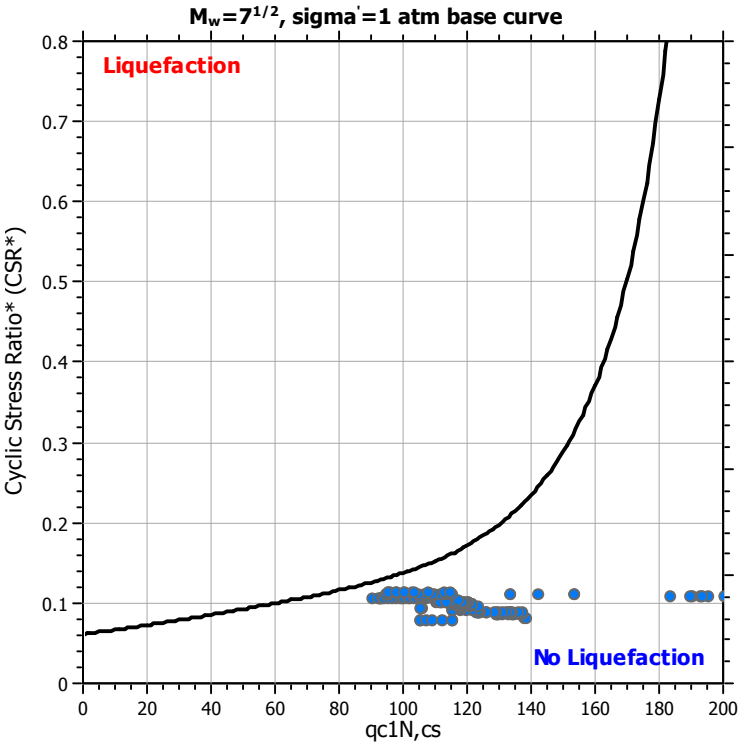
Project title : K200317 **Location : 24 Millpond Lane**

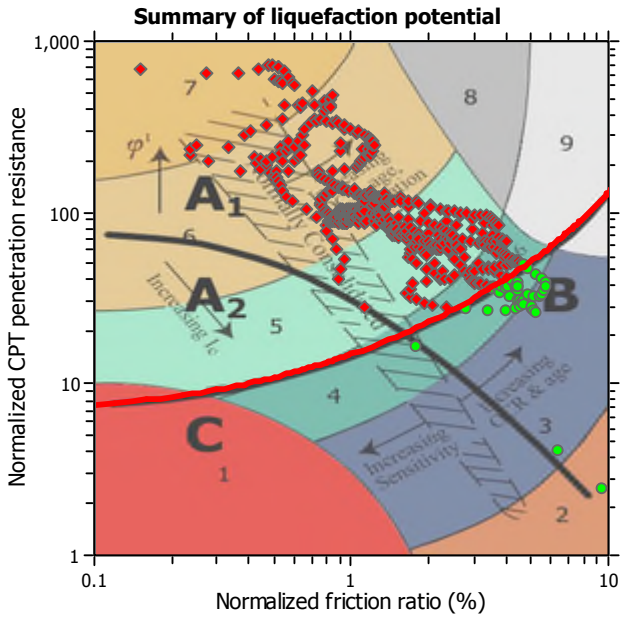
CPT file : CPT-02 SLS1

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

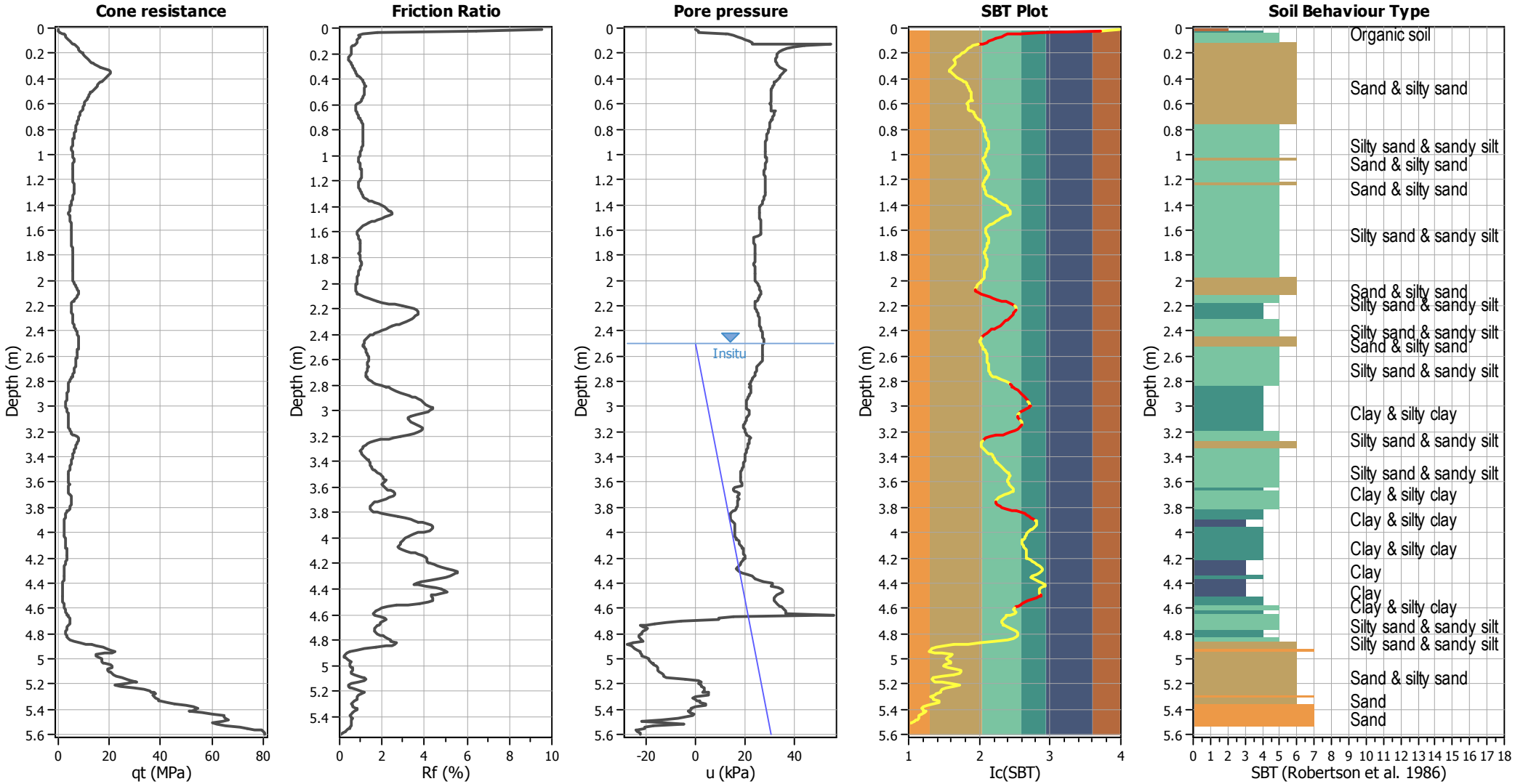






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



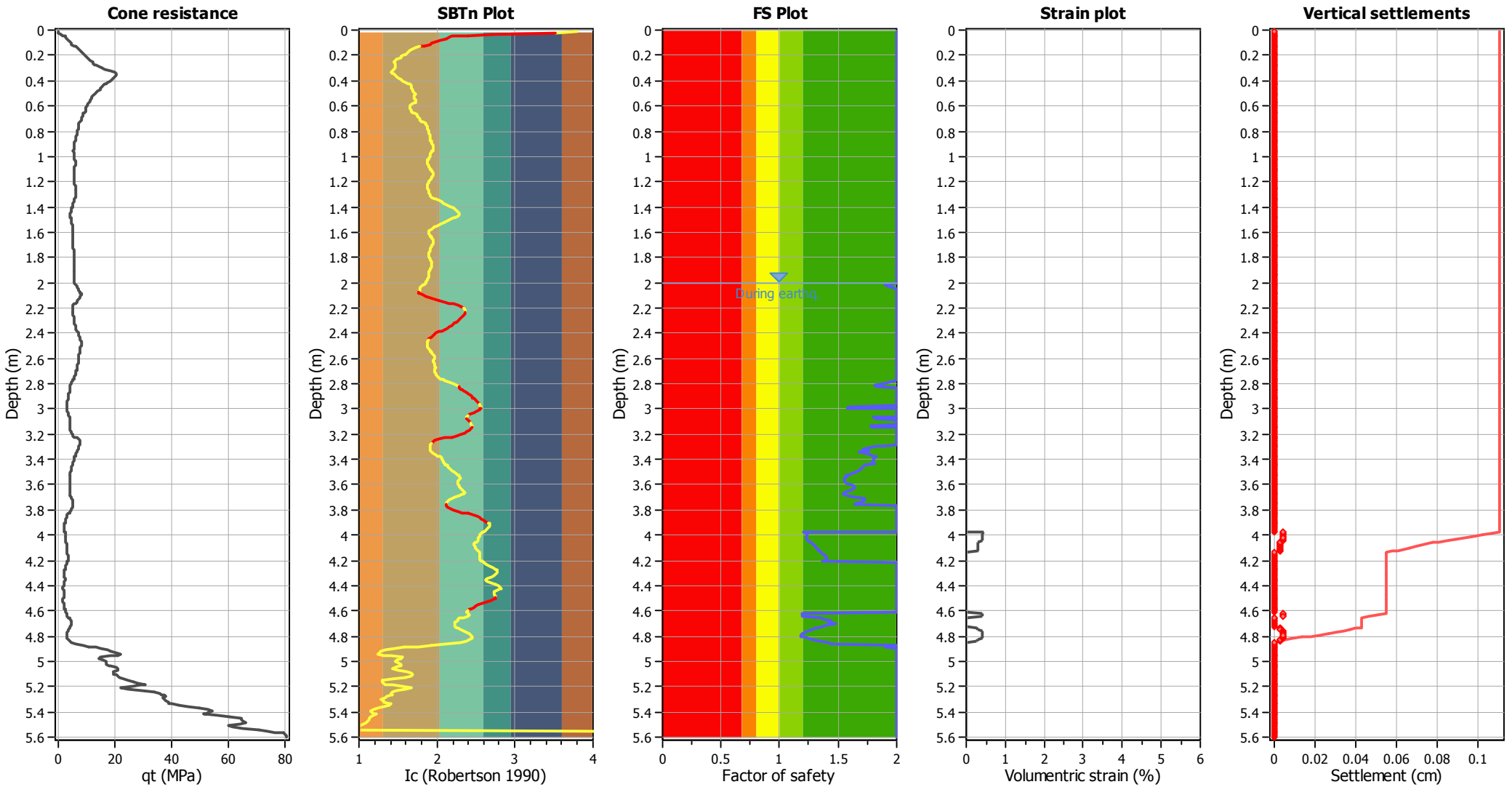
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

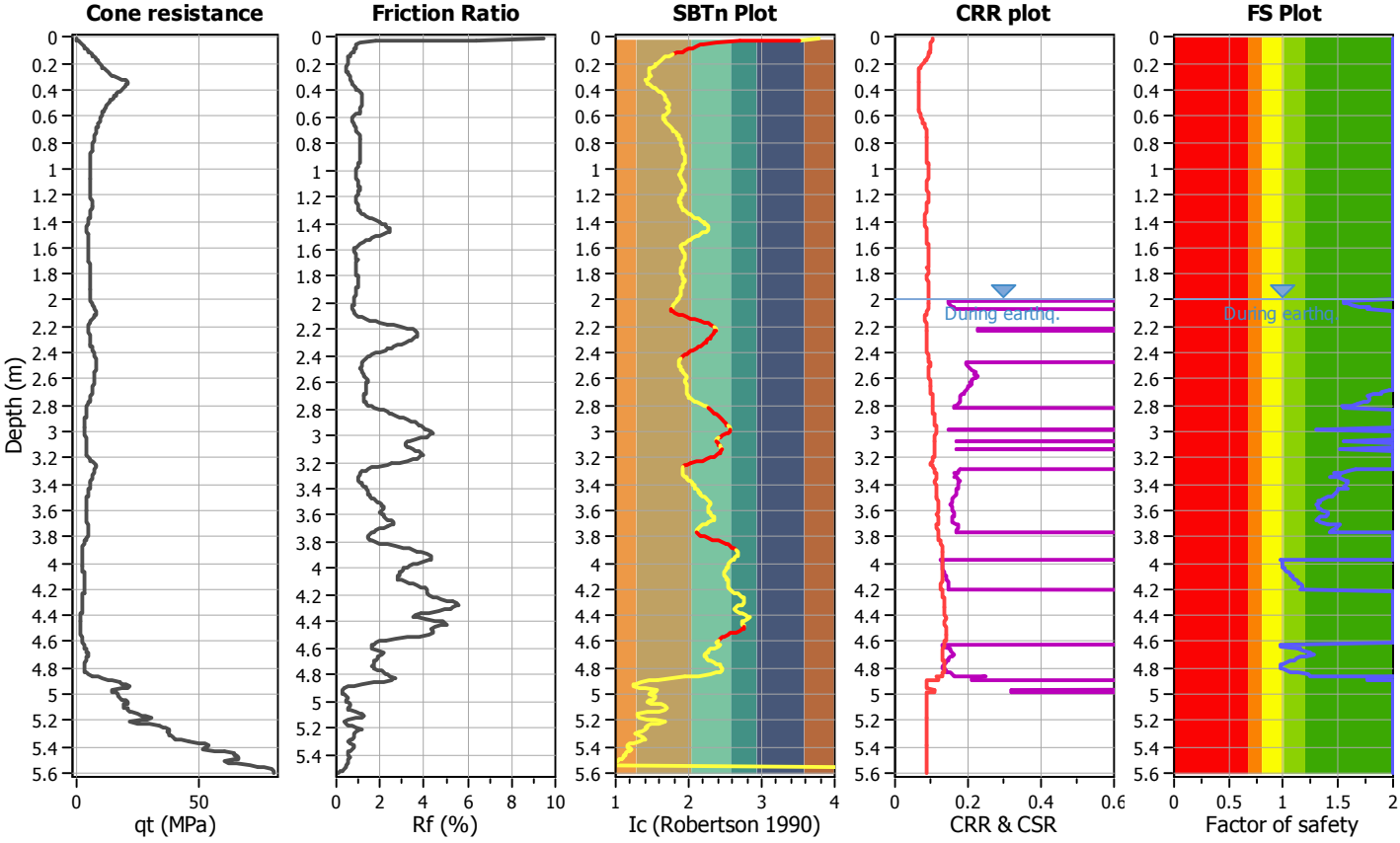
LIQUEFACTION ANALYSIS REPORT

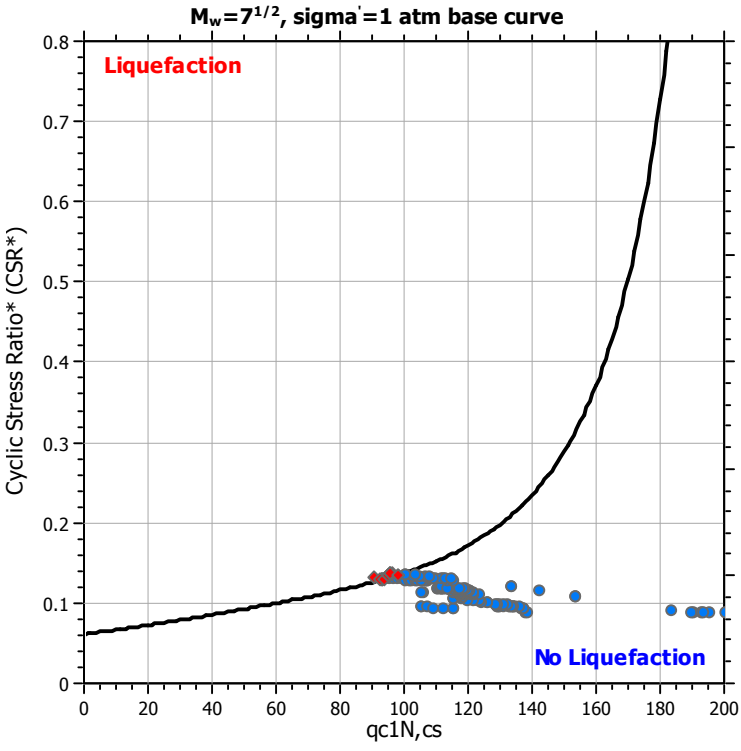
Project title : K200317 **Location : 24 Millpond Lane**

