RESOURCE CONSENT APPLICATION AND ASSESSMENT OF ENVIRONMENTAL EFFECTS

Brougham Street Commercial Development

for K.D. Holdings Limited






Rev 1 - 29/04/2020

This application, including all appendices, has been superseded by Revision 2 dated 04/09/2020.

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Brougham Street Commercial Development

for K.D. Holdings Limited

Reviewed

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CONTENTS

TABLES

FIGURES

1 INTRODUCTION

1.1 Purpose

The purpose of this application is to seek land use resource consent from the New Plymouth District Council (NPDC) to establish a multi-storey building to accommodate a basement carpark, ten commercial tenants and an apartment, with associated removal of a Notable Tree. Application forms are included in Appendix A.

1.2 Application Details

The application site is contained within Records of Title TNF1/436 and TNH4/976 owned by the applicant and NPDC respectively, as described in Table 1.1.

Table 1.1: Application Details

Applicant:	K.D. Holdings Limited	
Land Locations:	45-51 Brougham Street, New Plymouth	33 Devon Street West
Legal Descriptions:	(x3) Part Section 683 Town of New Plymouth and (x2) Part Lot 6 DP 3466	Lot 2 DP 15492
Records of Title:	TNF1/436	TNH4/976
Land Owners:	K.D. Holdings Limited	New Plymouth District Council
Site Areas:	478m^2	1132m^2
Consent Sought:	Land Use	
Operative District Plan (ODP) Environment Area:	Business A Environment Area	
ODP Map:	Maps C24a and C24b	
Proposed District Plan (PDP) Zone:	City Centre	
Special Notations:	Refer to Section 2.1 below.	

1.3 Summary of Non-Compliances

The following provides a summary of the New Plymouth District Plan (Operative and Proposed) rules that the proposal does not comply with. A full analysis of the proposal against the relevant rules of both Plans is included in Appendix D of this report.

With regard to the ODP, all activities requiring consent would have a **Restricted Discretionary** status. With regard to the PDP, the proposed removal of a Notable Tree triggers one rule with immediate legal effect which has a **Non-Complying Activity** status. Therefore, in accordance with the bundling principle, which is appropriate to apply in this case, the consent application shall be assessed overall with a **Non-Complying** activity status.

1.3.1 Operative District Plan (ODP) Rules

Rule	Parameter	Assessment	Activity Status
Bus12	Maximum building height	The proposed building at 25.5m high exceeds the maximum permitted height of 14m.	Restricted Discretionary
Bus58	Earthworks – maximum quantity	The proposed earthworks volume is approximately 650m^3 which exceeds the maximum permitted quantity of 20m^3 per 100m^2 of site area in any 12 month period.	Restricted Discretionary
Bus87	Parking	Parking design does not meet the dimension standards of the ODP.	Restricted Discretionary

Rule	Parameter	Assessment	Activity Status
Bus88	Loading and standing space	The proposal does not provide an on-site loading or standing space.	Restricted Discretionary
Bus90	On-site Manoeuvring	The proposal does not meet the design standards of the ODP.	Restricted Discretionary
OL50	Removal or destruction of a Category 2 Notable Tree	Removal of Notable Tree 97 is proposed.	Restricted Discretionary
OL63	Maximum height within Cameron Street Viewshaft	At 25.5m high the building exceeds the maximum permitted 14m height within Section 2 of the viewshaft.	Restricted Discretionary
OL71	Maximum height within Marsland Hill Viewshaft	At 25.5m high the building exceeds the maximum permitted height of 14m within Section 3 of the viewshaft.	Restricted Discretionary
OL75	Maximum height within Victoria Road Viewshaft	At 25.5m high the building exceeds the maximum permitted height of 14m within Section 2 of the Victoria Street viewshaft.	Restricted Discretionary

1.3.2 Proposed District Plan (PDP) Rules

Rule	Parameter	Assessment	Activity Status
TRE-R10	Removal, partial removal or destruction of a scheduled notable tree not otherwise provided for.	The removal of Notable Tree 97 is proposed. The tree is not currently unsafe or unsound.	Non-Complying