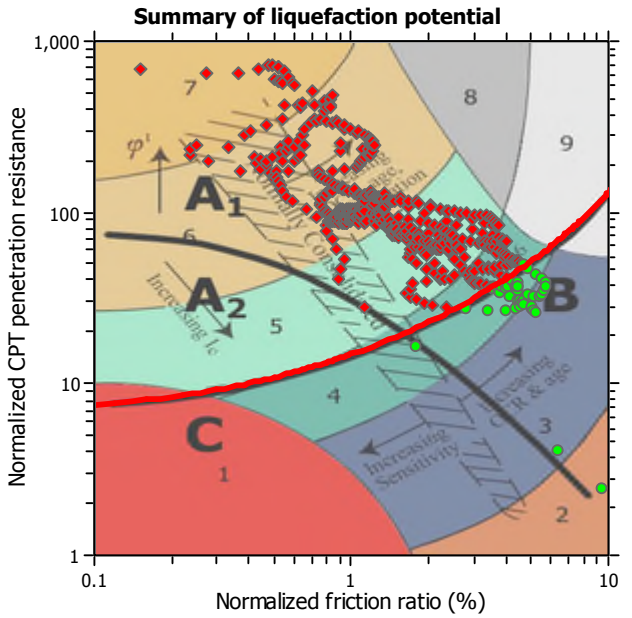
CPT file : CPT-02 SLS2

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

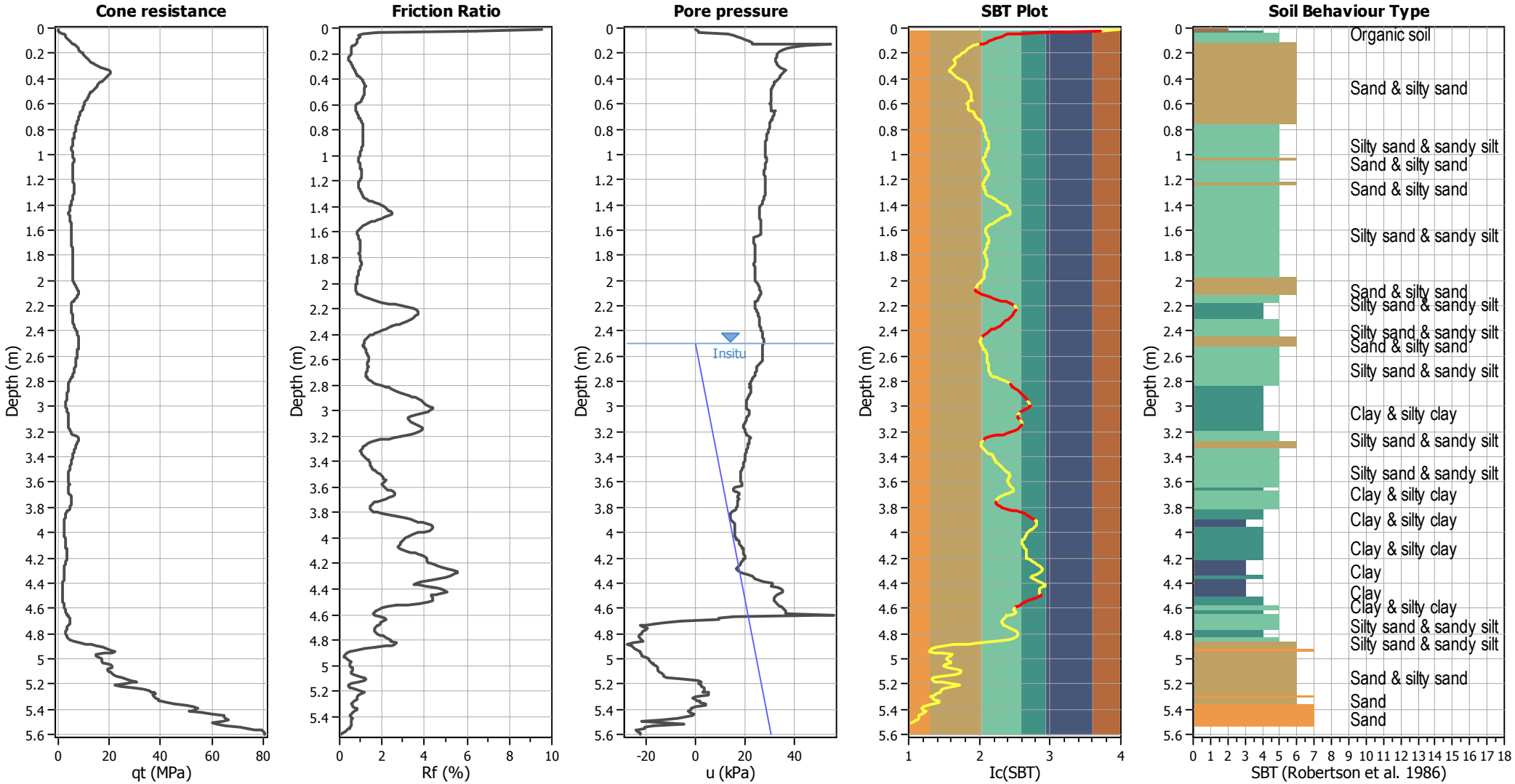






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



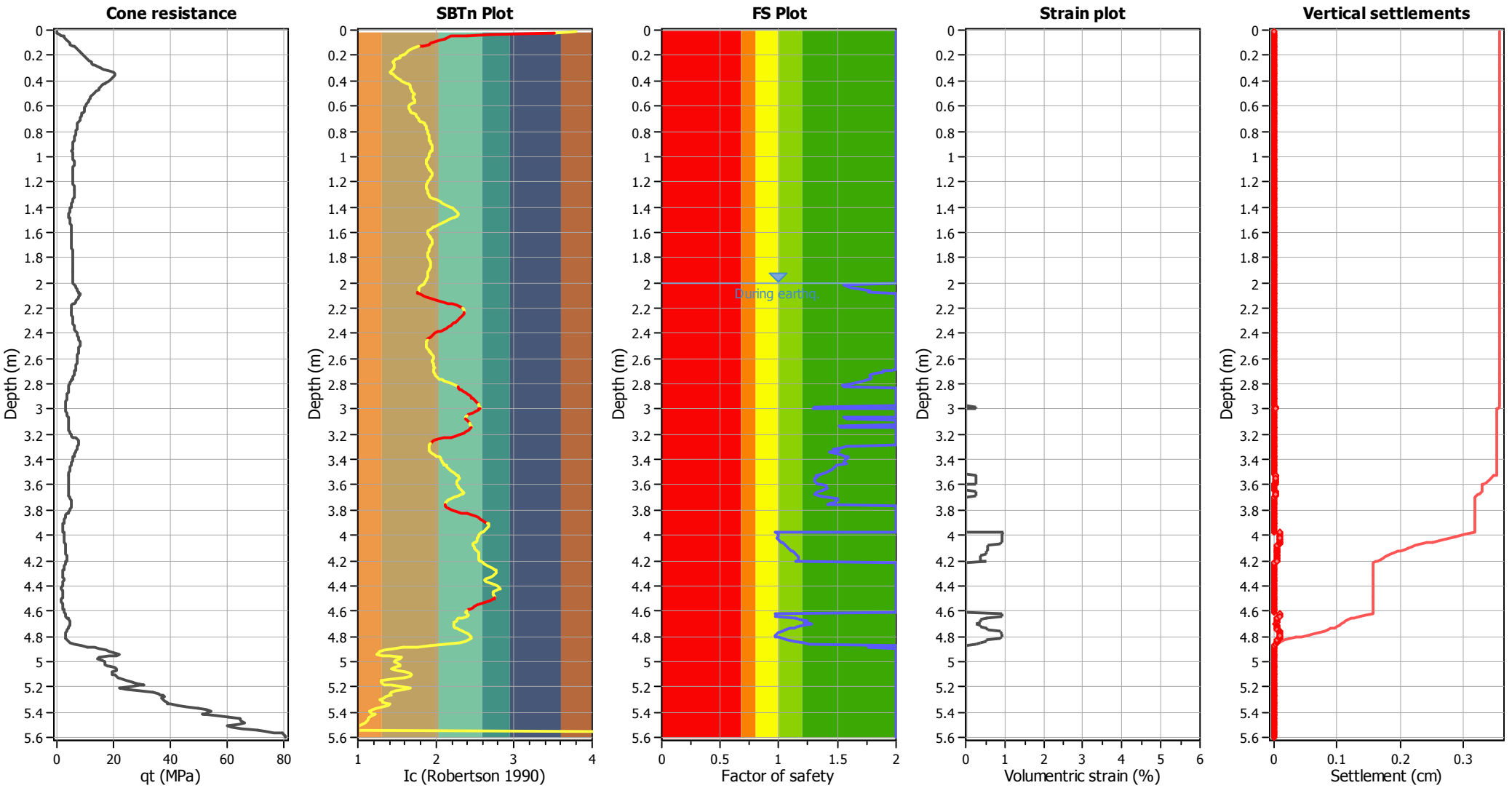
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

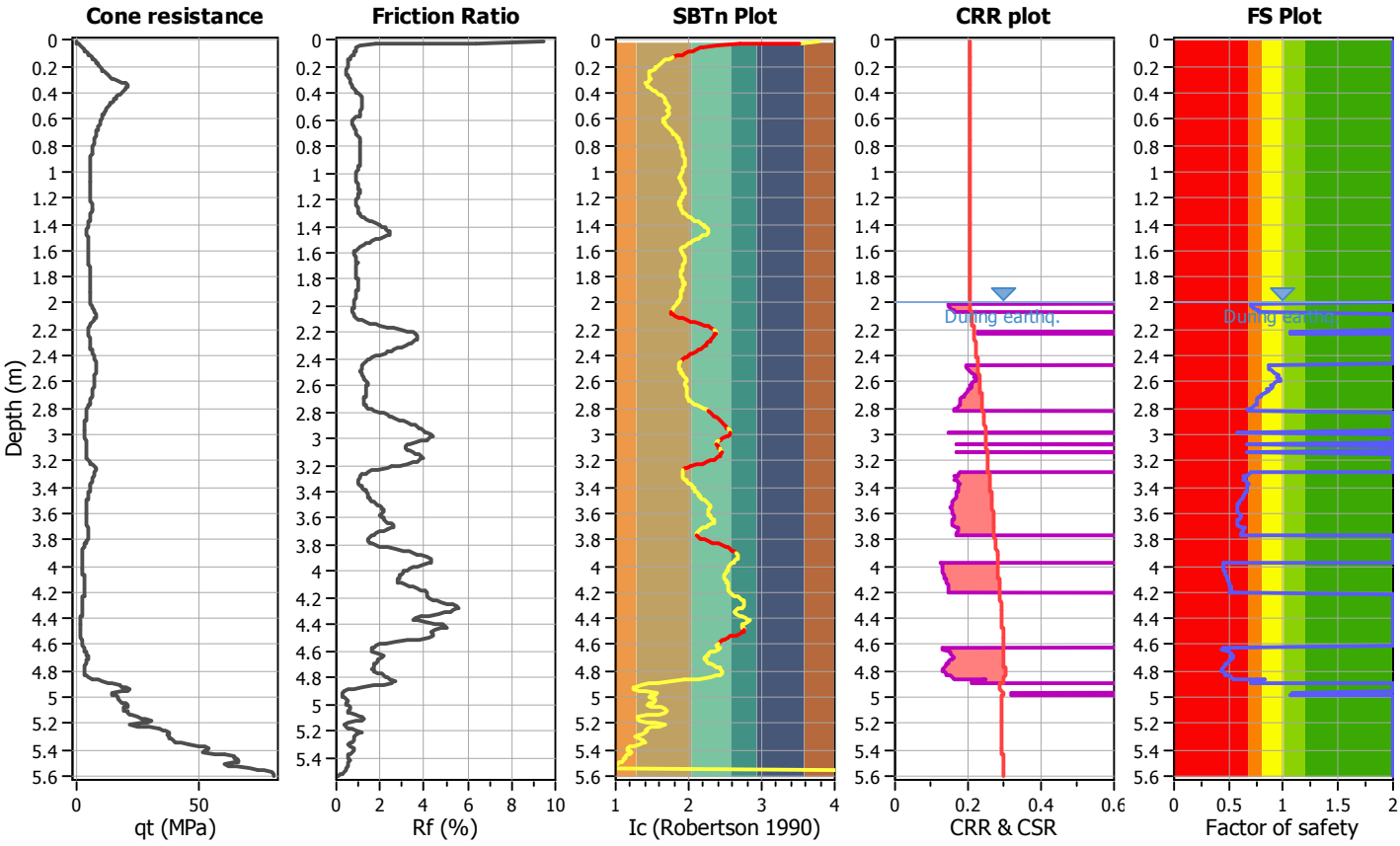
LIQUEFACTION ANALYSIS REPORT

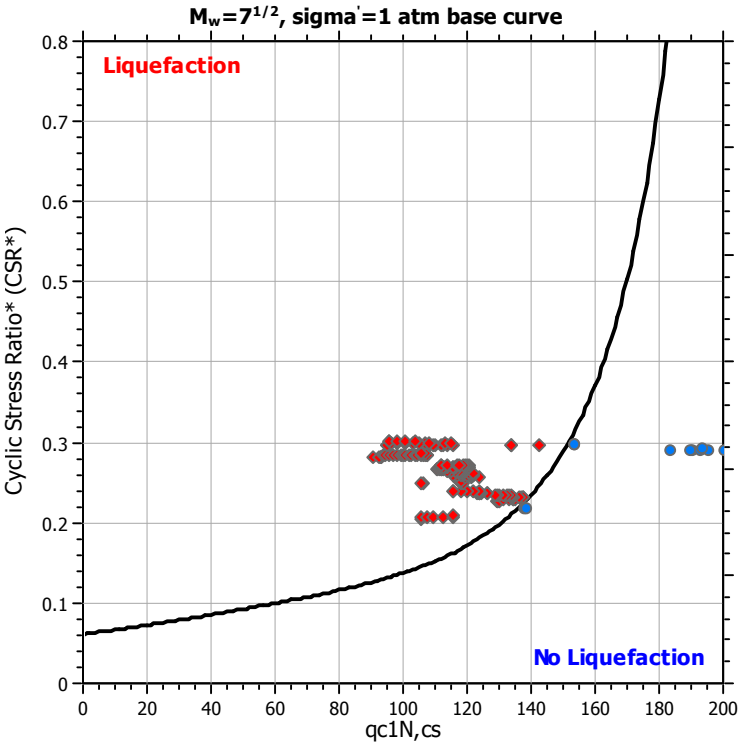
Project title : K200317 **Location : 24 Millpond Lane**

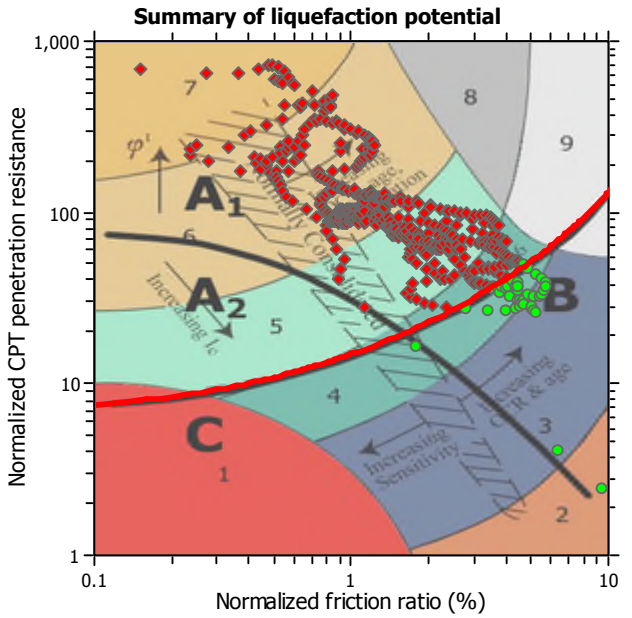
CPT file : CPT-02 ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

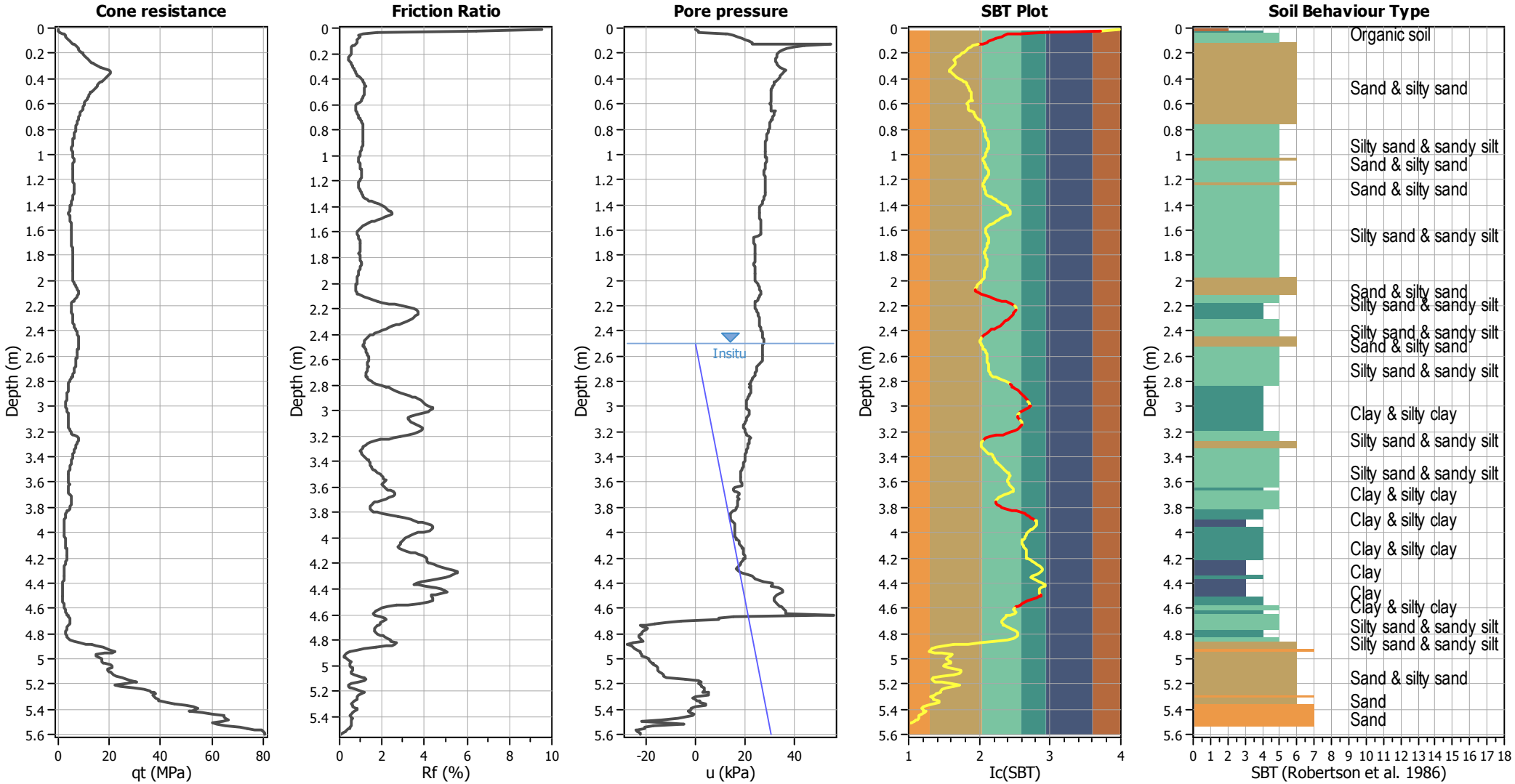






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



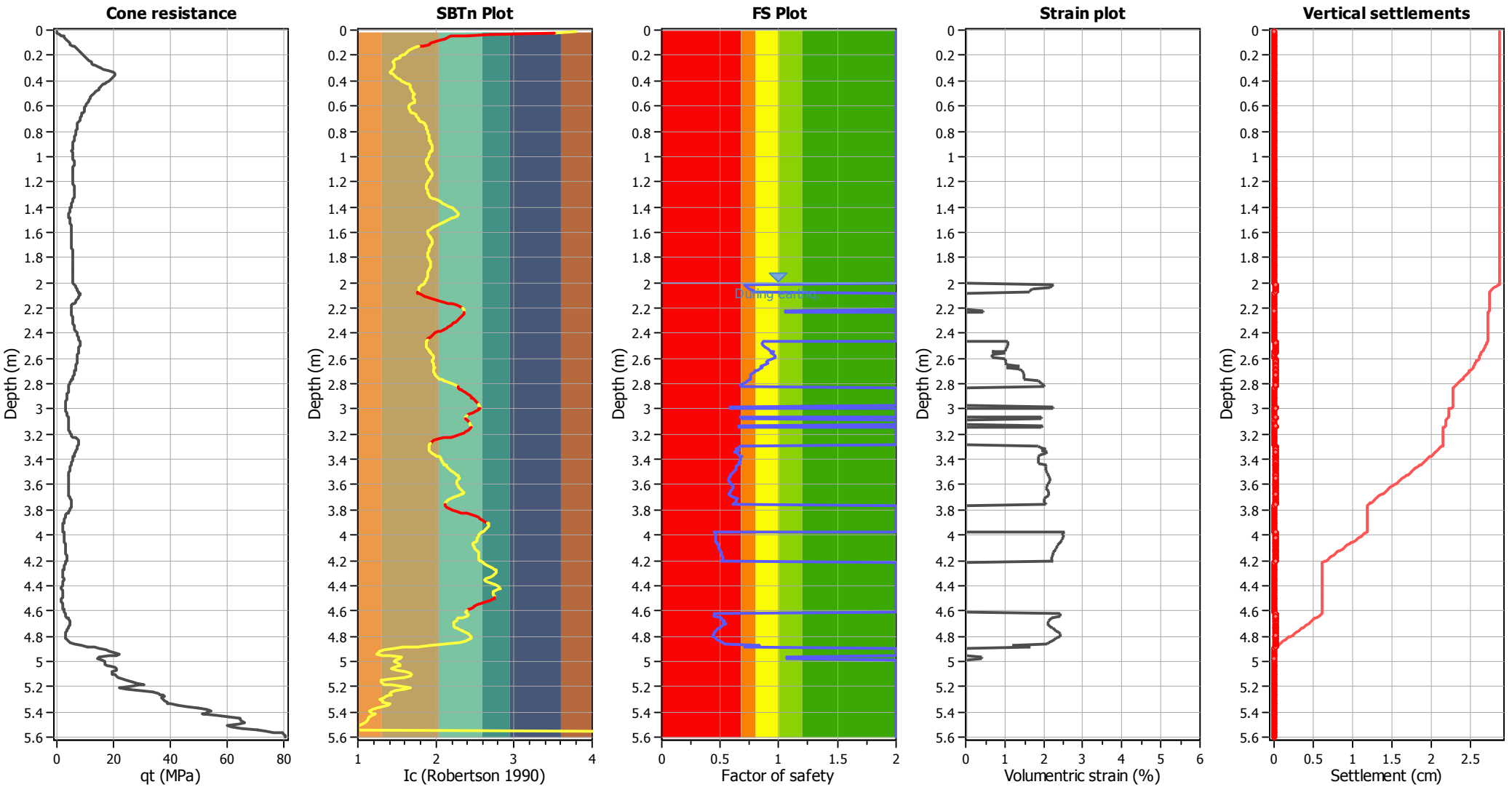
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

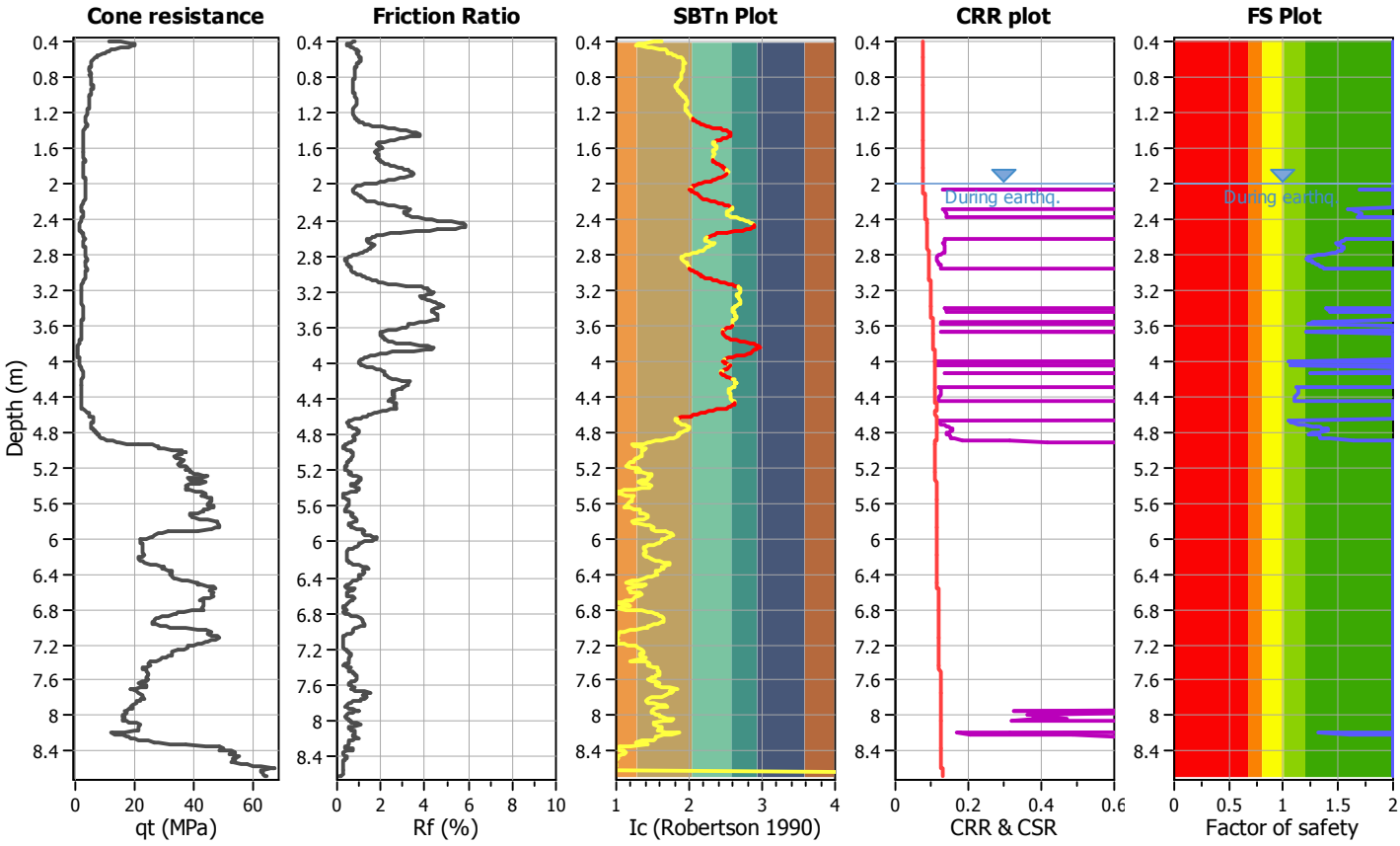
LIQUEFACTION ANALYSIS REPORT

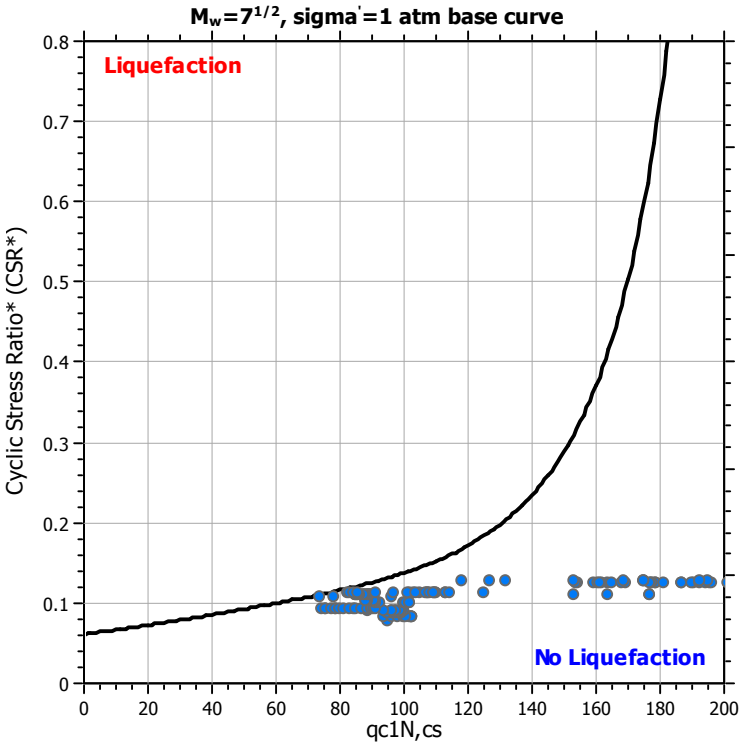
Project title : K200317 **Location : 24 Millpond Lane**

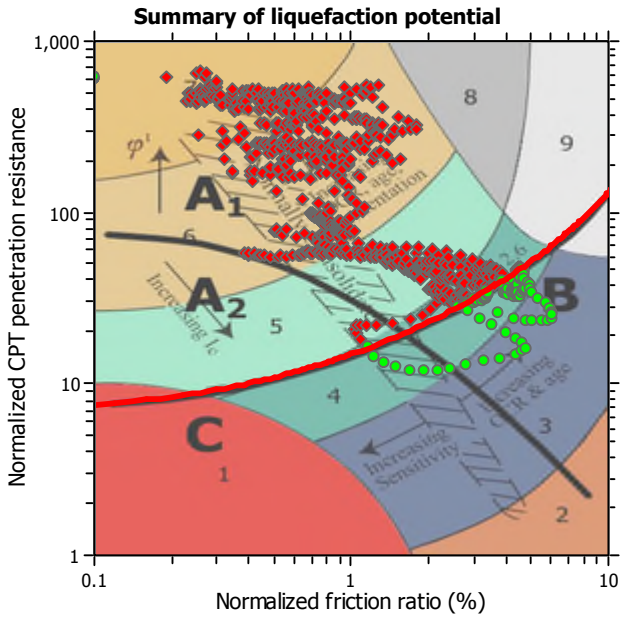
CPT file : CPT-03 SLS1

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.13	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

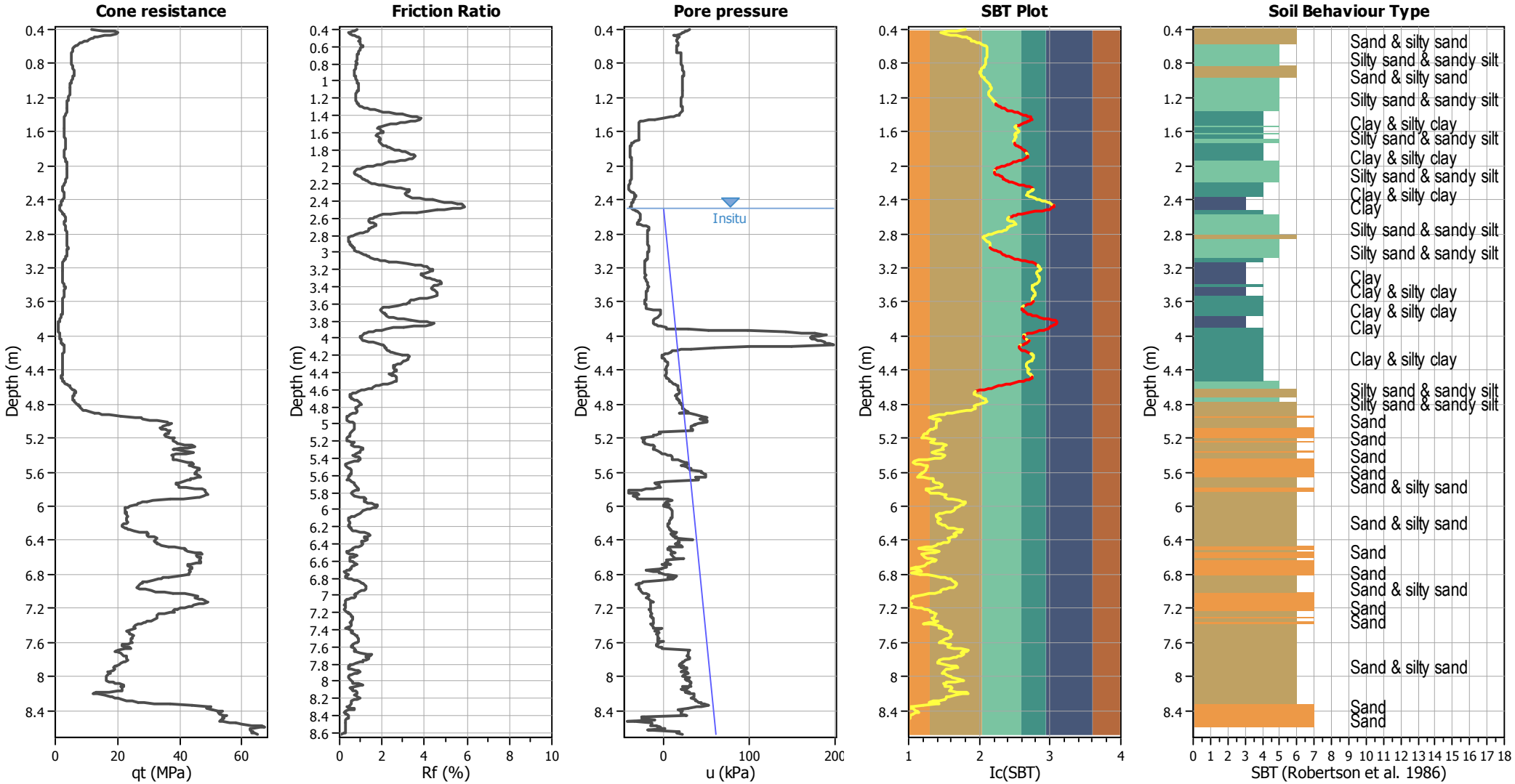






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



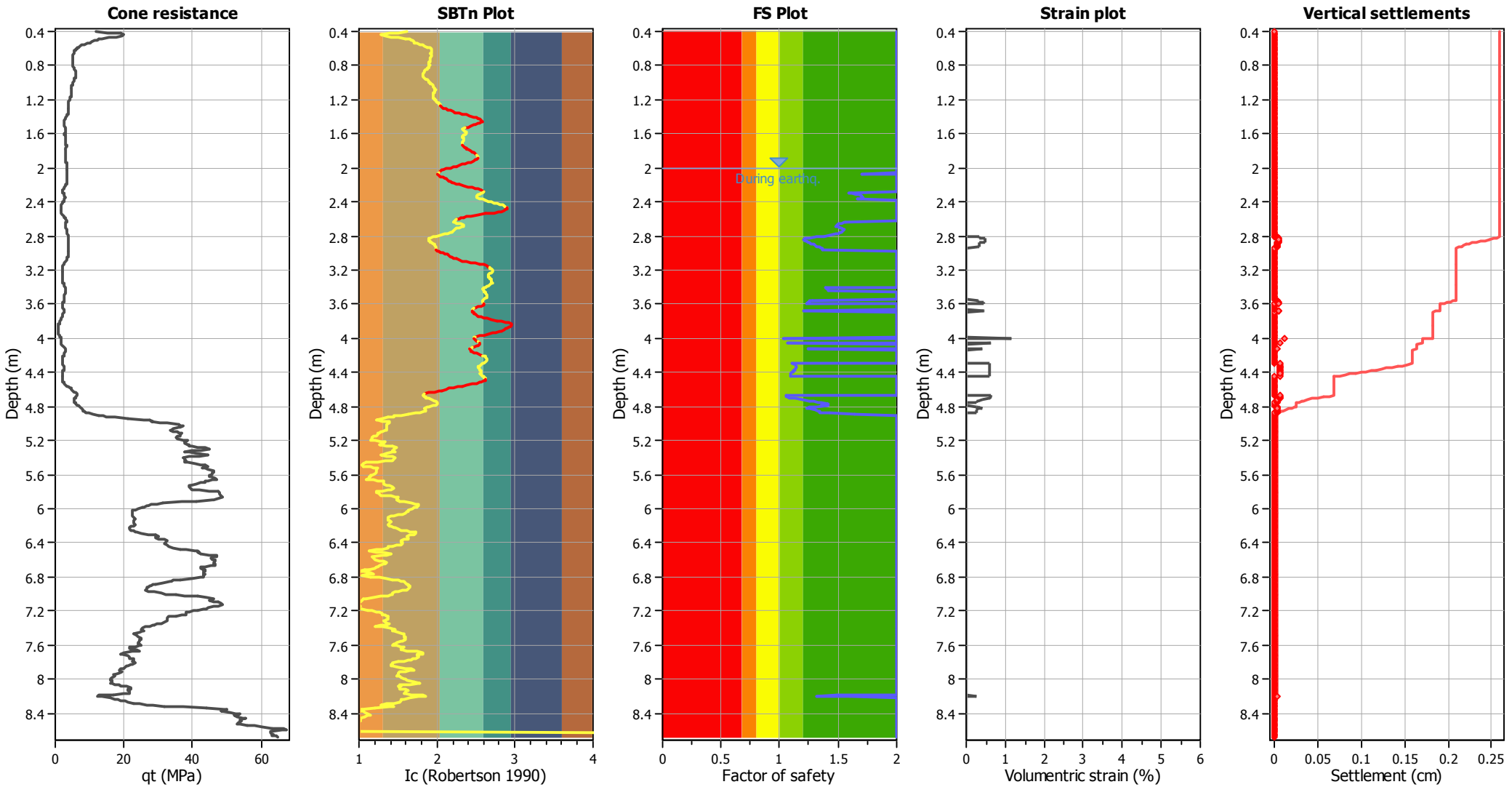
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.13	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

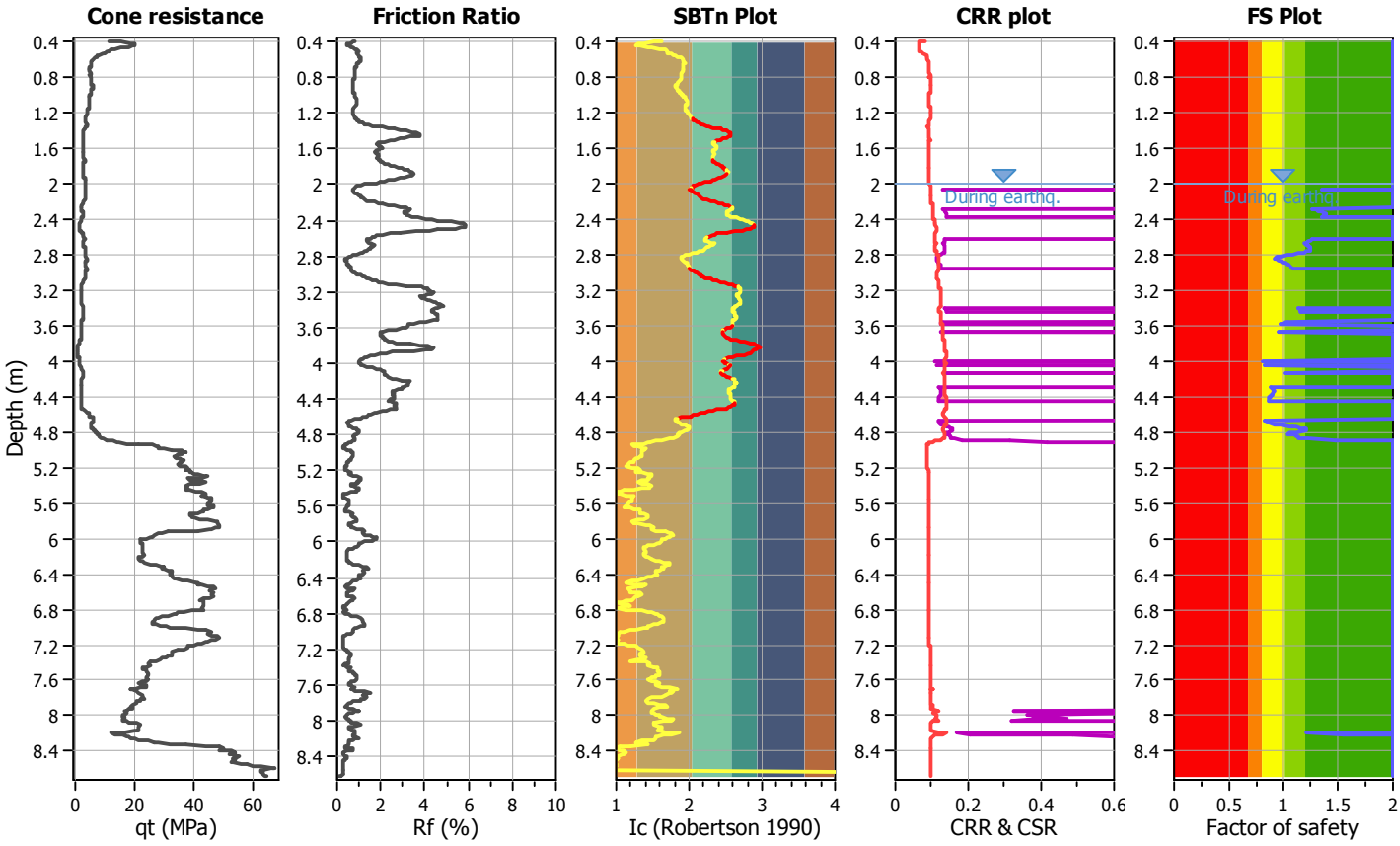
LIQUEFACTION ANALYSIS REPORT

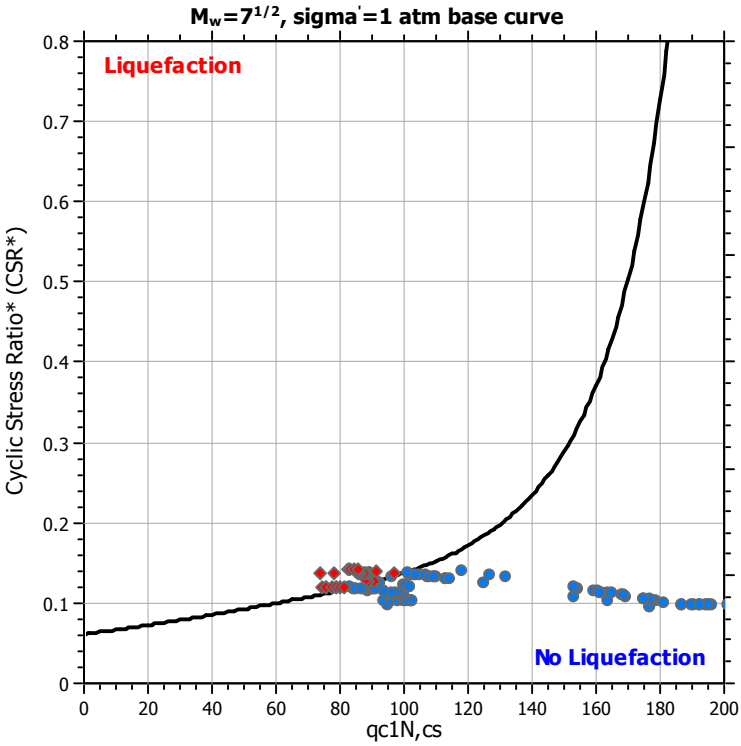
Project title : K200317 **Location : 24 Millpond Lane**

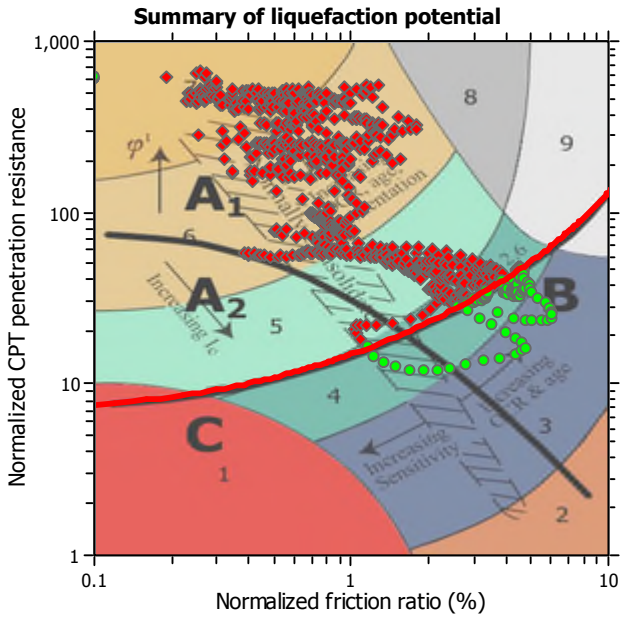
CPT file : CPT-03 SLS2

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	6.00	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.19	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