1.4 Technical Studies Undertaken

- An Architectural Design Statement by BOON Limited (architects) is provided in Appendix B.
- An Arboricultural Assessment of the Notable Tree undertaken by Bruce MacDonald of Asplundh is provided in Appendix E.
- An Archaeological Assessment undertaken by Ivan Bruce and Hamish Crimp is provided in Appendix F.
- A Memorandum detailing an assessment of the potential for soil contamination prepared by Alex Connolly and Dave Bolger (Environment Team, BTW Company) is provided in Appendix G.
- A Geotechnical Interpretative Report has been undertaken by Tonkin & Taylor Ltd and is provided in Appendix K.
- A Recommendation letter regarding the Notable Tree by Red Jacket Engineers is provided in Appendix M.

1.5 Consents from Other Authorities

An application for an Archaeological Authority from Heritage New Zealand will be progressed, separate to this resource consent process, for any earthworks on 45-51 Brougham Street and for any proposed modification of the railway embankment.

Though unlikely, should it be required, resource consent from the Taranaki Regional Council will be sought for taking of groundwater, for dewatering of the site during earthworks as part of erosion and sediment control.

2 SITE AND EXISTING ENVIRONMENT

2.1 Site Details

The application site is 45-51 Brougham Street (owned by the applicant), a small area of Lot 2 DP 15492 fronting Powderham Street (owned by NPDC), and a small area of footpath in the road reserve of Brougham Street. The site is identified in Figure 2.1 below with the area of proposed activities circled. Descriptions of the subject Lots follows:

- 45-51 Brougham Street is predominantly used for car parking with a gravel (unsealed) surface and is clear of structures, except for the Halamoana sculpture, retaining walls / fences and signage along boundaries. It has no vegetation of its own although it is overhung by Notable Tree 97 on the NPDC Titles as explained later in this report and as illustrated in Appendix I. The Halamoana sculpture is positioned on the south-western corner of the site. An existing vehicle crossing some 5m wide at the kerb is located on Brougham Street adjacent to 43 Brougham Street. The history of 45-51 Brougham Street has been described in detail within the Memorandum on the potential for soil contamination in Appendix G. As per the Geotechnical Interpretive Report of Appendix K "*The site slopes moderately downwards to the north from approximately 11.3 RL m at the street corner to 9.7 RL m, with a steep bank sloping towards the east along the eastern boundary, dropping down to Huatoki Stream at approximately 2 RL m*". There is a stone block and timber sleeper non-engineered retaining wall up to 2-3 m high at the crest of this steep bank upslope from the stream. The stone wall is one of the remnants of a railway embankment built in the late 1800s, as further described later in Section 2.5.
- Lot 2 DP 15492 spans from Powderham Street to Devon Street and contains the Metro Plaza building which has recently been purchased by NPDC to make way for green space[1]. The portion adjacent to 45-51 Brougham Street is occupied by part of the Metro Plaza building, a strip of deck / stairway access, and some established trees including Notable Tree 97. Huatoki Stream is immediately adjacent to the east in Lot 3 DP 15492 and then runs through Lot 2 underground. The access and building to the south are not publicly accessible, with a fence and locked gates on the Powderham Street frontage. There is no vehicle access on Devon Street nor Powderham Street.

[1] https://www.stuff.co.nz/taranaki-daily-news/news/115278490/npdc-buys-new-plymouth-metro-plaza-building-for-155-million-as-part-of-green-space-plans (Daily News, 27 August 2019)

Figure 2.1: Aerial photo of site (outlined) and general area of proposed activities (circled) (Source: LINZ, 2016-17)

2.1.1 Operative District Plan

With regard to the ODP (Figure 2.2 and Figure 2.3), the site is located in:

- The Business A Environment Area;
- Section 2 of both the Cameron Street and Victoria Street Viewshafts;
- Section 3 of the Marsland Hill Viewshaft;
- A Defined Pedestrian Frontage is located along Devon Street;
- Notable Tree 97 is located on Lot 2 DP 15492. In Appendix 13 (Notable Trees) this single tree is categorised as a Willow Myrtle (Agonis flexuosa) in Category 2;
- Huatoki Stream is a Priority Waterbody; and
- Powderham Street is identified as State Highway 45 and Brougham Street as a Local Road within the Roading Hierarchy.