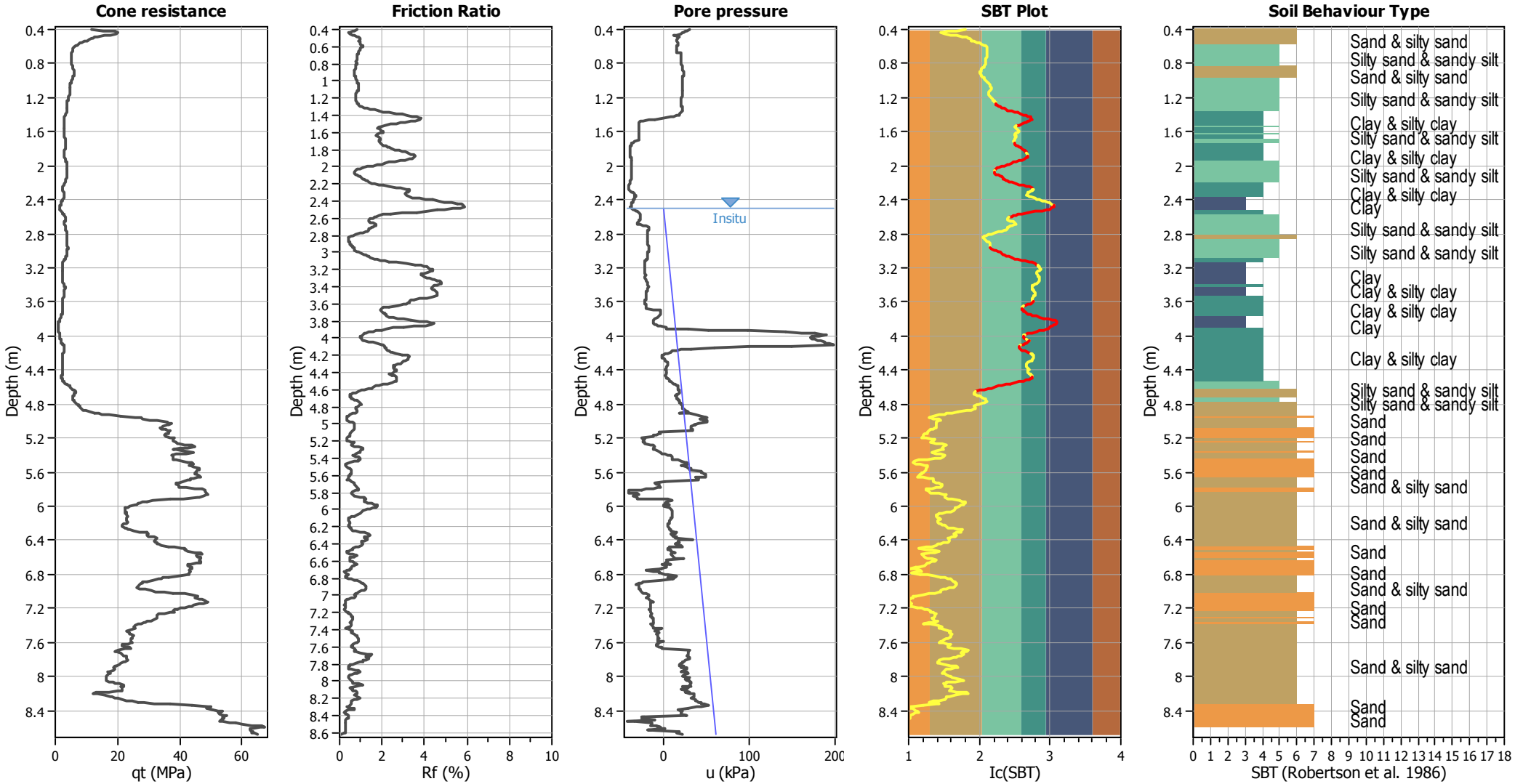






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



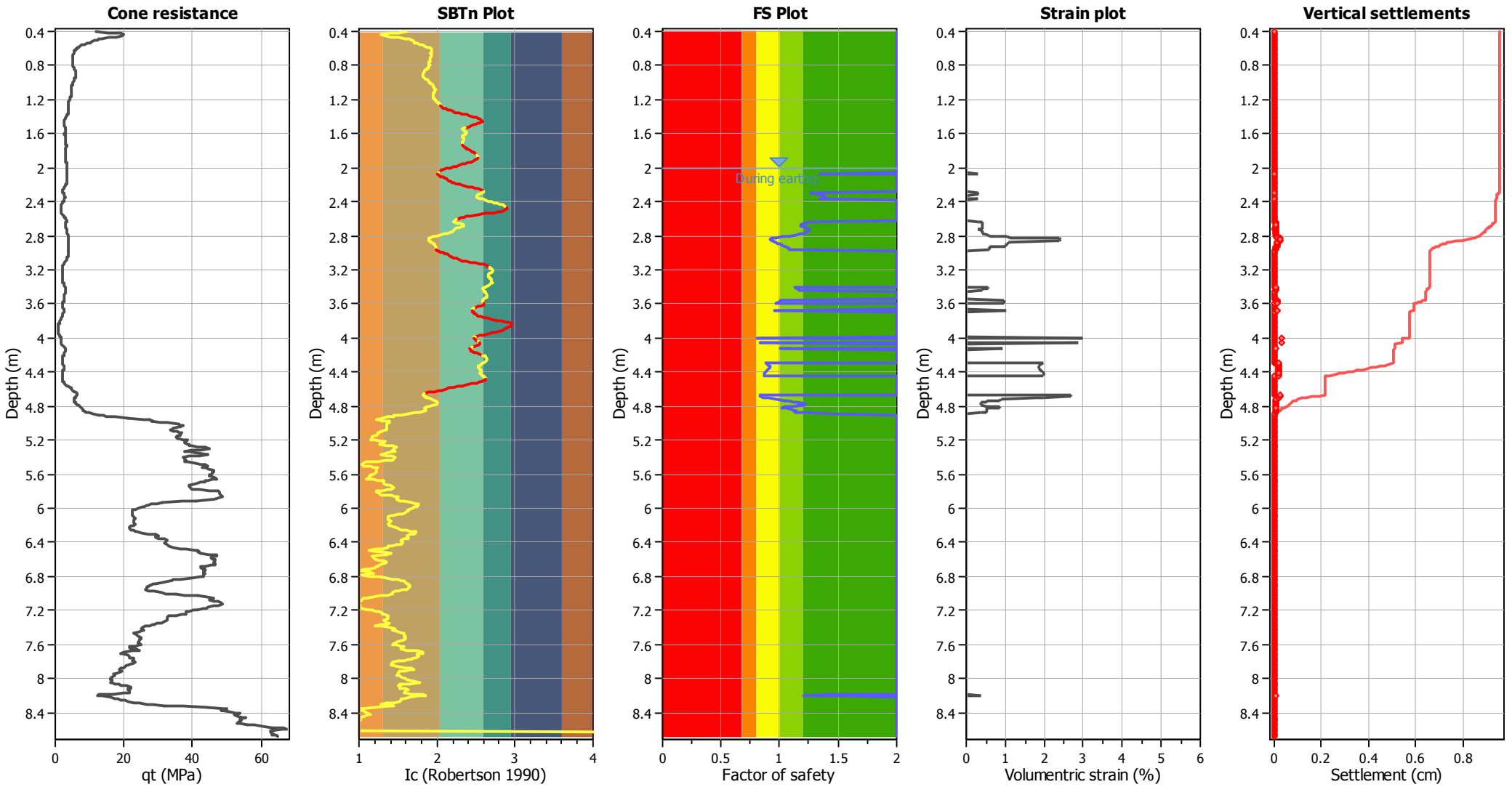
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	6.00	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.19	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

KGA Geotechnical Group
Unit 3, 201 Opawa Road, Hillsborough, Christchurch 8022
P O Box 7630, Sydenham, Christchurch 8240
www.kga.co.nz

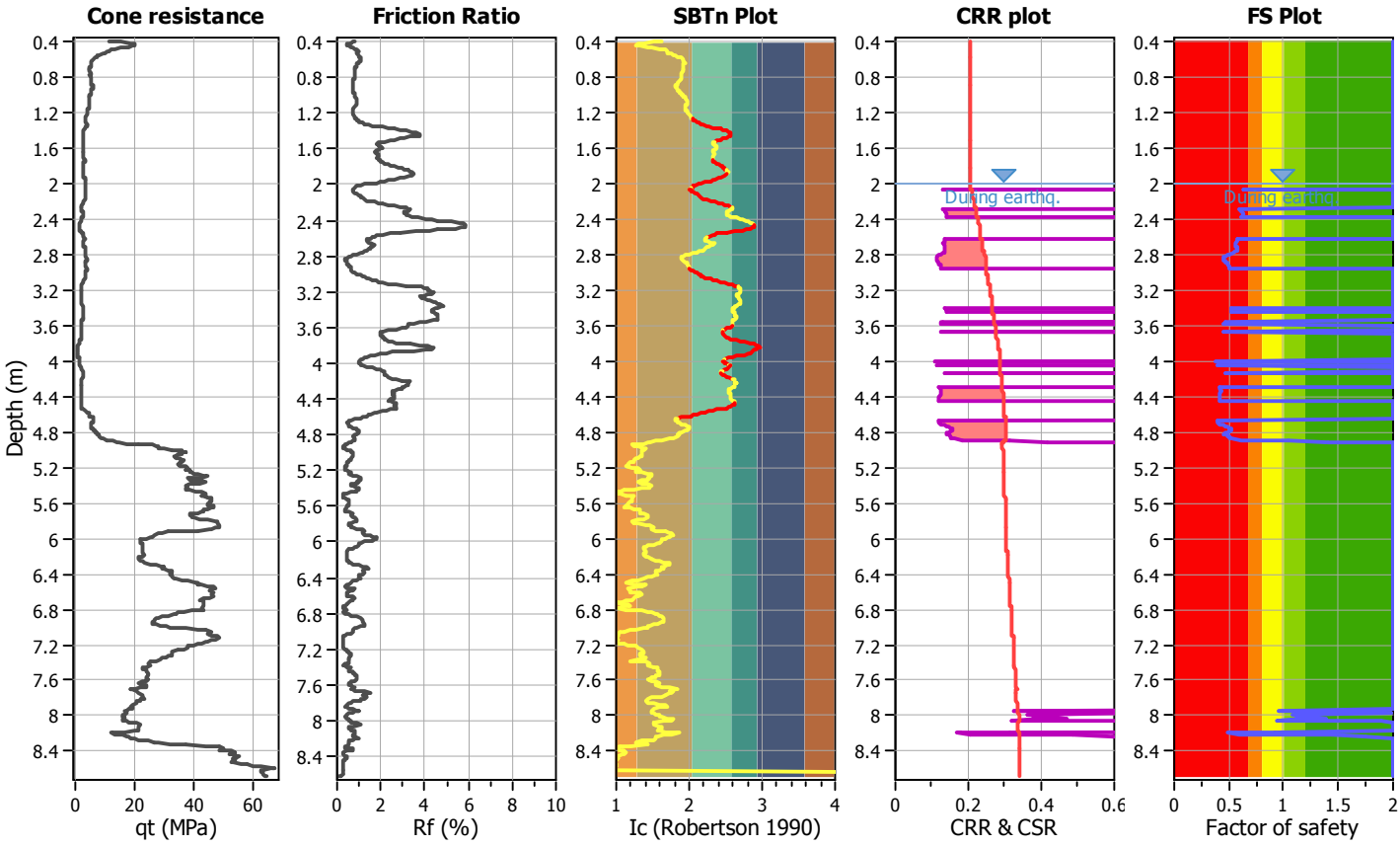
LIQUEFACTION ANALYSIS REPORT

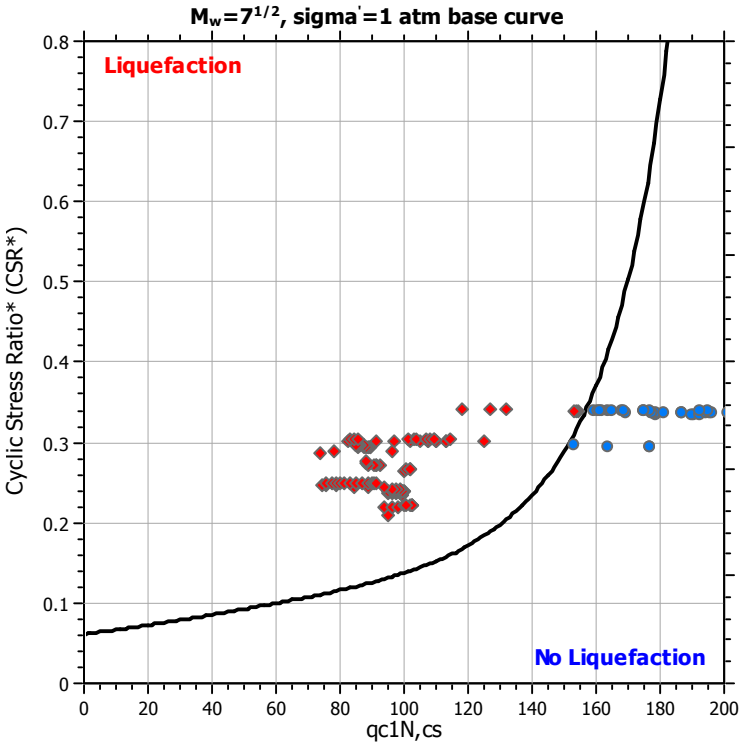
Project title : K200317 **Location : 24 Millpond Lane**

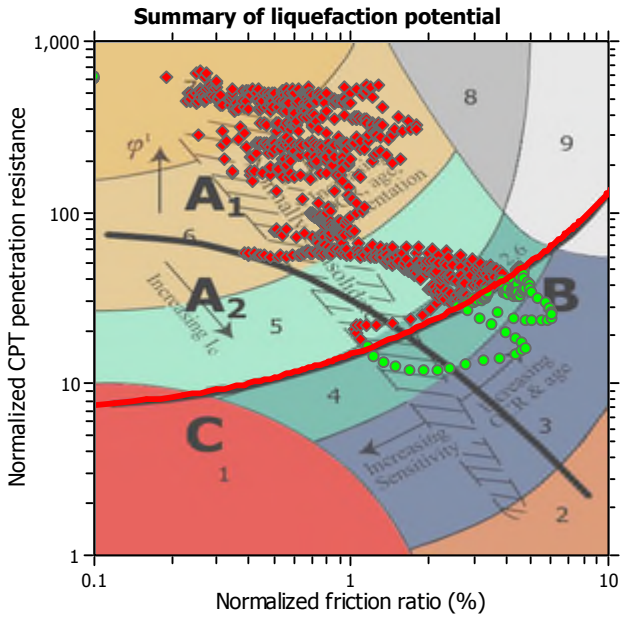
CPT file : CPT-03 ULS

Input parameters and analysis data

Analysis method:	B&I (2014)	G.W.T. (in-situ):	2.50 m	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	B&I (2014)	G.W.T. (earthq.):	2.00 m	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.50	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method
Peak ground acceleration:	0.35	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

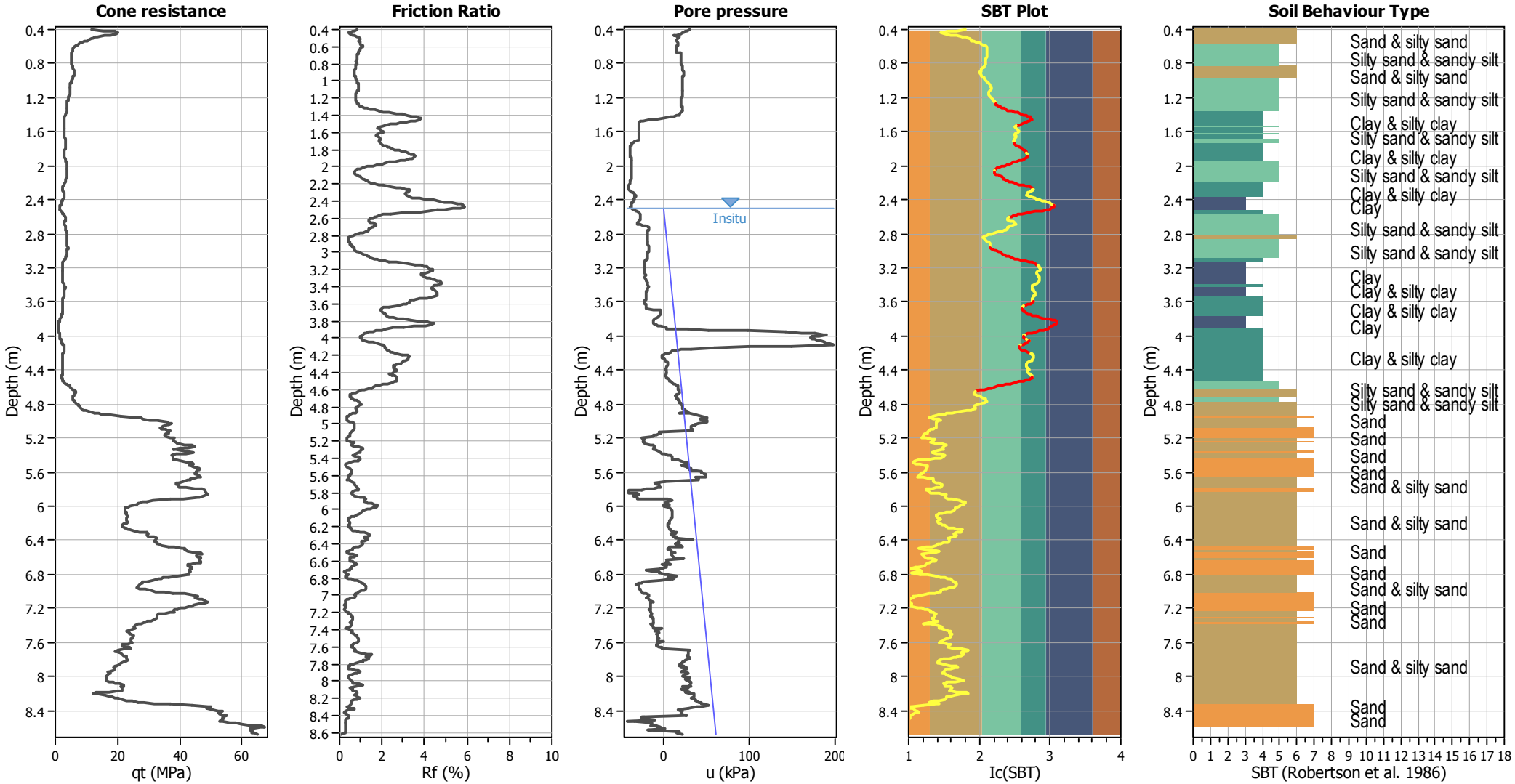






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and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

CPT basic interpretation plots



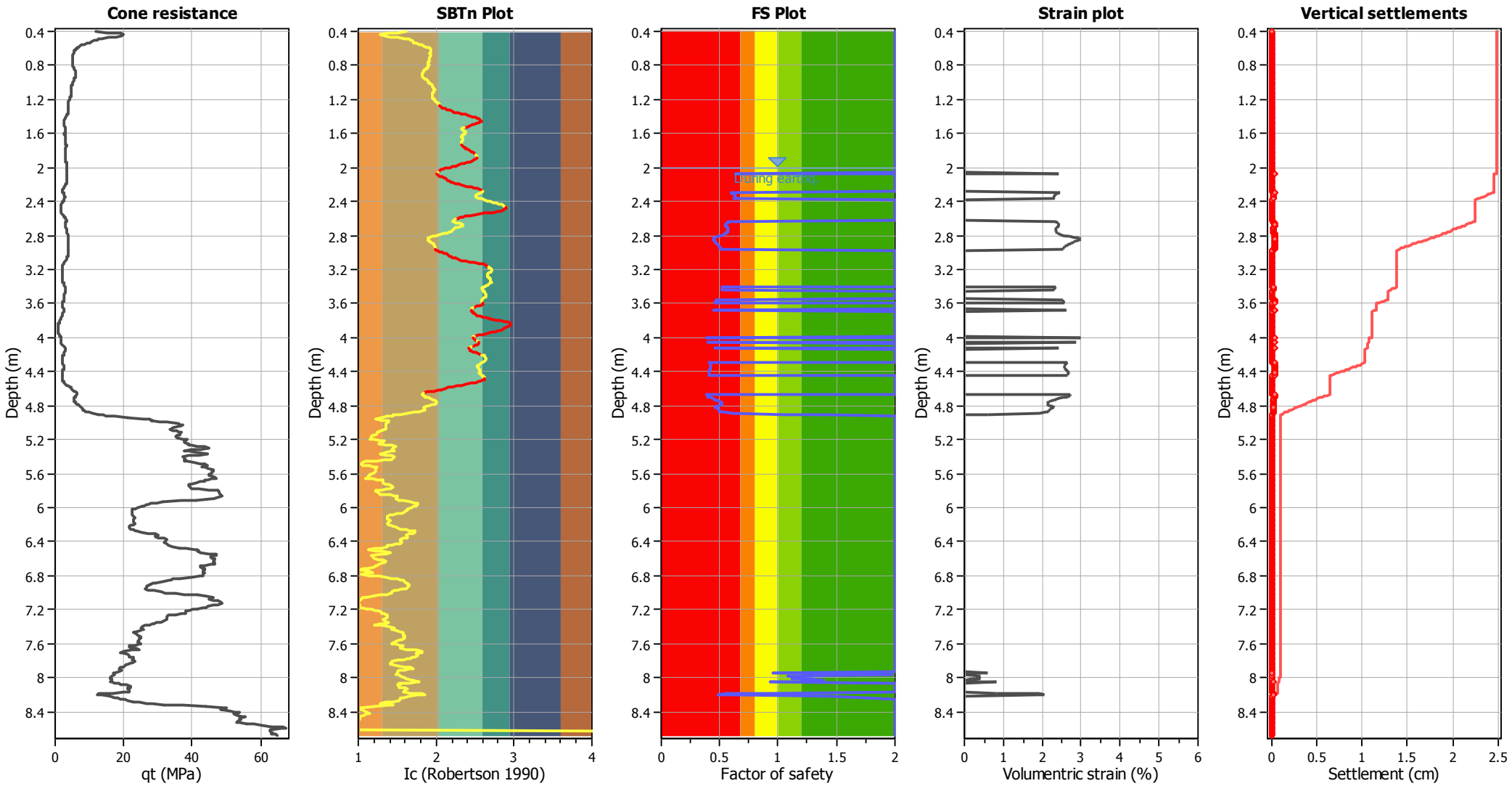
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	2.00 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:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.35	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	2.50 m	Fill height:	N/A	Limit depth:	N/A

SBT legend

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

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

APPENDIX E

Statement of Professional Opinion

Suitability of Site for Subdivision

Statement of Professional Opinion on the Suitability of Land for Subdivision

(Appendix I to the Infrastructure Design Standard)

Issued by: *KGA Geotechnical Group Limited*
(Geotechnical engineering firm or suitably qualified engineer)

To: *Selwyn District Council*
(Owner/Developer)

To be supplied to: *Selwyn District Council*
(Territorial authority)

In respect of: *Land Subdivision*
(Description of proposed infrastructure/land development)

At: *24 Millpond Lane, Lincoln*
(Address)

I *(Geotechnical engineer)* *R. Kamuhangire* on behalf of *(Geotechnical engineering firm)* *KGA Geotechnical Group Limited*

hereby confirm:

1. I am a suitably qualified and experienced geotechnical engineer and was retained by the owner/developer as the geotechnical engineer on the above proposed development.

2. My/the geotechnical assessment report, dated *27 May 2020* has been carried out in accordance with the Department of Building and Housing *Guidelines for geotechnical investigation and assessment of subdivisions* and includes:
   (i) Details of and the results of my/the site investigations.
   (ii) A liquefaction assessment.
   (iii) An assessment of rockfall and slippage, including hazards resulting from seismic activity.
   (iv) An assessment of the slope stability and ground bearing capacity confirming the location and appropriateness of building sites.
   (v) Recommendations proposing measures to avoid, remedy or mitigate any potential hazards on the land subject to the application, in accordance with the provisions of Section 106 of the Resource Management Act 1991.

3. In my professional opinion, I consider that Council is justified in granting consent incorporating the following conditions:

   Following recommendations described in Section 10 and Table 5 of KGA Geotechnical Report K200317, dated 27 May 2020

4. This professional opinion is furnished to the territorial authority and the owner/developer for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any building.

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

6. The geotechnical engineering firm issuing this statement holds a current policy of professional indemnity insurance of no less than $ *2M*
(Minimum amount of insurance shall be commensurate with the current amounts recommended by IPENZ, ACENZ, TNZ, INGENIUM.)

.....
(Signature of Engineer)

Date: *27 May 2020*

Qualifications and experience: *BSc (Civil Hons), MSc, CEng, MICE, CMEngNZ, CPEng*

Appendix D: Preliminary Site Investigation

Soil Contamination Risk
Preliminary Site Investigation Report

24 Millpond Lane,
Lincoln

June 2020

Malloch Environmental Ltd

19 Robertsons Road, Kirwee
RD1, Christchurch 7671
021 132 0321
www.mallochenviro.co.nz

Soil Contamination Investigations • XRF Services • Environmental Planning

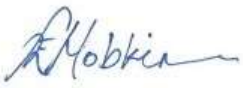
QUALITY CONTROL AND CERTIFICATION SHEET

Client: Selwyn District Council

Date of issue: 9 June 2020

Report written by:

Fran Hobkirk, Environmental Scientist, BSc
(3 years contaminated land experience)

Signed: 

Report reviewed and certified as a Suitably Qualified and Experienced Practitioner by:

Nicola Peacock, Principal Environmental Engineer, NZCE, CEnvP
(11 years contaminated land experience within 27 years environmental experience)

Signed: 

CONTENTS

APPENDICES

1 Executive Summary

The subject site involves a single lot with street address 24 Millpond Lane, Lincoln. It is proposed to subdivide the subject site which will create six new residential lots an access reserve and a balance lot with existing building. This will involve a change in use and disturbance of soils. The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS) do apply to the subject site and require an assessment of the likelihood of soil contamination being present. It is noted also that Malloch Environmental Ltd is obligated to consider the requirements of Section 10 of the Health and Safety at Work (Asbestos) Regulations 2016. This report details the work undertaken to assess the risks.

This investigation has determined the subject site has had a general pastoral use until 1973 when it became the site of the Ellesmere Country Club. Subsequent uses of the site include offices for Environment Canterbury and a junior campus for Lincoln Primary School.

Part of the site is listed on the ECan Listed Land Use Register Statement for 'A17 - Storage tanks or drums for fuel, chemicals or liquid waste'. A 4,500L underground diesel fuel tank was present on the subject site from the 1960s until its removal in 2011. A Detailed Site Investigation (DSI) undertaken at the time of its removal showed no significant hydrocarbon contamination has been caused by the tank. The DSI confirmed the laboratory Total Petroleum Hydrocarbon (TPH) results were well below the 'commercial/industrial' soil guideline values (SGVs) that were appropriate for the use of the land at that time. This investigation has now confirmed that the results are also well below the residential SGVs. Therefore, while the removed tank is a confirmed Hazardous Activities and Industries List (HAIL) activity, it has already been adequately investigated and it is considered highly unlikely that the removed tank poses a risk to human health in either a commercial or residential use. An above ground diesel tank has subsequently replaced the removed underground storage tank. The tank is on a concrete pad and is in good condition. There is no visual or olfactory evidence of any spills or leaks around the tank. The tank is a confirmed HAIL activity but it is considered highly unlikely to pose a risk to human health through contaminated soils. There is no evidence of HAIL activities or industries having occurred on the rest of the subject site, now or in the past.

The subject site is considered suitable for the proposed uses, including residential use, with no further investigations required.

In terms of planning status at the time of writing of this report, the NESCS does apply to the site and resource consent under the NESCS would be required for subdivision and change of use as a controlled activity.

2 Objectives of the Investigation

This report has been prepared in accordance with the Ministry for the Environment's "Contaminated Land Management Guidelines No 1: Reporting on Contaminated Sites in New Zealand". This report includes all requirements for a Stage 1 Preliminary Site Investigation report. This is one of the methods described in Section 6(3) of the NESCS to establish whether the regulations apply. The objective is to determine whether there is any risk of potential contamination that would warrant further investigation.

3 Scope of Work Undertaken

The scope of the work undertaken has included:

- Obtaining ECan data from the Listed Land Use Register (LLUR)
- Search of LINZ NZ orchard database
- Review of historic aerial photos
- Review of historic titles
- Site inspection
- Preparation of report in accordance with MfE guidelines

4 Site Identification

The site is located at 24 Millpond Lane in Lincoln as shown on the plan in **Figure 1** below. The site legally described as Lot 2 DP 430391 and has a total area of approximately 10,072m^2.

Figure 1 – Location Plan

5 Site Description and Surrounding Environment

The subject site is generally flat land. There is a circular building and a car parking area on the subject site. It is bounded by residential land. Lincoln's retail strip on Gerald Street lies approximately 450m north-west of the subject site.

6 Geology and Hydrology

The ECan GIS describes the soils as Templeton deep silty loam. Wells in the area indicate that topsoils are underlain by layers of clay, gravel and sand. Soil trace elements are 'Regional, Recent'.

The site lies over the unconfined/semi-confined gravel aquifer system. Ground water levels recorded on nearby bore logs are between 0.30m and 4.19m deep. The direction of ground water flow is generally in a south-easterly direction. The nearest active well is a public supply well approximately 53m east of the subject site.

According to Ecan's GIS there are no open water features on the subject site. L-1 Creek lies adjacent to the subject site, running parallel to the western and southern boundary of the site.

7 Site History

7.1 Previous Site Ownership and Use

Historic Certificates of Title were searched, and the following relevant ownership information was obtained:

Oct 1925 - Samuel James Rolston, farmer
Mar 1969 - John Bentley Williams, solicitor
Sep 1969 - Emil John Hall, schoolmaster, George William Taylor, civil servant and Simon James Rae, civil servant
Sep 1970 - Ellesmere Country Club (Incorporated)
Apr 2003 - The Selwyn District Council

Note that some of the older information was of poor quality and difficult to follow, therefore the accuracy of the spelling of names and dates is not guaranteed. Copies of the Historic Titles are included in **Appendix A.**

7.2 Regional Council Records

The ECan Listed Land Use Register (LLUR) Statement lists part of the subject site for 'A17 - Storage tanks or drums for fuel, chemicals or liquid waste'. A 4,500L underground diesel tank was present at the site from the 1960s until 2011. The tank was located on the northeast side of the circular building, in close proximity to the building. This was within current proposed Lot 7. A Detailed Site Investigation was undertaken by Envirochem during the removal of the tank. The tank was found in good condition and no significant odour or staining was noted during excavation of the tank. Soil samples were taken from the walls and based of the unlined tank pit and the reticulation and vent pipelines. The soil samples were analysed for Total Petroleum Hydrocarbons (TPH). Hydrocarbons were only detected in two of the eight samples. One sample contained 155mg/kg of C15-C36 fraction TPH and the other sample contained 77 mg/kg C10-C14 fraction and 820mg/kg of C15-C36 fraction TPH. The investigation states these are under the 'industrial/commercial' soil guidelines applicable to the use of the site, however, this PSI also notes these results are well below the soil guidelines for a residential use. The site is categorised as 'Below guideline values - Industrial/ Commercial'.

Four nearby sites are also listed, the sites are adjacent to each other and all were part of 70 South Belt prior to its subdivision. All four sites are listed for 'A1 - Agrichemicals' since 70 South Belt was used for storage and cleaning of agricultural chemical spray equipment from 1994 until 2001. The 70 South Belt site was investigated in 2002 by URS New Zealand Ltd. Small areas with contamination above residential guideline values were identified on the investigation site. However, remedial works have been completed and validation sampling has demonstrated that no significant contamination remains with all validation sample results below residential guidelines. The remediated site is considered suitable for residential land use. The four listed sites are categorised as 'Below guideline values - Residential'.

The LLUR Statement also includes information about a Preliminary Site Investigation undertaken on land adjacent to the subject site. The Preliminary Site Investigation reports that a mill was once present on the site. Two potential sources of contamination are reported:

1. An archaeological assessment indicated that there could be rubbish pits remaining from the site's use as a mill. The presence of these rubbish pits is suspected but not confirmed.
2. Fill from a known contaminated site (70 South Belt) was reportedly imported onto the site to backfill the mill basement. However, records indicate contaminated soils from the source site were disposed of appropriately and it is considered very unlikely that contaminated soil was imported to this site.

The report recommended that the development of the site for residential use should be allowed to proceed and further investigation be undertaken if any rubbish pits are found during development.

See LLUR Statement in **Appendix C.**

Resource consent information was sourced from the GIS mapping system. There are no active resource consents for the subject site. There is an active resource consent for an adjacent lot to take and use groundwater.

7.3 LINZ Records

The LINZ Orchard layer does not show the subject site, or any adjacent sites as having listed orchards.

7.4 Review of Historic Aerial Photographs

A total of nine aerial photos (see copies in **Appendix B**) have been used to assess the historic use of the site as detailed below:

- The earliest photo is from **1942** and has been sourced from ECan's GIS. The subject site is in pasture. There are no buildings or structures on the subject site. There may be a small shed adjacent to the eastern boundary of the subject site. The majority of the surrounding area is similar pasture farmland. The Moffat's flour mill house and associated buildings are beyond the subject site to the south. There is a dwelling beyond the subject site to the north-east, a dwelling and farm building beyond the subject site to the north and two dwellings beyond the subject site to the west. The L-1 Creek can be seen beyond the subject site running parallel to the western and southern boundary of the subject site.
- The photo from the early 1960s is dated **1962** on the top of the photo and **1963** on the bottom of the photo. It is sourced from ECan's GIS and shows no significant changes to the

subject site. Five residential lots have been developed beyond the subject site, adjacent to the northern boundary of the subject site. Other residential lots have also been developed further north beyond the subject site, adjacent to Edward Street.

- A photo from **1974** is sourced from ECan's GIS and shows a circular building has been constructed on the subject site. Additional residential development has occurred beyond the subject site to the north.
- A photo from **1984**, sourced from ECan's GIS, shows a large car park area has been constructed on the eastern half of the subject site. Residential development has occurred beyond the subject site to the east. Beyond the subject site to the west, across the L-1 Creek, a lot appears to have a commercial use with a large shed and a hardstanding area.
- A photo from **1994** is sourced from ECan's GIS and shows no significant changes to the subject site or surrounding area.
- A photo from **2000**, sourced from ECan's GIS, is of low quality and detail difficult to discern. There is no apparent change of use for the subject site or surrounding area.
- A photo from **2004** is sourced from ECan's GIS and shows no significant changes to the subject site. The mill buildings beyond the subject site to the south have been removed. Residential development has occurred beyond the subject site to the west and south.
- A photo from **2012** is sourced from ECan's GIS and shows no significant changes to the subject site or surrounding area.
- The most recent aerial photo reviewed, dated **2019**, sourced from ECan's GIS shows a playground has been added to the north-west of the circular building. There are no other significant changes to the subject site. Beyond the subject site to the south the Moffat's mill site has been developed for residential use.

7.5 Additional Information

According to a summary list of consents provided by the Selwyn District Council the circular building on the subject site was built in 1973. This building initially housed the Ellesmere Country Club which later became known as The Lincoln Club. A Property Information Memorandum (PIM) application indicates the use of the building changed from a country club to a community centre/hall in 2008. The building was temporarily used by Environment Canterbury in 2011. From late 2016 until late 2018 it became the Junior Campus for Lincoln Primary School.

8 Site Inspection

A site inspection was undertaken by Malloch Environmental Ltd on the 8th June 2020. During the inspection, an above ground diesel fuel tank was noted near to the north-east side of the circular building. This tank is in the same location as the removed underground tank, therefore, it must have been installed since 2011. The tank appears to be in good condition with some minor rust staining but no evidence of damage or deterioration of the metal. The tank is sited on a raised concrete pad which is surrounded on three sides by asphalt and on the fourth side by bare ground. There was no visual or olfactory evidence of any diesel spills or leaks.

Photo 1 - Tank exterior appears in good condition, concrete pad appears clean with no evidence of spills or leaks

Photo 2 - Bare earth at end of tank, no evidence of spills or leaks

No evidence of asbestos containing materials was seen on the exterior of the circular building. The building appears to be constructed from painted concrete blocks, timber and iron.

Photo 3 - Exterior of building: painted concrete block, timber and iron

Aside from the above ground tank, no other potential HAIL activities were noted during the site inspection.

9 HAIL Uses and Possible Types of Contaminants Associated with Past Use

The Hazardous Activities and Industries List (HAIL) compiled by The Ministry for the Environment include the following categories (*in italics*) that could be associated with the historical uses of the site with a summary of the risk of these activities having been carried out on the site.

A - Chemical manufacture, application and bulk storage

10. Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds

The subject site has been used for pastoral activities prior to the 1970s. The normal uses of fertilisers and pastoral weed controls associated with pastoral use are unlikely to have caused soil contamination that would pose a risk to human health. It is considered unlikely that persistent agrichemicals or fuels were used or stored on the site in any significant volume now or in the past.

17. Storage tanks or drums for fuel, chemicals or liquid waste

A 4,500L underground diesel fuel tank was present on the subject site from the 1960s until 2011. However, a DSI was undertaken at the time of the tank removal. The results of this investigation showed no Total Petroleum Hydrocarbon (TPH) contamination above industrial/commercial or residential guideline values is present at the tank site. Therefore, this removed tank is not considered to pose a risk to human health in either a commercial or residential use.

An above ground diesel tank has subsequently replaced the removed underground storage tank. The tank is on a concrete pad and appears to be in good condition. There is no visual or

olfactory evidence of any spills or leaks around the tank. This tank is also considered highly unlikely to pose a risk to human health through contaminated soils.

H - Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment

There are four nearby sites listed on the LLUR for 'A1 - Agrichemicals' as the land was used for storage and cleaning of agricultural chemical spray equipment from 1994 until 2001. The sites have been investigated and small areas of contamination above residential SGVs were found. The areas have since been remediated. Given the localised nature of the contamination found and the separation distance from the subject site, it is considered highly unlikely that any contamination from those sites would have migrated to the subject site.

I - Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment

There is no evidence of any buildings or structures being present on the subject site prior to 1973. Therefore, it is considered highly unlikely that soil contamination from lead-based paint products exists on the subject site in sufficient quantities that would pose a risk to human health.

As the building present on the subject site was built in 1973 it is possible that asbestos containing materials (ACM) were used in its construction. However, as the building is to remain on site any ACM only poses a risk if it is present on the outside of the building and is in a deteriorated state. Given the building's recent use as a school it is assumed that any ACM would be well maintained or would have been appropriately removed. Therefore, soil contamination from asbestos is considered unlikely.

10 Basis for Soil Guideline Values (SGV)

10.1 Activity Description

This report has been written for the following potential activities:

- Subdivision of the site and development of part of the site for residential use,
- Soil disturbance activities associated with the above use and development of the site

10.2 Zoning

The subject site is currently zoned Living 1.

10.3 Soil Guideline Values

Human health soil contaminant standards for a group of 12 priority contaminants were derived under a set of five land-use scenarios and are legally binding under The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Health) Regulations 2011 (NESCS). These standards have been applied where applicable. The regulations describe these as Soil Contaminant Standards. For contaminants other than the 12 priority contaminants, the hierarchy as set out in the Ministry for the Environment Contaminated Land Management Guidelines No 2 has been followed. These are generally described as Soil Guideline Values. For simplicity, this report uses the terminology Soil Guideline

Values (SGV) when referring to the appropriate soil contaminant standard or other derived value from the hierarchy. For soil, guideline values are predominantly risk based, in that they are typically derived using designated exposure scenarios that relate to different land uses. For each exposure scenario, selected pathways of exposure are used to derive guideline values. These pathways typically include soil ingestion, inhalation and dermal adsorption. The guideline values for the appropriate land use scenario relate to the most critical pathway.

The current proposal for the site includes six new residential lots, an access reserve and the balance lot with the current building. The building on the south of the site is to remain and Malloch Environmental Ltd have not been advised of any planned change of use for the proposed lot that will contain the building (proposed Lot 7). A subdivision plan is included in **Appendix D**.