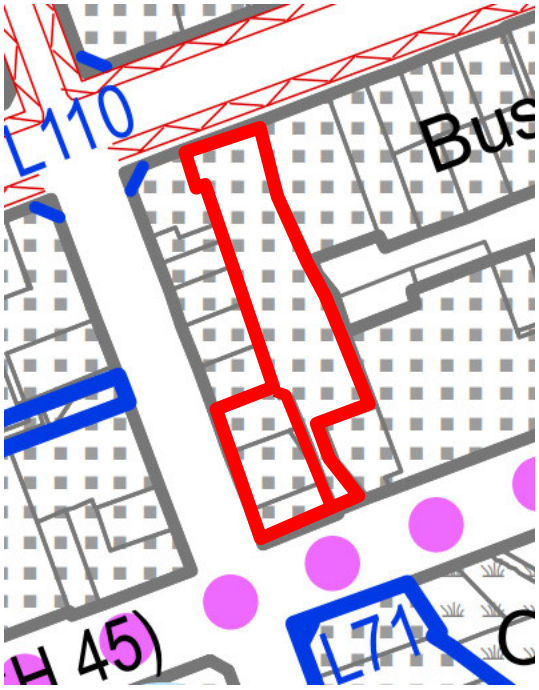

Figure 2.2: Extract from ODP C24a Map (site outlined red)

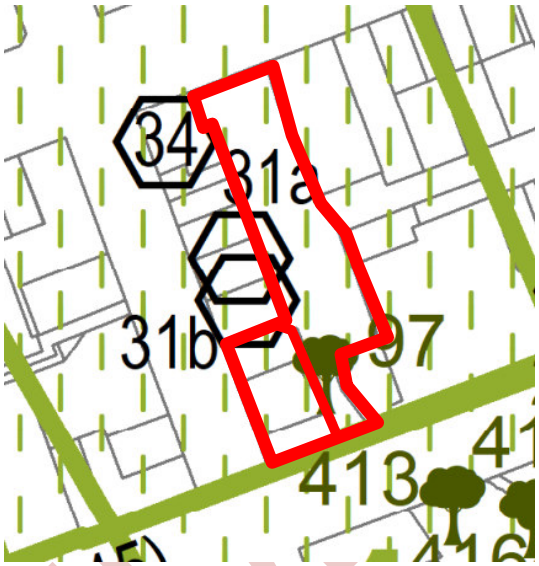

Figure 2.3: Extract from ODP C24b Map (site outlined red)

2.1.2 Proposed District Plan

The PDP was notified on 23 September 2019 and the submission period closed on 22 November 2019. The PDP proposes the following provisions for the site (Figure 2.4):

Shared Provisions (both Titles):

- City Centre Zone;
- Victoria Road Viewshaft Section 2;
- Cameron Street Viewshaft Section 2;
- Pukaka / Marsland Hill Viewshaft Section 4;
- Powderham Street: State Highway; and
- Dripline of Notable Tree Site ID 97.

Specific to 45-51 Brougham Street:

- Height Management Area C (17m maximum permitted height); and
- Brougham Street: Local Road.

Specific to Lot 2 DP 15492

- Height Management Area B (14m) at northern end, majority of site in Height Management Area C (17m);
- Notable Tree Site ID 97; and
- Heritage Character Area.