The land-use scenarios applicable for the proposed use of this site and any associated earth disturbing activities include:

- 'residential 10% produce' for the residential lots and as a conservative scenario for a primary school use
- 'recreational' for the reserve area
- 'commercial/industrial/outdoor workers' as a proxy value to protect the health of construction workers.

11 Site Characterisation and Conclusion

This investigation has determined the subject site has had a general pastoral use until 1973 when it became the site of the Ellesmere Country Club. Subsequent uses of the site include offices for Environment Canterbury and a junior campus for Lincoln Primary School.

Part of the site is listed on the LLUR for 'A17 - Storage tanks or drums for fuel, chemicals or liquid waste'. A 4,500L underground diesel fuel tank was present on the subject site from the 1960s until its removal in 2011. The DSI undertaken at the time of its removal showed no significant hydrocarbon contamination has been caused by the tank. The DSI confirmed the laboratory TPH results were well below the 'commercial/industrial' SGVs that were appropriate for the use of the land at that time. This investigation has now confirmed that the results are also well below the residential SGVs. Therefore, while the removed tank is a confirmed HAIL activity, it has already been adequately investigated and it is considered highly unlikely that the tank poses a risk to human health in either a commercial or residential use.

An above ground diesel tank has subsequently replaced the removed underground storage tank. The tank is on a concrete pad and is in good condition. There is no visual or olfactory evidence of any spills or leaks around the tank. The tank is a confirmed HAIL activity but it is considered highly unlikely to pose a risk to human health through contaminated soils.

There is no evidence of HAIL activities or industries having occurred on the rest of the subject site, now or in the past.

The subject site is considered suitable for the proposed uses, including residential use, with no further investigations required.

12 Planning Status

In terms of the NESCS section 5 (7) states that the land is considered to be covered if an activity or industry described in the HAIL is being undertaken on it; or has been undertaken on it; or it

is more likely than not that an activity is being or has been undertaken on it. Section 6 describes the methods for determining whether the land is as described in section 7. Method 6 (3) is to rely on a Preliminary Site Investigation.

This Preliminary Site Investigation found evidence of an activity or industry described in the HAIL occurring on the subject site. HAIL A17 applies to part of the site with an underground storage tank present from the 1960s until 2011 and an above ground storage tank installed at some point since 2011. The current tank is considered highly unlikely to pose a risk to human health through contaminated soils under any proposed land use. A Detailed Site Investigation was undertaken in 2011 by Envirochem following the removal of the underground storage tank. It showed contaminant levels are below the standards set out in Regulation 7 but above expected background concentrations. Therefore, the proposed subdivision is considered to be a controlled activity under Regulation 9 and consent is required.

13 Limitations

Malloch Environmental Limited has performed services for this project in accordance with current professional standards for environmental site assessments, and in terms of the client's financial and technical brief for the work. Any reliance on this report by other parties shall be at such party's own risk. It does not purport to completely describe all the site characteristics and properties. Where data is supplied by the client or any third party, it has been assumed that the information is correct, unless otherwise stated. Malloch Environmental Limited accepts no responsibility for errors or omissions in the information provided. Should further information become available regarding the conditions at the site, Malloch Environmental Limited reserves the right to review the report in the context of the additional information.

Opinions and judgments expressed in this report are based on an understanding and interpretation of regulatory standards at the time of writing and should not be construed as legal opinions. As regulatory standards are constantly changing, conclusions and recommendations considered to be acceptable at the time of writing, may in the future become subject to different regulatory standards which cause them to become unacceptable. This may require further assessment and/or remediation of the site to be suitable for the existing or proposed land use activities. There is no investigation that is thorough enough to preclude the presence of materials at the site that presently or in the future may be considered hazardous.

Appendix A – Historic Certificates of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy

R.W. Muir
Registrar-General of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **518430**
Land Registration District **Canterbury**
Date Issued 16 June 2010

Prior References
CB47D/414

Estate	Fee Simple
Area	1.0072 hectares more or less
Legal Description	Lot 2 Deposited Plan 430391

Original Registered Owners
The Selwyn District Council

Interests

Appurtenant hereto is a water easement created by Outstanding Deed of Easement 19098 (28 D 937) - 19.6.1867 at 2:00 pm

Appurtenant hereto is a right of way, right to drain water and sewage and a right to convey water, electric power and telephonic communications specified in Easement Certificate A466343.5 - 14.7.2000 at 2:02 pm

The easements specified in Easement Certificate A466343.5 are subject to Section 243 (a) Resource Management Act 1991

Land Covenant in Deed 5587484.1 - 15.5.2003 at 9:00 am

8532008.1 Departmental Dealing correcting the name of the registered proprietor to Selwyn District Council - 29.6.2010 at 9:00 am

9980372.4 Surrender of the easements specified in Easement Certificate A466343.5 - 27.2.2015 at 8:54 am

COMPUTER FREEHOLD REGISTER
UNDER LAND TRANSFER ACT 1952

Historical Search Copy

R.W. Muir
Registrar-General
of Land

Identifier CB47D/414
Land Registration District Canterbury
Date Issued 14 July 2000

Cancelled

Prior References
CB8F/1162

Estate	Fee Simple
Area	1.0113 hectares more or less
Legal Description	Lot 1 Deposited Plan 82718

Original Proprietors
Ellesmere Country Club (Incorporated)

Interests

Appurtenant hereto is a water easement created by Outstanding Deed of Easement 19098 (28 D 937)

402183.6 Mortgage to Bank of New Zealand - 22.9.1982 at 11.14 am

A278022.1 Mortgage to Ellesmere Country Club Nominees Limited - 20.1.1997 at 11.34 am

A466343.4 Resolution under Section 321(3)(c) Local Government Act 1974 (DP 82718) - 14.7.2000 at 2.02 pm

A466343.5 Easement Certificate specifying the following easements - 14.7.2000 at 2.02 pm

Type	Servient Tenement	Easement Area	Dominant Tenement	Statutory Restriction
Right of way, right to drain water and sewage, right to convey water, electric power and telephonic communications	Lot 2 Deposited Plan 82718 - CT CB47D/415	A DP 82718	Lot 1 Deposited Plan 82718 - herein	

The above easements are subject to Section 243(a) Resource Management Act 1991

5567851.1 Discharge of Mortgage 402183.6 - 30.4.2003 at 9:00 am

5567851.2 Discharge of Mortgage A278022.1 - 30.4.2003 at 9:00 am

5567851.3 Change of Name of Ellesmere Country Club (Incorporated) to The Lincoln Club Incorporated - 30.4.2003 at 9:00 am

5567851.4 Transfer to The Selwyn District Council - 30.4.2003 at 9:00 am

Land Covenant in Deed 5587484.1 - 15.5.2003 at 9:00 am

part Lot 3 DP 430391 is vested in Selwyn District Council as Local Purpose Reserve pursuant to Section 239(1)(a) Resource Management Act 1991 subject to the Reserves Act 1977

8495696.1 CTs issued - 16.6.2010 at 9:51 am

Legal Description	Title
Lot 2 Deposited Plan 430391	518430
Part Lot 3 Deposited Plan 430391	518431

CANCELLED

LT69

47D/414

Reference:
Prior CT: 8F/1162
Document No.: A466343.7

REGISTER

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT 1952

This Certificate dated the 14th day of July Two Thousand under the seal of the Registrar-General of Land, New Zealand, for the Land Registration District of CANTERBURY

WITNESSETH that **ELLESMERE COUNTRY CLUB (INCORPORATED)** is seised of an estate in **fee simple** (subject to such reservations, restrictions, encumbrances and interests as are notified by memorial endorsed hereon) in the land hereinafter described, delineated on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 1.0113 hectares, more or less being **LOT 1 DEPOSITED PLAN 82718**

REGISTRAR-GENERAL OF LAND NEW ZEALAND

For Registrar-General of Land

Appurtenant hereto is a water easement created by Outstanding Deed of Conveyance 19098 (28 D 937) - 19.6.1867 at 2.00

402183.6 Mortgage to Bank of New Zealand - 22.9.1982 at 11.14

A278022.1 Mortgage to Ellesmere Country Club Nominees Limited - 20.1.1997 at 11.34

A466343.4 Resolution under Section 321(3)(c) Local Government Act 1974 (DP 82718)

Appurtenant hereto is a right of way, right to drain water and sewage, right to convey water, electric power and telephonic communications over part Lot 2 marked A on DP 82718 CT 47D/415 as specified in Easement Certificate A466343.5

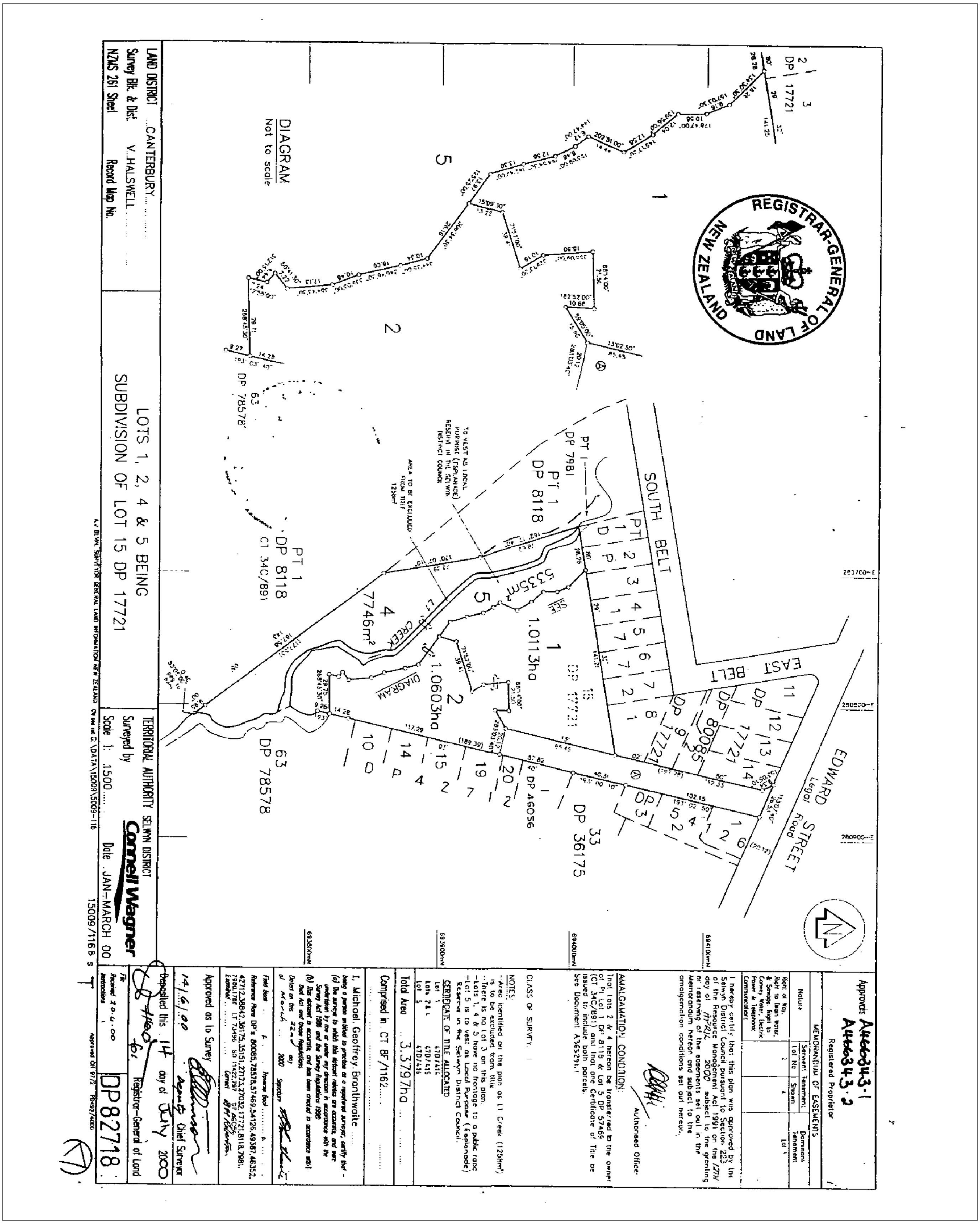
The easements specified in Easement Certificate A466343.5 are subject to Section 243(a) Resource Management Act 1991

all 14.7.2000 at 2.02

For RGL

47D/414

5


LOTS 1, 2, 4 & 5 BEING
SUBDIVISION OF LOT 15 DP 17721
LAND DISTRICT CANTERBURY
Survey Blk. & Dist. V HALSWELL
TERRITORIAL AUTHORITY SELWYN DISTRICT
Connell Wagner
Scale 1: 1500
Date JAN-MARCH 00
DIAGRAM
Not to scale
SOUTH BELT
EAST BELT
EDWARD STREET
Legal Road
DP 78578
DP 36175
DP 46056
REGISTRAR-GENERAL OF LAND NEW ZEALAND
MEMORANDUM OF EASEMENTS
AMALGAMATION CONDITION
CERTIFICATE OF TITLE ALLOCATED
Total Area 3.3797ha
Approved as to Survey
Deposited this 14 day of July 2000
Registrar-General of Land
DP 82718

References
Prior C/T. 500/162

Transfer No.
N/C. Order No. 760342

Land and Deeds 69

CANCELLED

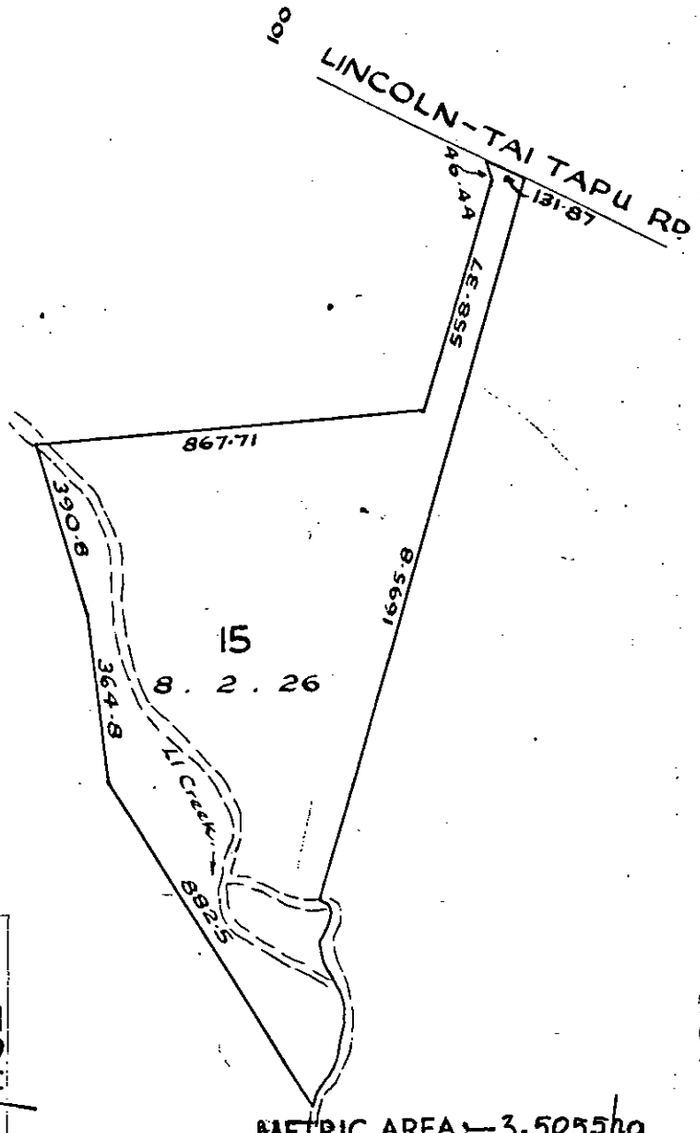
No. 8F/1162

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT REGISTER

This Certificate dated the 14th day of March one thousand nine hundred and Sixty-nine under the seal of the District Land Registrar of the Land Registration District of Canterbury

WITNESSETH that JOHN BARTLEY WILLIAMS of Christchurch Solicitor —

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 8 acres 2 roods 26 perches or thereabouts situated in Block V of the Halswell Survey District being Lot 15 on Deposited Plan 17721 Part Rural Section 1880 —



METRIC AREA:—3.5055ha

Scale: 1 inch = 8.2.26

DISTRICT LAND REGISTRAR CANTERBURY N.Z.

Assistant Land Registrar

Subject to a Building Line Restriction imposed by Notice 399820

Lot 2

Appurtenant to the above described land is a water easement created by Deed of Conveyance 19098 (28 D937)

A.L.R.

Transfer 777240 to Emil John Hall, Schoolmaster, George William Taylor, Civil Servant and Simon James Rae, Civil Servant, all of Lincoln - 26.9.1969 at 11.20 a.m.

A.L.R.

Mortgage 777241 to Bank of New Zealand - 26.9.1969 at 11 a.m. DISCHARGED 3/8/1970

A.L.R.

Transfer 809031 to Ellesmere Country Club (Incorporated) at Lincoln - 18/9/1970 at 12.5 p.m

A.L.R.

- OVER -

No. 8F/1162

C.T.8F/1162

DISCHARGED 22/9/1982

Mortgage 809032 to Kevin Patrick McDrury, Leslie George Llewellyn Copp and Robert Williams Eggleston - 18/9/1970 at 12.5 p.m

A.L.R.

Mortgage 63699/1 to Bank of New Zealand - 18.12.1975 at 1.35 p.m.

953090/1

DISCHARGED 22/9/1982

A.L.R.

Mortgage 63699/2 to Young Hunter Nominees Limited - 18.12.1975 at 1.35 p.m.

A.L.R.

DISCHARGED 22/9/1982

Mortgage 63699/3 to Quill Mortis Limited 18.12.1975 at 1.36 p.m.

A.L.R.

DISCHARGED 22/9/1982

Mortgage 63699/4 to New Zealand Breweries Limited - 18.12.1975 at 1.36 p.m.

A.L.R.

No.63699/5 Memorandum of Priority making Mortgage No.63699/1 first Mortgage, Mortgage No.63699/2 second Mortgage, Mortgage No.63699/3 third Mortgage, Mortgage No.63699/4 fourth Mortgage and Mortgage No.809032 fifth Mortgage - 18.12.1975 at 1.35 p.m.

A.L.R.

No. 268497/4 Fencing Covenant

A.L.R.

No.402183/3 Change of Name of the Mortgagee under Mortgage 63699/4 to Lion Breweries Limited - 22.9.1982 at 11.14 am.

for A.LR.

Mortgage 402183/6 to Bank of New Zealand - 22.9.1982 at 11.14 am.

for A.L.R.

DISCHARGED 7/6/1991

Mortgage 402183/7 to Young Hunter Nominees Limited - 22.9.1982 at 11.14 am.

for A.L.R.

Mortgage A278022/1 to Ellesmere Country Club Nominees Limited - 20.1.1997 at 11.34am

for A.L.R.

Amalgamation Correspondence A365291.1

SEE OVER

Lot 5 DP 82718 is vested in The Selwyn District Council as Local Purpose (Esplanade) Reserve under Section 239 Resource Management Act 1991

A466343.3 Certificate under Section 224(c) Resource Management Act 1991 by The Selwyn District Council (affects DP 82718)

A466343.4 Resolution under Section 321(3)(c) Local Government Act 1974 (affects Lot 1 DP 82718)

A466343.5 Easement certificate affecting Lots on DP 82718

NATURE	SERVIENT LAND	DOMINANT LAND
Right of way, right to drain water and sewage, right to convey water, electric power and telephonic communications	2-A	1

The above easements will be subject to Section 243(a) Resource Management Act 1991 when created

A466343.6 Transfer of Lots 2 and 4 DP 82718 to Kajens Trading & Development Limited

A466343.7 CT 47D/414 issued for Lot 1 DP 82718

A466343.8 CT 47D/415 issued for Lots 2 and 4 DP 82718

A466343.9 CT 47D/416 issued for Lot 5 DP 82718

all 14.7.2000 at 2.02

For RGL

CANCELLED
DUPLICATE DESTROYED

3̶6̶8̶/291

NEW ZEALAND.

Reference: Land Transfer (Compulsory Registration of Titles) Act, 1924.
Deeds Index. 7¼ 561, 562.
Application No. C 923

Register-book,
Vol. 368, folio 291

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT.

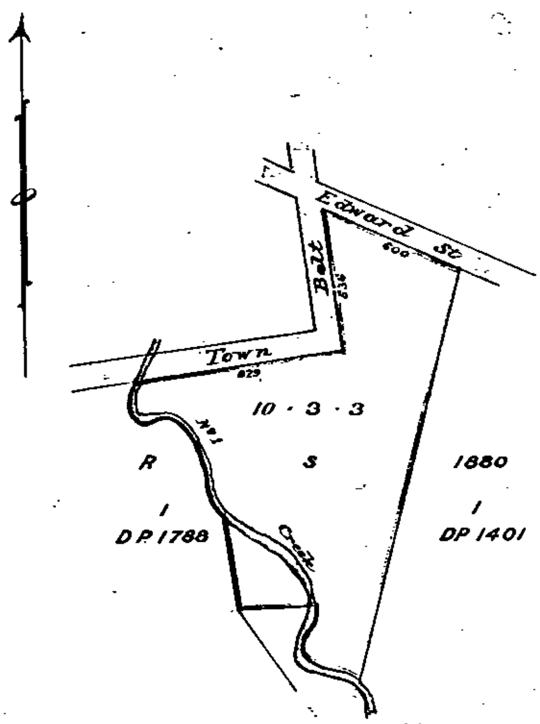
LIMITED AS TO PARCELS AND TITLE.

CANCELLED

This Certificate, dated the Twentieth day of October one thousand nine hundred and Twenty-five under the hand and seal of the District Land Registrar of the Land Registration District of Canterbury Witnesseth that SAMUEL JAMES ROLSTON of Lincoln Farmer

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial under written or endorsed hereon, subject also to any existing right of the Crown to take and lay off roads under the provisions of any Act of the General Assembly of New Zealand) in the land hereinafter described, as the same is delineated by the plan hereon bordered green, be the several admeasurements a little more or less, that is to say: All that parcel of land containing TEN ACRES THREE ROODS AND THREE PERCHES or thereabouts situated in Block V of the Halswell Survey District being parts of Rural Section 1880 and being more particularly described in Conveyance Registered No. 132039 (211/545)

[signature]
Asst. ~~District~~ Land Registrar.



Scale: 5 Chains to an Inch

Outstanding Deed of Conveyance Registered No. 19098 (28/937) creating an easement being a right to the full and free liberty use and enjoyment of all the water flowing and running down the Creek or Stream called No. 1 Creek as the same water flows through and along the above parcel of land containing 10 acres or thereabouts for all and every use and purpose whatsoever with certain other liberties and privileges and subject to certain restrictions Edward Cephas John Stevens to Henry Moffat [signature] A.L.R.

Outstanding Deed of Mortgage Registered No. 132040 (211/547) Samuel James Rolston to Henry Ewart Sansom [signature] A.L.R.

title
5 August 26
[signature]

Cancelled and New Certificate issued Volume ... folio 127 the limitations as to parcels having been removed (See Application 13096) [signature]
DLR

3̶6̶8̶/291

[Land and Deeds—4.
[Form B.

393/197

NEW ZEALAND.

Reference: Vol. 368, Folio 291
Transfer No.
Application No. 13496
Order for N/O No.

Register-book, Vol. 393, folio 197 Cancelled

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT.

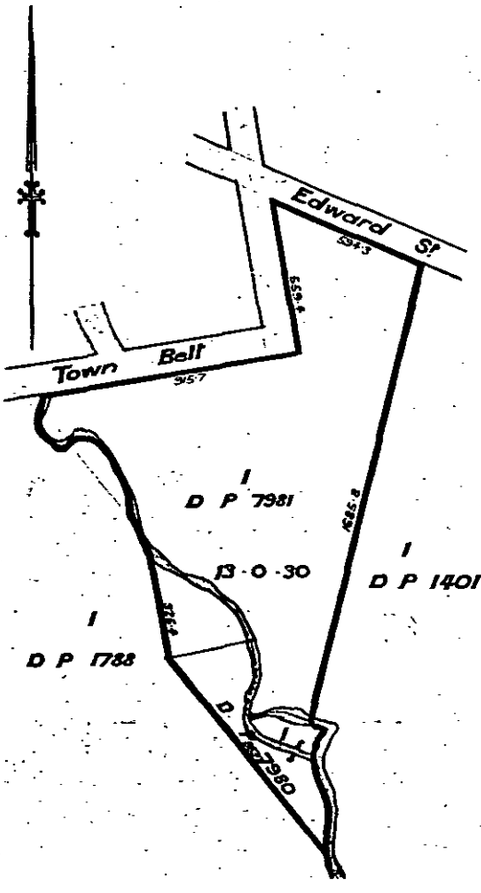
CANCELLED

This Certificate, dated the Sixth day of April, one thousand nine hundred and twenty-seven under the hand and seal of the District Land Registrar of the Land Registration District of Canterbury **Witnesseth** that

SAMUEL JAMES ROLSTON of Lincoln Farmer

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial under written or endorsed hereon, subject also to any existing right of the Crown to take and lay off roads under the provisions of any Act of the General Assembly of New Zealand) in the land hereinafter described, as the same is delineated by the plan hereon bordered green, be the several admeasurements a little more or less, that is to say: All that parcel of land containing THIRTEEN ACRES AND THIRTY PERCHES or thereabouts situated in Block V of the Halswell Survey District being Lot 1 on plan deposited in the Land Registry Office at Christchurch as No.7980 and Lot 1 on plan deposited as aforesaid as No.7981 part of Rural Section 1000

Image Quality due to Condition of Original



Scale: 4 Chains to an Inch

District Land Registrar.

Outstanding Deed of Conveyance Registered No.19098 (28/937) creating an easement effecting part being a right to the full and free liberty use and enjoyment of all the water flowing and running down the creek or stream called No.1 Creek as the same water flows through and along the above parcel of land containing 10 acres or thereabouts for all and every use and purpose whatsoever with certain other liberties and privileges and subject to certain restrictions Edward Cephas John Stevens to Henry Moffat

D.L.R.

Outstanding Deed of Mortgage Registered No.132040 (211/547) Samuel James Rolston to Henry Ewart Sansom of part

D.L.R.

K.10468 produced the 31 day of May 1938 at 9.30 a.m. Order of Adjustment under the Mortgagors and Lessees Rehabilitation Act, 1936. Hereby declared that the above described land is discharged from the Outstanding Mortgage 132040 and the said Outstanding Mortgage

Discharge of Outstanding Mortgage 132040 note hereof and Reduction of principal sum produced 19 February 1942 at 11.14 a.m. (See Transfer 27513

- over -

393/197

393/197

343/1947

Transfer 275113 produced 19 February 1947 at 11:14 am. Samuel Jane-Bolton to Ivan Vingate Weston of part

500/161. [illegible signature]

Cancelled as to Balance and New CT issued Vol 500 folio 162.

N.CO 8850 [illegible signature]

Cancelled

393/197

[Land and Deeds—4.

Form B.

NEW ZEALAND

Reference: Vol. 393, Folio 197 / Transfer No. / Application No. / Order for N/C No. 6850

Register-book, Vol. 500, folio 162 Cancelled

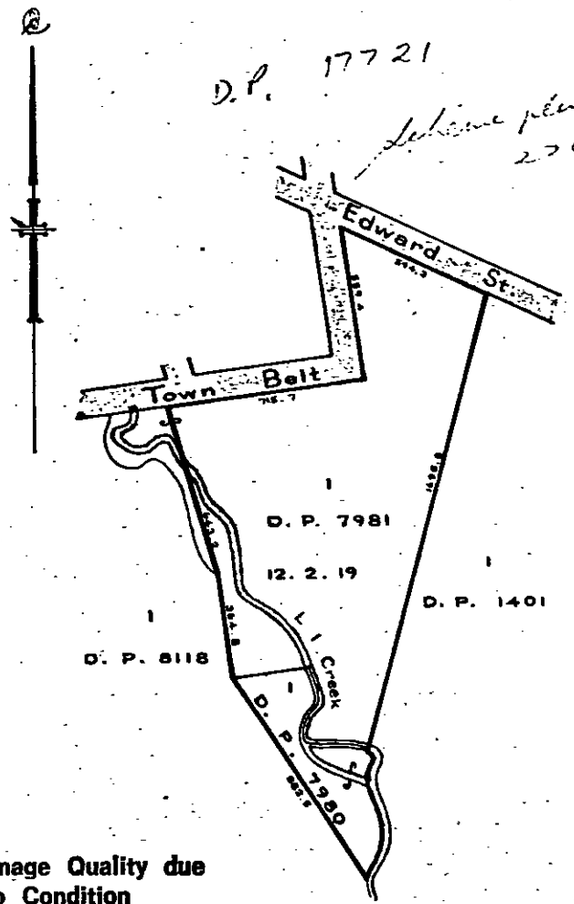
500/162

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate, dated the Nineteenth day of February one thousand nine hundred and Forty-seven under the hand and seal of the District Land Registrar of the Land Registration District of Canterbury **Witnesseth** that

SAMUEL JAMES ROLSTON of Lincoln Farmer

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial under written or endorsed hereon; subject also to any existing right of the Crown to take and lay off roads under the provisions of any Act of the General Assembly of New Zealand) in the said land hereinafter described, as the same is delineated by the plan hereon bordered green be the several admeasurements a little more or less, that is to say: All that parcel of land containing TWELVE ACRES TWO ROODS AND NINETEEN PERCHES or thereabouts situated in Block V of the Halswell Survey District being Lot 1 on Deposited Plan No.7980 and part of Lot 1 on Deposited Plan No.7981 part of Rural Section 1880



Scale: 4 chains to an inch.

Assistant District Land Registrar.

Outstanding Deed of Conveyance Registered No.19098 (28 D 937) creating an easement affecting part being a right to the full and free liberty use and enjoyment of all the water flowing and running down the creek or stream called No.1 Creek as the same water flows through and along part Lot 1 Plan 7981 for all and every use and purpose whatsoever with certain other liberties and privileges and subject to certain restrictions A.L.R.

Outstanding Deed of Mortgage Registered No.132040 (211 D 547) Samuel James Rolston to Jerry Stewart Sansom of part DISCHARGED A.L.R.

K.10468 produced the 31 day of May 1938 at 9.30 a.m. Order of Adjustment under the Mortgagors and Lessees Rehabilitation Act 1936 affecting the part of the above described land subject to Outstanding Mortgage 132040 and Outstanding Mortgage 132040 A.L.R.

Reduction of principal sum of Outstanding Mortgage 132040 produced 19 February 1947 at 11.14 a.m. (See Transfer 275113) DISCHARGED A.L.R.

399820 Notice pursuant to Section 5 of the Land Subdivision in Counties Act 1946 that Lots 11 to 15 on Scheme Plan 2700 are subject to a condition as to Building Line entered 21st June 1954 at 1.40 p.m.

Discharge of Outstanding Mortgage 132040 as to Lots 10 and 16 Plan 17721 produced 11th February 1955 at 2.55 p.m.

Over

500/162

500/162

500/162 41265 Transfer Dedication of Lot 16 Plan 17721 as road for a public road by Samuel James Ralston produced 8 February 1955 at 2.56pm
[signature] AR

By virtue of section 13 of the Land Subdivision in Counties Act 1946 Lot 10 DP 17721 is vested in Her Majesty the Queen as Crown land available for disposal for such purposes 11 February 1955 at 2.58pm. [signature] AR

Cancelled as to Lot 10 Plan 17721

PART CANCELLED

~~399820 Notice pursuant to Section 6 of the Land Subdivision in Counties Act 1946 that Lots 11 to 15 deposited plan 2700 are subject to a condition as to Building Line entered 24 June 1954 at 1.40pm~~
See last Lot. A.L.R.

412234 Transfer of Lot 14 plan 17721 Samuel James Ralston to Norman Alfred Hewitt (Fencing Covenant) produced 15 March 1955 at 11.22am
637/45 [signature] ALR

414411 Transfer of Lot 6 plan 17721 Samuel James Ralston to Reinhard Ferdinand Matthias van Stevenink produced 16 March 1955 at 12 noon
637/46 [signature] ALR

415167 Transfer of Lot 6 Plan 17721 Samuel James Ralston to Harvey Caplin Smith produced 5 April 1955 at 12.25pm (Fencing Covenant)
640/12 [signature] ALR

415281 Transfer of Lot 5 Plan 17721 Samuel James Ralston to Frederick Benjamin Ford produced 30 March 1955 at 12.20pm
637/13 [signature] ALR

414833 Transfer of Lots 3 and 4 Plan 17721 Samuel James Ralston to Her Majesty the Queen for a Teachers Residence produced 23 March 1955 at 1.40pm
640/16 [signature] ALR

415961 Transfer of Lot 2 Plan 17721 Samuel James Ralston to Alec Wilson Riddolls produced 7 April 1955 at 2.39pm
640/56 [signature] ALR

412518 Transfer of Lot 8 Plan 17721 Samuel James Ralston to Errol John Hall produced 11 May 1955 at 3pm (Fencing Covenant)
642/13 [signature] ALR

420966 Transfer of Lot 9 Plan 17721 Samuel James Ralston to Ian Alfred Murray Cruickshank produced 6 July 1955 at 2.47pm (Fencing Covenant)
CT 648/73 [signature] DAR

500/162
420967 Transfer of Lot 11 Plan 17721 Samuel James Ralston to Thomas Hampton Mussent Bennett and Marjorie Hazel Bennett produced 6 July 1955 at 2.48pm (Fencing Covenant)
648/74 [signature] DAR

429679 Transfer of Lot 13 Plan 17721 Samuel James Ralston to Elsie Hunt produced 29 November 1955 at 11.50am (Fencing Covenant) [signature] ALR

432014 Transfer of Lot 7 Plan 17721 Samuel James Ralston to Adam James Lancaster produced 24 January 1956 at 3pm (Fencing covenant) [signature] ALR
668/7

439587 Transfer of Lot 12 Plan 17721 Samuel James Ralston to George William Marshall produced 13 June 1956 at 11.10am. [signature] ALR
681/70

DPL 740/66 issued for Lot 10 Plan 17721 (4/12/1958) [signature]

Transmission 597078 of Balance to John Bartley Williams of Christchurch, Solicitor as Executor Entered 20/3/1963 at 12.7pm [signature] ALR

NCO 760342 14.3.1969 Cancelled and new CT 8F/1162 issued for the balance of the within land [signature] ALR

Cancelled
Duplicate Destroyed

Appendix B – Historic Aerials

1942 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:40 PM

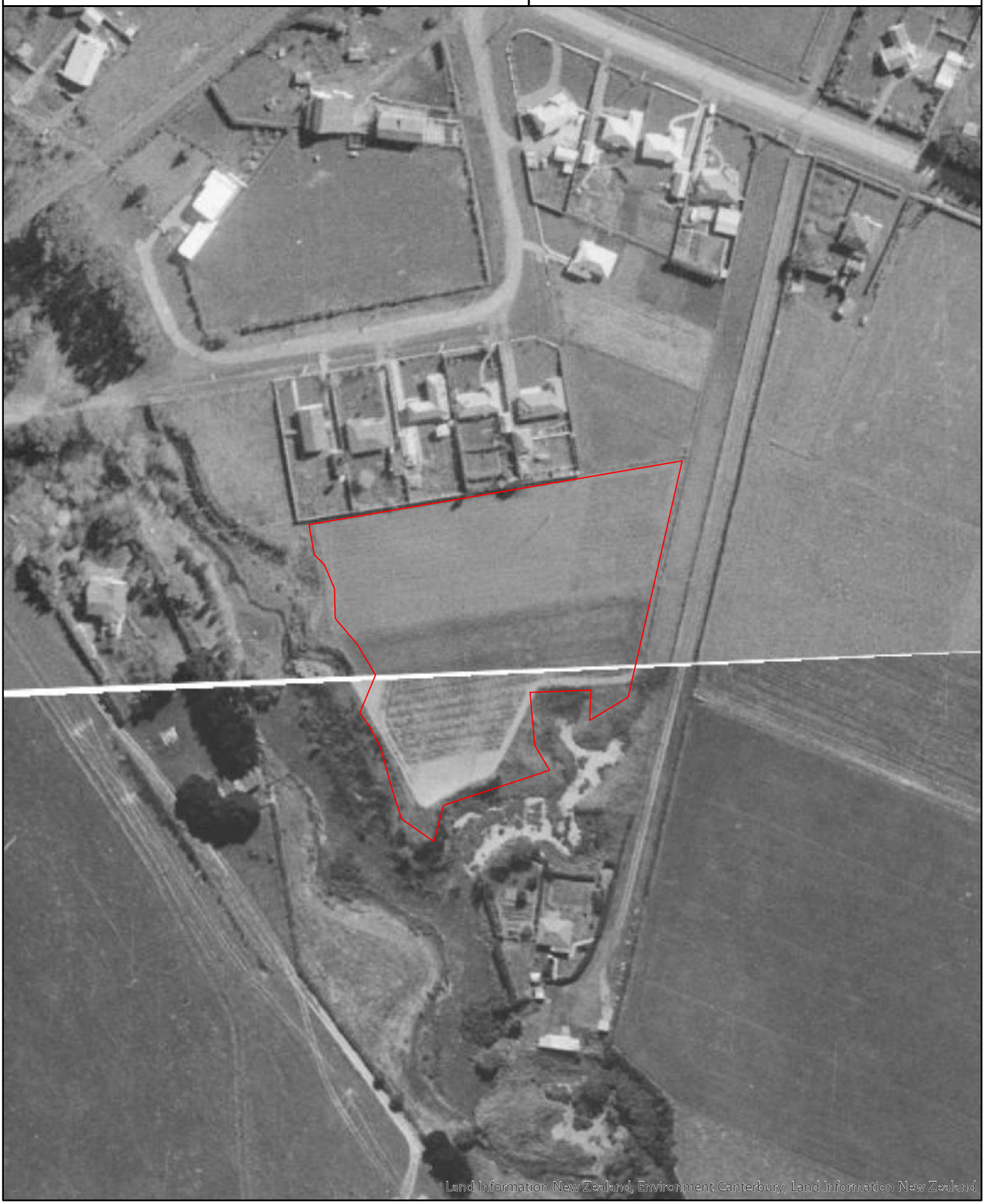
1962/63 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:41 PM



1974 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:42 PM

1984 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:44 PM

1994 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:44 PM

2000 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:45 PM

2004 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:46 PM

2012 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:47 PM

2019 Aerial

N

0 0.03 0.05 0.08 0.1 Kilometres

Scale: 1:1,700 @A4

Map Created by MEL on 14/05/2020 at 4:47 PM

Appendix C – LLUR Statement

Property Statement
from the Listed Land Use Register

Visit www.ecan.govt.nz/HAIL for more information about land uses.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

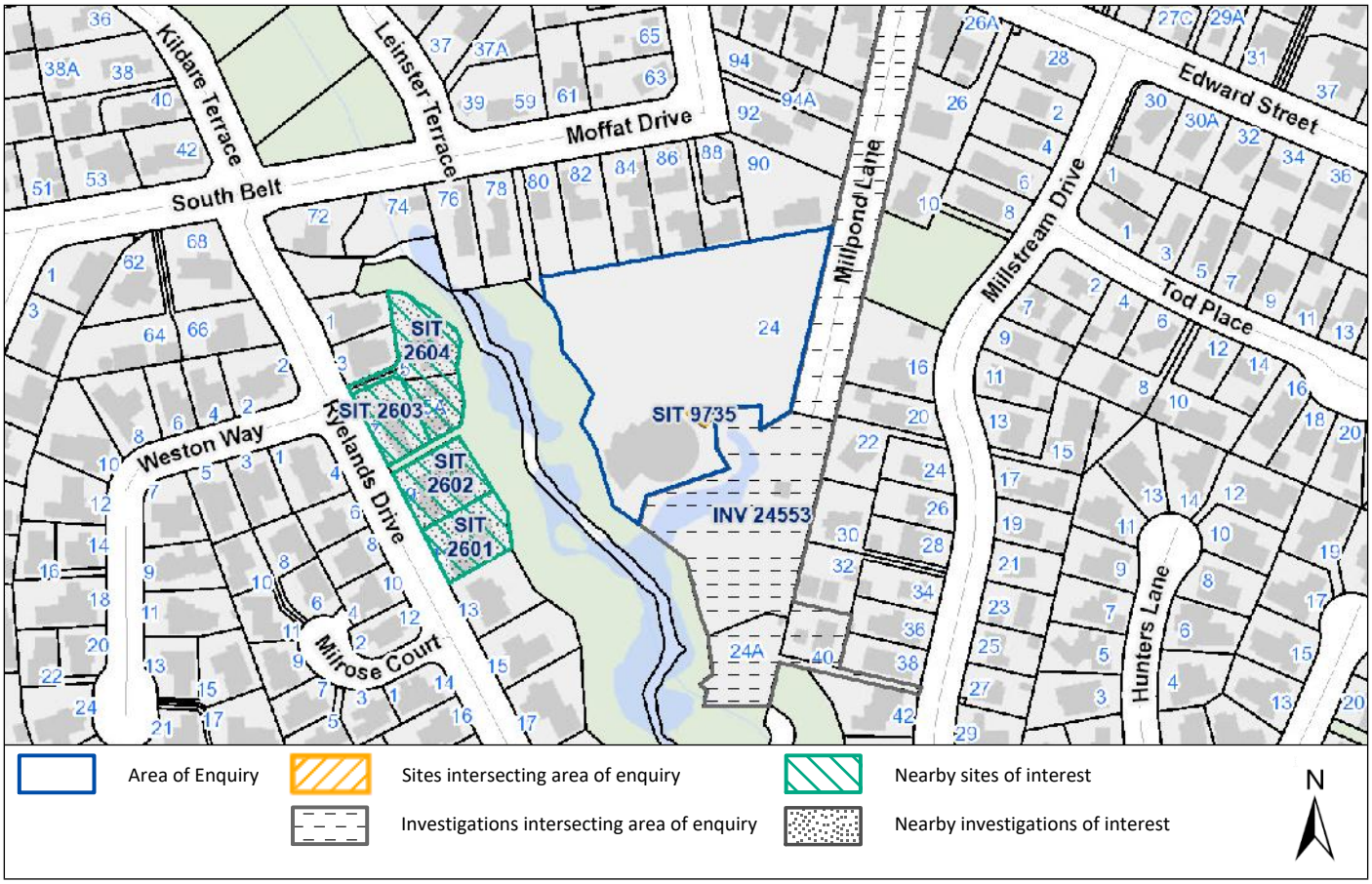
Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Date:	12 May 2020	
Land Parcels:	Lot 2 DP 430391	Valuation No(s): 2404156500



The information presented in this map is specific to the area within a 100m radius of property you have selected. Information on properties outside the serach radius may not be shown on this map, even if the property is visible.