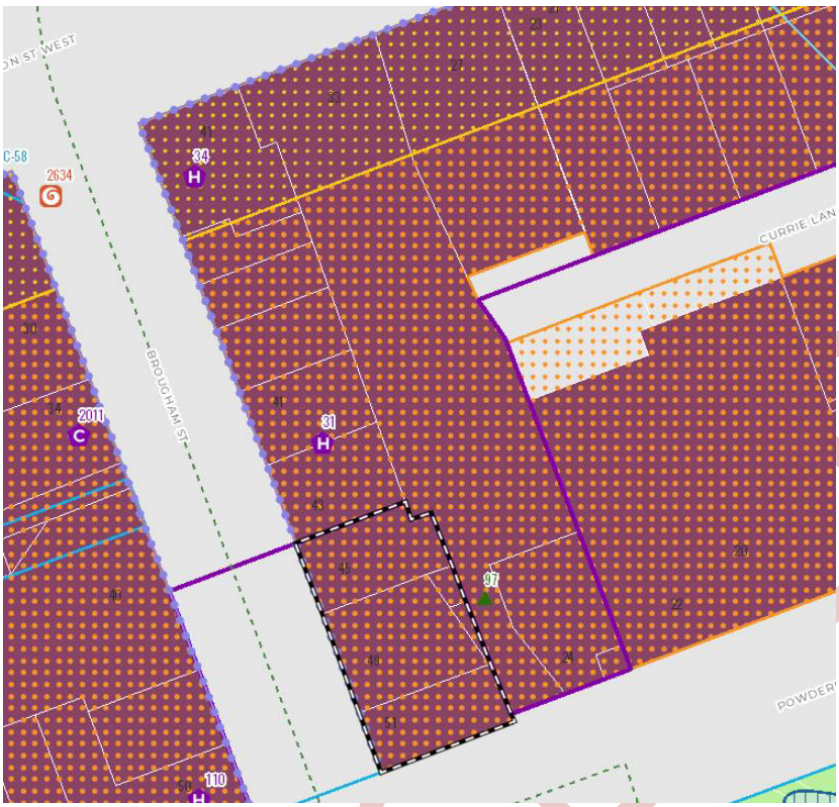

Figure 2.4: Extract from PDP Map

2.2 Surrounding Land Use Context

Land use is predominantly commercial in this area, with many retail and service businesses such as clothing stores, restaurants and motels along Brougham and Powderham Streets.

On the northern side of Powderham Street, development is high density with site coverage commonly at 100% and multi-storeyed buildings (e.g. the Grand Central Hotel at 40 Brougham Street and the NPDC-owned carpark building at 20 Powderham Street).

Sir Victor Davies Park with mature trees is established southeast of the site on the opposite side of Powderham Street, along the Huatoki Stream. Huatoki Stream then crosses under the street to emerge temporarily through Lot 3 DP 15492, before going underground again beneath the buildings on the site.

2.3 Traffic Environment-

Powderham Street and a portion of Brougham Street have 50 km/h speed limits, with this turning to 30 km/h on Brougham Street adjacent to 45-51 Brougham Street and immediately south of its vehicle crossing.

The application site is included in the Parking Exemption Area of the ODP meaning there are no minimum parking requirements.

2.4 Services

Reticulated water, wastewater and stormwater mains are located along Brougham Street, Powderham Street and Devon Street. Electricity and telecommunication services are available along all streets. Lot 2 DP 15492 has connections to all of the above but 45-51 Brougham Street is not utilising utility connections at this time.

2.5 Heritage and Cultural Values

There are no Waahi Taonga/Sites of Significance or Archaeological Sites identified in Chapter 26 of the ODP for the application site, nor are there any identified for the application site on the PDP or the New Zealand Archaeological Association's (NZAA's) Archsite database.

An Archaeological Assessment was undertaken by Ivan Bruce and is attached in Appendix F. It outlines that a stone railway embankment (built between 1873-1875) is situated on Lot 2 DP 15492. The site therefore has an archaeological site present on it, though it is not scheduled in the ODP or PDP.

Sites adjacent to the north (41-42 Brougham Street, also owned by the applicant) are occupied by pre-1900 Brougham Street Offices which are identified on the NZAA database 'Archsite' with site identifier P19/381. The Offices are identified in the ODP Appendix 8 as Heritage Buildings with identifiers 31a and 31b, and in the PDP as a Heritage Building with identifier 31.

Huatoki Stream is a Statutory Acknowledgement Area of Te Atiawa Iwi as identified in the Te Atiawa Claims Settlement Act 2016.

2.6 National Environmental Standard - Contaminated Soil

Regulation 5 of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS) describes disturbing soil and changing the use of a piece of land as activities to which the NES applies where an activity that can be found on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) is being undertaken on it, has been undertaken on it or where it is more than likely that a HAIL activity is being or has been undertaken on it.

The memorandum on the potential for soil contamination provided in Appendix G provides the following conclusions:

- *The subject site at 45-51 Brougham Street has no known recorded HAIL activity or any reason to advise further research regarding soil contamination.*
- *The site had a building erected in 1907 that was used as a warehouse for wholesaler's companies until 1983 when fire burnt the building down. The site has been used as a carpark since 1983.*
- *There is no reason to believe there is any soil contamination on the site or cause for a Preliminary Site Investigation to be undertaken at the site based on the information we have obtained from aerial imagery and TRC records.*

The subject site is not identified as a HAIL site on the Taranaki Regional Council Register of Selected Land Uses (RSLU) for contaminated sites. With regard to this and the summary above, the site is not subject to the NES-CS.

3 PROPOSAL

3.1 Proposed Land Use

3.1.1 Proposed Building

The activities proposed in this application centre around a mixed-use commercial / apartment building on 45-51 Brougham Street incorporating a connection / interface to the adjacent future public space (further explained in Section 3.1.2).

The proposal is to construct a building on 45-51 Brougham Street consisting of a parking basement, five storeys for premium commercial use plus an apartment. Plans and a Design Statement are provided in Appendix B. The building is a maximum of 25.5m high (above the current surveyed site level provided in Appendix I) and includes:

- 13 carparking spaces within the basement, with lifts and stairs to the floors above;
- Levels 1-5 with floor area to accommodate two tenancies on each level with associated toilet facilities; and
- A three-bedroom apartment on the top level.

The Halamoana sculpture will be relocated off-site.

The building is 11.5m above the permitted height of 14m. Specific design elements to address effects of the building are explained in the Design Statement of Appendix B and include:

- The use of complete glass facades on all sides for the majority of the building, to create a feeling of lightness and maintain visual connection between commercial occupants and the outside world;
- The stepping back of the apartment at the top of the building, reducing its size, prominence and visibility from the ground;
- The external eastern stairs, starting at street level and servicing most of the storeys, will extend some 2.9m x 4.2m into Lot 2 DP 15492. An appropriate legal mechanism will need to be agreed between the applicant and NPDC to authorise the stairs. The purpose of the stairs is to provide connection between the building and the NPDC site;
- Vertical timber screening wrapped around the carparking level which is pushed down to a semi-basement level, maintaining an active edge of the building whereby its entry is near the corner of Powderham and Brougham Streets; and
- The opportunity for passive surveillance and crime prevention through environmental design from the building's ability to be occupied 24/7.

The structural elements of the building are to be predominantly constructed of locally sourced timber and other low environmental-impact materials. The building is designed to maximise energy efficiency, incorporating elements such as solar electricity generation, an intelligent heating / cooling system, enhanced insulation and automatic LED lighting controls.

A 9.8m x 2m canopy (verandah) is proposed for a portion of the building frontage along Brougham Street. This extends from Level 2 into road reserve 2m outside of the site's western boundary to provide pedestrian shelter and identify the entrance to the building from street level. The verandah is cantilevered over the footpath and does not utilise any supports connected to the ground. The appropriate approval will be sought from Council with regard to a road reserve encroachment licence or lease.

3.1.2 Huatoki Redevelopment

NPDC have purchased the Metro Plaza and Huatoki Stream parcels adjoining 45-51 Brougham Street for the purposes of redevelopment into public green space. Opening the Huatoki Stream from Powderham to Ariki Street has been a long-held strategic ambition of NPDC since at least 1998[2].

The long-term intention overall is to redevelop the whole application site incorporating 45-51 Brougham Street and the NPDC site from Powderham to Devon Street, as an integrated public/private development that celebrates the awa (Huatoki) and supports commercial, residential and public space uses. A preliminary concept design has been prepared and is included in Appendix L for information purposes only, to demonstrate how the proposed building connects at the interface with the redevelopment of the land adjoining the Huatoki Stream.

The redevelopment of the Huatoki does not form part of this application and will be subject to separate consultation and consenting processes, some of which have been initiated with Ngāti Te Whiti and NPDC as explained in Section 6.3.