Summary of sites:

Site ID	Site Name	Location	HAIL Activity(s)	Category
2601	Ryelands Subdivision	70 South Belt, Lincoln	A1 - Agrichemicals;	Below guideline values - Residential
2602	Ryelands Subdivision	70 South Belt, Lincoln	A1 - Agrichemicals;	Below guideline values - Residential
2603	Ryelands Subdivision	70 South Belt, Lincoln	A1 - Agrichemicals;	Below guideline values - Residential
2604	Ryelands Subdivision	70 South Belt, Lincoln	A1 - Agrichemicals;	Below guideline values - Residential
9735	24 Edward Street, Lincoln	24 Edward Street, Lincoln	A17 - Storage tanks or drums for fuel, chemicals or liquid waste;	Below guideline values - Industrial/Commercial

Please note that the above table represents a summary of sites and HAILs intersecting the area of enquiry within a 100m buffer.

Information held about the sites on the Listed Land Use Register

Site 2601: Ryelands Subdivision (Within 100m of enquiry area.)

Site Address:	70 South Belt, Lincoln
Legal Description(s):	Lot 113 DP 313085

Site Category:	Below guideline values - Residential
Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Residential

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1994	2001	Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for commercial agrichemical application.

Notes:

16 Aug 2002 Consent also obtained from Selwyn District Council R305532 - to removed contaminated soil to enable future residential activites to be undertaken on the sites.

1 Oct 2009 The information held on our files for this site was appraised on 01 October 2009 and the LLUR category changed to Below Guideline Values - Residential.

Concentrations of contaminants above residential guideline values were identified on site, however subsequent remedial works and validation sampling has demonstrated that no significant contamination remains (all validation samples below residential guidelines), and the site is suitable for residential land use.

Investigations:

24 May 2002 **INV 304: Remediation Action Plan - Pesticide Contaminated Soil, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

31 Jul 2002 **INV 305: Kajens Trading & Development Limited: Site Validation Report for 70 South Belt, Lincoln.** (Detailed Site Investigation)
URS New Zealand Limited

Summary of investigation(s):

This site was used for storage and cleaning of agricultural chemical spray equipment for seven years until early 2001. A variety of agricultural chemicals were used at the site (organonitrogen pesticides, organophosphorus pesticides and acidic herbicides). No organochlorine pesticides were used at the site.
The impact of these activities could be seen by area denuded of vegetation and surrounded by grass, extending from the former working area to a low-lying area adjacent to a stand of gum trees.
Soil sampling and analysis was undertaken from February to May 2002. Pesticide concentrations in samples taken from one location was in excess of relevant residential guidelines. The Hazard Index (HI) and Carcinogenic Risk (CR) was calculated for each sampling location to assess the possible impact of all the pesticides detected at each location. AN HI greater than one was calculated for one sample.
Groundwater sampling was conducted in May 2002. Pesticide and herbicide concentrations detected in the two groundwater samples were below the guidelines for protection of aquatic ecosystems and the New Zealand drinking water standards.
Given that the residential criteria are protective only of human health through direct exposure with contaminated soils and not also through ingestion via plant uptake, remediation was based not only on those areas above applicable guidelines but also on the excavation of all areas that were visually impacted (i.e. those areas of the site where grass growth had been affected). The results of the soil investigation showed that soil contamination was generally restricted to the upper 0.5 metres (m). Remediation therefore involved excavation of all impacted areas to between 0.2 m and 0.5 m. In one area, deeper excavation to 0.7 m was carried out based on the soil investigation result at 0.5 m.
Validation sample analytical results showed that 24 compounds were detected. Of these, 18 had residential criteria available. All samples were below the residential criteria by at least one order of magnitude and had acceptable HI and CR values.
The remediation undertaken at the site is considered to have removed soils contaminated above acceptable levels. Sampling indicates that residual concentrations of contaminants are well below residential acceptance criteria.
Limited impact to groundwater was shown from the investigation and through the remediation/excavations, the contaminant source was removed, reducing the future impact to groundwater.
Information from site owner received 31/10/02:
"Remediation activities were undertaken on the eastern half of Lot 114. Part of the former workshed and adjacent working area was located on this lot. The area effected was approximately 28 m long and between 3 m to 16 m wide. Remediation activities in this area included excavation of material to 0.5 m in the working area adjacent to the former workshed and 0.2 m in the peripheral area surrounding this."
Also refer to hard file for a copy of a map delineating remediated area.

Site 2602: Ryelands Subdivision (Within 100m of enquiry area.)

Site Address:	70 South Belt, Lincoln
Legal Description(s):	Lot 114 DP 313085

Site Category:	Below guideline values - Residential
Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Residential

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1994	2001	Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for commercial agrichemical application.

Notes:

19 Aug 2002 Consent also obtained from Selwyn District Council R305532 - to removed contaminated soil to enable future residential activites to be undertaken on the sites.

1 Oct 2009 The information held on our files for this site was appraised on 01 October 2009 and the LLUR category changed to Below Guideline Values - Residential.

Concentrations of contaminants above residential guideline values were identified on site, however subsequent remedial works and validation sampling has demonstrated that no significant contamination remains (all validation samples below residential guidelines), and the site is suitable for residential land use.

Investigations:

24 May 2002 **INV 306: Remediation Action Plan - Pesticide Contaminated Soil, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

31 Jul 2002 **INV 307: Kajens Trading & Development Limited: Site Validation Report for 70 South Belt, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

Summary of investigation(s):

This site was used for storage and cleaning of agricultural chemical spray equipment for seven years until early 2001. A variety of agricultural chemicals were used at the site (organonitrogen pesticides, organophosphorus pesticides and acidic herbicides). No organochlorine pesticides were used at the site.
The impact of these activities could be seen by area denuded of vegetation and surrounded by grass, extending from the former working area to a low-lying area adjacent to a stand of gum trees.
Soil sampling and analysis was undertaken from February to May 2002. Pesticide concentrations in samples taken from one location were in excess of relevant residential guidelines. The Hazard Index (HI) and Carcinogenic Risk (CR) were calculated for each sampling location to assess the possible impact of all the pesticides detected at each location. AN HI greater than one was calculated for one sample.
Groundwater sampling was conducted in May 2002. Pesticide and herbicide concentrations detected in the two groundwater samples were below the guidelines for protection of aquatic ecosystems and the New Zealand drinking water standards.
Given that the residential criteria are protective only of human health through direct exposure with contaminated soils and not also through ingestion via plant uptake, remediation was based not only on those areas above applicable guidelines but also on the excavation of all areas that were visually impacted (i.e. those areas of the site where grass growth had been affected). The results of the soil investigation showed that soil contamination was generally restricted to the upper 0.5 metres (m). Remediation therefore involved excavation of all impacted areas to between 0.2 m and 0.5 m. In one area, deeper excavation to 0.7 m was carried out based on the soil investigation result at 0.5 m.
Validation sample analytical results showed that 24 compounds were detected. Of these, 18 had residential criteria available. All samples were below the residential criteria by at least one order of magnitude and had acceptable HI and CR values.
The remediation undertaken at the site is considered to have removed soils contaminated above acceptable levels. Sampling indicates that residual concentrations of contaminants are well below residential acceptance criteria.
Limited impact to groundwater was shown from the investigation and through the remediation/excavations, the contaminant source was removed, reducing the future impact to groundwater.
Information received from site owner 31/10/02:
"Remediation activities were undertaken on the eastern half of Lot 114. Part of the former workshed and adjacent working area was located on this lot. The area effected was approximately 28 m long and between 3 m to 16 m wide. Remediation activities in this area included excavation of material to 0.5 m in the working area adjacent to the former workshed and 0.2 m in the peripheral area surrounding this."
Also refer to hard file for a copy of a map delineating remediated area.

Site 2603: Ryelands Subdivision (Within 100m of enquiry area.)

Site Address:	70 South Belt, Lincoln
Legal Description(s):	Lot 115 DP 313085

Site Category:	Below guideline values - Residential
Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Residential

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1994	2001	Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for commercial agrichemical application.

Notes:

19 Aug 2002 Consent also obtained from Selwyn District Council R305532 - to removed contaminated soil to enable future residential activites to be undertaken on the sites.

14 Oct 2002 Information received from site owner.

Lot 116 was not part of the site used for storage and cleaning of agricultural chemical spray equipment.

1 Oct 2009 The information held on our files for this site was appraised on 01 October 2009 and the LLUR category changed to Below Guideline Values - Residential.

Concentrations of contaminants above residential guideline values were identified on site, however subsequent remedial works and validation sampling has demonstrated that no significant contamination remains (all validation samples below residential guidelines), and the site is suitable for residential land use.

Investigations:

24 May 2002 **INV 308: Remediation Action Plan - Pesticide Contaminated Soil, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

31 Jul 2002 **INV 309: Kajens Trading & Development Limited: Site Validation Report for 70 South Belt, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

Summary of investigation(s):

This site was used for storage and cleaning of agricultural chemical spray equipment for seven years until early 2001. A variety of agricultural chemicals were used at the site (organonitrogen pesticides, organophosphorus pesticides and acidic herbicides). No organochlorine pesticides were used at the site.
The impact of these activities could be seen by area denuded of vegetation and surrounded by grass, extending from the former working area to a low-lying area adjacent to a stand of gum trees.
Soil sampling and analysis was undertaken from February to May 2002. Pesticide concentrations in samples taken from one location were in excess of relevant residential guidelines. The Hazard Index (HI) and Carcinogenic Risk (CR) were calculated for each sampling location to assess the possible impact of all the pesticides detected at each location. AN HI greater than one was calculated for one sample.
Groundwater sampling was conducted in May 2002. Pesticide and herbicide concentrations detected in the two groundwater samples were below the guidelines for protection of aquatic ecosystems and the New Zealand drinking water standards.
Given that the residential criteria are protective only of human health through direct exposure with contaminated soils and not also through ingestion via plant uptake, remediation was based not only on those areas above applicable guidelines but also on the excavation of all areas that were visually impacted (i.e. those areas of the site where grass growth had been affected). The results of the soil investigation showed that soil contamination was generally restricted to the upper 0.5 metres (m). Remediation therefore involved excavation of all impacted areas to between 0.2 m and 0.5 m. In one area, deeper excavation to 0.7 m was carried out based on the soil investigation result at 0.5 m.
Validation sample analytical results showed that 24 compounds were detected. Of these, 18 had residential criteria available. All samples were below the residential criteria by at least one order of magnitude and had acceptable HI and CR values.
The remediation undertaken at the site is considered to have removed soils contaminated above acceptable levels. Sampling indicates that residual concentrations of contaminants are well below residential acceptance criteria.
Limited impact to groundwater was shown from the investigation and through the remediation/excavations, the contaminant source was removed, reducing the future impact to groundwater.
Information received from the site owner 31/10/02:
"Remediation activities were undertaken on only a very small area in the south-eastern corner of Lot 115. Part of the former shed was located on this lot, however the main working area was south of the Lot 115 boundary. The area affected was approximately 8 m long by 2 m wide. Remediation activities in this area included excavation of material to 0.2 m depth."

Site 2604: Ryelands Subdivision (Within 100m of enquiry area.)

Site Address:	70 South Belt, Lincoln
Legal Description(s):	Lot 1 DP 339643, Lot 2 DP 339643

Site Category:	Below guideline values - Residential

Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Residential

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1994	2001	Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for commercial agrichemical application.

Notes:

26 Nov 2002 Consent also obtained from Selwyn District Council R305532 - to removed contaminated soil to enable future residential activites to be undertaken on the sites.

1 Oct 2009 The information held on our files for this site was appraised on 01 October 2009 and the LLUR category changed to Below Guideline Values - Residential.

Concentrations of contaminants above residential guideline values were identified on site, however subsequent remedial works and validation sampling has demonstrated that no significant contamination remains (all validation samples below residential guidelines), and the site is suitable for residential land use.

Investigations:

24 May 2002 **INV 351: Remediation Action Plan - Pesticide Contaminated Soil, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

13 Jul 2002 **INV 350: Kajens Trading & Development Limited: Site Validation Report for 70 South Belt, Lincoln** (Detailed Site Investigation)
URS New Zealand Limited

Summary of investigation(s):

This site was used for storage and cleaning of agricultural chemical spray equipment for seven years until early 2001. A variety of agricultural chemicals were used at the site (organonitrogen pesticides, organophosphorus pesticides and acidic herbicides). No organochlorine pesticides were used at the site.
The impact of these activities could be seen by area denuded of vegetation and surrounded by grass, extending from the former working area to a low-lying area adjacent to a stand of gum trees.
Soil sampling and analysis was undertaken from February to May 2002. Pesticide concentrations in samples taken from one location were in excess of relevant residential guidelines. The Hazard Index (HI) and Carcinogenic Risk (CR) were calculated for each sampling location to assess the possible impact of all the pesticides detected at each location. AN HI greater than one was calculated for one sample.
Groundwater sampling was conducted in May 2002. Pesticide and herbicide concentrations detected in the two groundwater samples were below the guidelines for protection of aquatic ecosystems and the New Zealand drinking water standards.
Given that the residential criteria are protective only of human health through direct exposure with contaminated soils and not also through ingestion via plant uptake, remediation was based not only on those areas above applicable guidelines but also on the excavation of all areas that were visually impacted (i.e. those areas of the site where grass growth had been affected). The results of the soil investigation showed that soil contamination was generally restricted to the upper 0.5 metres (m). Remediation therefore involved excavation of all impacted areas to between 0.2 m and 0.5 m. In one area, deeper excavation to 0.7 m was carried out based on the soil investigation result at 0.5 m.
Validation sample analytical results showed that 24 compounds were detected. Of these, 18 had residential criteria available. All samples were below the residential criteria by at least one order of magnitude and had acceptable HI and CR values.
The remediation undertaken at the site is considered to have removed soils contaminated above acceptable levels. Sampling indicates that residual concentrations of contaminants are well below residential acceptance criteria.
Limited impact to groundwater was shown from the investigation and through the remediation/excavations, the contaminant source was removed, reducing the future impact to groundwater.
Information received from the site owner 31/10/02:
"remediation activities were undertaken on a small area in the south-western corner of Lot 117. The main working area was located just inside the southern boundary of this lot. The area affected was approximately 8 m by 12 m. Remediation activities in this area included excavation of material to 0.2 m over the majority of the area, with some excavation to 0.7 m along the southern boundary".

Site 9735: 24 Edward Street, Lincoln (Intersects enquiry area.)

Site Address:	24 Edward Street, Lincoln
Legal Description(s):	Lot 2 DP 430391

Site Category:	Below guideline values - Industrial/Commercial
Definition:	Investigation results demonstrate that hazardous substances present at the site, but below applicable guidelines. - Industrial/Commercial

Land Uses (from HAIL):

Period From	Period To	HAIL land use
1960s	2011	Storage tanks or drums for fuel, chemicals or liquid waste

Notes:

31 Oct 2018 A 4,500 L steel underground diesel fuel tank was located at 24 Edward Street, Lincoln from the 1960's to 2011. The tank was used to store heating fuel for the Ellesmere Country Club and was removed in 2011.

Investigations:

23 Dec 2011 **INV 9409: Report on the removal of an underground diesel fuel storage tank at 24 Edward Street, Lincoln**
(Detailed Site Investigation)
Envirochem

Summary of investigation(s):

The Ellesmere Country Club at 24 Edward Street, Lincoln, had a 4,500 litre, steel, underground storage tank removed in 2011 as it no longer complied with regulations. The tank had been installed in the 1960s to provide diesel for heating at the club.

The tank was found in good condition and soil samples were collected from the walls and base of the unlined tank pit. The reticulation and vent pipeline soils were also sampled (the lines were not removed). No significant odour or staining was noted during excavation of the tank. The soil samples were analysed for Total Petroleum Hydrocarbons (TPH). All results complied with commercial/industrial land use guidelines with only two samples detecting hydrocarbons.

The site has been appropriately investigated and all results complied with industrial/commercial land use guidelines. The site is regarded as 'below guideline values - industrial/commercial'.

Information held about other investigations on the Listed Land Use Register

20 Aug 2013 **INV 24553: Preliminary Environmental Site Investigation - 40 Millstream Drive & 24 Edward Street, Lincoln**
(Preliminary Site Investigation)
Geoscience Consulting Ltd

Summary of investigation(s):

Environment Canterbury has received a Preliminary Site Investigation report that includes all or part of the property you have selected.

The preliminary site investigation reports that a mill was once present on the site. Two potential sources of contamination are reported - firstly that an archaeological assessment indicated that there could be rubbish pits remaining from the site's use as a mill. The presence of these rubbish pits is suspected but not confirmed. The second potential contamination source was fill from a known contaminated site, reportedly imported on site to backfill the mill basement. However records indicate contaminated soil from the source site were disposed of appropriately and it is considered very unlikely that contaminated soil was imported to this site.

Based on the preliminary site investigation's findings there are no known contamination sources in the investigation area.

For further information from Environment Canterbury, contact Customer Services and refer to enquiry number ENQ255481.

Appendix D – Subdivision Plan

AMENDMENTS :

AMENDMENT	DATE	DESCRIPTION

NOTES :

1) Areas and dimensions are approximate only and are subject to final survey and deposit of plans.

2) Service easements to be created as required.

3) This plan has been prepared for discussion purposes only. No liability is accepted if the plan is used for any other purposes.

Total Area : 1.0070ha

Comprised in: C.F.R.518430

DAVIE LOVELL-SMITH
PLANNING SURVEYING ENGINEERING

116 Wrights Road P O Box 679 Christchurch 8140. New Zealand
Telephone: 03 379-0793 Website: www.dls.co.nz E-mail: office@dls.co.nz

JOB TITLE:

Millpond Lane , Lincoln

SHEET TITLE:

Site Plan

DRAWING STATUS

For Discussion Purposes

SCALE : 1:500@A3 DATE : April 2020

CAD FILE : J:\19698\P19698 Site Plan R1.dwg

DRAWING No : **P19698**

SHEET No: 1 OF 1

REVISION : **R0**

Appendix E: Record of Title

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier **518430**
Land Registration District **Canterbury**
Date Issued 16 June 2010

Prior References
CB47D/414

Estate	Fee Simple
Area	1.0072 hectares more or less
Legal Description	Lot 2 Deposited Plan 430391

Registered Owners
Selwyn District Council

Interests

Appurtenant hereto is a water easement created by Outstanding Deed of Easement 19098 (28 D 937) - 19.6.1867 at 2:00 pm

Land Covenant in Deed 5587484.1 - 15.5.2003 at 9:00 am

Identifier **518430**