3.2 Access, Parking and Manoeuvring

Building design is to utilise the existing vehicle crossing for access to the 2.5m tall underground carpark. A height limit will be imposed on the crossing and it will be available for use by light vehicles only.

The proposal has no parking requirements under the ODP due to the site being within the Parking Exemption Area. However, the proposal is to provide 13 light (private) vehicle parking spaces in the basement of the building for use by commercial tenants and apartment residents. While the ODP does not require a certain number of parks for this activity, the design and manoeuvring standards still apply. The proposal is for more compact parks and aisle widths than what the ODP specifies and as such does not comply, though manoeuvring can be undertaken within this space to ensure vehicles enter and exit the site in a forward gear. Full details of carpark and aisle width design are provided in the plans of Appendix B and assessment against the relevant rules in Appendix D.

No on-site loading or standing spaces are proposed, instead any deliveries by a courier van to future commercial tenants are to be undertaken from the five-minute loading bay available on the opposite side of Dawson Street.

3.3 Vegetation

The proposal is to remove the Notable Tree from Lot 2 DP 15492 by way of cutting and removing all trunk and branches, and the bulk of the tree roots thereafter by excavation. This work would be undertaken in consultation and agreement with the landowner (NPDC) and with all necessary health and safety measures in place.

Significant further explanation on the due diligence process undertaken to ascertain whether the tree could be retained and incorporated into the proposal is provided as part of Section 4.3.

3.4 Earthworks

Earthworks are proposed to create the basement level and undertake servicing installation / foundation construction activities.

[2] https://www.newplymouthnz.com/-/media/NPDC/Documents/Forms%20and%20Fees/Design%20Considerations/Design%20Considerations%20Central%20area%20site%20survey.ashx (NPDC, 2012)

With a carpark floor level of RL 9.3, excavation of 0.5m to 1.5m below the current ground level is proposed for floor, base course and foundation activities, taking the cut to a level of RL 8.8. Therefore, an estimated earthworks volume of 630m^3 is proposed for the building footprint. An additional volume of approximately 20m^3 is required for vehicle access, with a total proposed estimated earthworks volume of 650m^3.

The proposal includes the removal of the tree from its position above the railway retaining wall. A volume for the earth disturbance associated with the removal of the tree roots is dependent on the scale and composition of the roots however the ground will be made good to the finished carpark level afterwards.

3.5 Heritage

The proposed activities are wholly within the sites as explained in Section 2 and are not proposed to have any effect on the foundations or above-ground structure of the Heritage Buildings to the north at 43 Brougham Street.

The proposed removal of the tree may result in some disturbance or removal of part of the railway embankment wall, to be determined by engineering assessment. Any disturbance or modification of the railway wall requiring an Archaeological Authority will be progressed with Heritage New Zealand as a separate process to this resource consent.

4 ASSESSMENT OF ENVIRONMENTAL EFFECTS

Under the Resource Management Act 1991 (RMA) an application for resource consent must include, in accordance with Schedule 4, an assessment of environmental effects in such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

Potential adverse effects from the proposal are considered to predominantly relate to the building height, effects on Business Environment Area character and amenity, removal of the Notable Tree and associated loss of amenity, compact parking and manoeuvring space design and earthworks.

4.1 Effects of the Building on Character and Amenity

Potential adverse effects from the proposal are considered to be with regard to conflicts with the character of the site or area, blocking or impinging on public viewshafts, loss of amenity for other sites and public areas, potential shading, and dominance effects.

The existing character of the surrounding area is of relatively high-density development with predominantly multi-storeyed buildings and also the Notable Tree. The site at 45-51 Brougham Street is currently an outlier in this area by being vacant since the 1980s. Although on a prominent corner, it does not currently have any structure or land use that actively participates in the typical surrounding commercial activities, instead providing carparking. The design of the building, with both its size and mixed commercial / apartment uses, will significantly enhance the character of the area through replacing an untidy carparking area with a modern high value land use. Vibrancy is added by providing more commercial and residential space for people to work and live within the central business area of New Plymouth.

With regard to shading, as of right the site could be developed to its full extent with a 14m high building. Shading from this permissible building is illustrated on Drawings A9.01 and A9.02 in Appendix B and would cover a significant area of Dawson and Powderham Streets and a portion of some sites to the west and south, mostly in winter. Proposed shading beyond that which is permitted is also illustrated on the same plans. Shading that falls on habitable spaces has the potential to detract from the amenity of those sites however when shaded spaces are not dwellings, there is considered to be a much lower level of sensitivity. As illustrated in the plans, the areas in which the bulk of additional shading will occur are in road reserve (Brougham and Powderham Streets) or on 35 Powderham Street (owned by the applicant, thus adverse effects upon them can be disregarded) and on 20 Powderham Street and the Sir Victor Davies Park (both owned by NPDC). All of the sites that would experience additional shading are not used for residential purposes. Additionally, road users and pedestrians are by nature only passing through the shade for a short time. Overall any potential adverse effects with regard to shading over and above that which would be permitted are considered to be less than minor.

The building is set within an area of commonly high site coverage and multi storeyed buildings, therefore the significance of the portion over the 14m is considered to be somewhat diminished by surrounding tall buildings. The purpose of the additional storeys is to maximise the efficiency of the use of the site by supplying leasable commercial space to businesses within inner-city New Plymouth with an ancillary residential use. Additionally, it is anticipated that NPDC foresee an increase in the permitted height level for the site to 17m through the PDP (including through a proposed Height Management Area and with regard to all relevant viewshafts). Altogether there are not considered to be proportional adverse effects to be avoided by reducing commercial or residential space in the building in order to comply with the permitted 14m height limit.

As per the Design Statement of Appendix B, the proposal offers mitigation in the form of:

- Architectural design with a glass façade to enhance connectivity between other properties and the street with the building, instead of a closed impenetrable space. This is considered to maintain amenity for the area in preventing a solid impenetrable structure (e.g. of concrete or steel) with no interaction with the surrounding environment.
- Stepping back of the top storey from the outside walls of the storeys below, to reduce its area (bulk) and make it less visible from street level.

Additionally, as per the Appendix B Design Statement, the building has been designed with environmental sustainability at its core, resulting in reduced environmental effects compared to other perhaps more conventional modern commercial buildings commonly being constructed, including:

- Structural design almost entirely consisting of timber. In turn this reduces the weight of the building - resulting in smaller foundations and less disturbance to adjacent buildings (such as the historic Brougham Street Offices);
- Roof mounted solar electricity generation - using some of the site's own area / building roof to generate power to supply some of the building's demand;
- Energy efficient heating, cooling and ventilation system;
- Enhanced insulation and double glazing – reducing the building's demand for electricity;
- Automatic lighting controls including LED bulbs – minimising unused lit areas and with a lower electricity usage per bulb; and
- Water efficient fittings and fixtures, plus a rainwater harvesting system to provide flushing water – reducing demand for potable water.

While these design elements are not necessarily visual, they are considered to significantly reduce the resources required to construct and thereafter run and maintain a commercial building of this scale, compared to an alternative conventional building which could conceivably be predominantly steel and concrete and incorporate none of the energy and water-saving technologies described above.

The location of the stairs on the eastern side of the building provides a crucial physical connection between the building and the NPDC site and can be further enhanced in the future once the NPDC area is redeveloped as a public space. Instead of turning its back to the NPDC site, the building interacts positively with it, enhancing amenity and character of this space.

Overall, the contributions and added vibrancy from enhancing an underdeveloped untidy site and providing new spaces for people to work and live, are considered to balance and mitigate adverse effects on character and amenity from the overheight nature of the building. Any potential adverse effects with regard to bulk and location effects on character and amenity on any other site and the wider Business Environment Area are considered to be no more than minor.

4.2 Viewshafts

Photos from viewshafts are provided in Appendix J.

With regard to Cameron Street Viewshaft, the proposed building is considered to have little, if any, visibility due to being located behind the prominent trees of Central School (Figure 4.1 and Figure 4.2, Appendix J). The proposal therefore has less than minor adverse effects on the viewshaft.

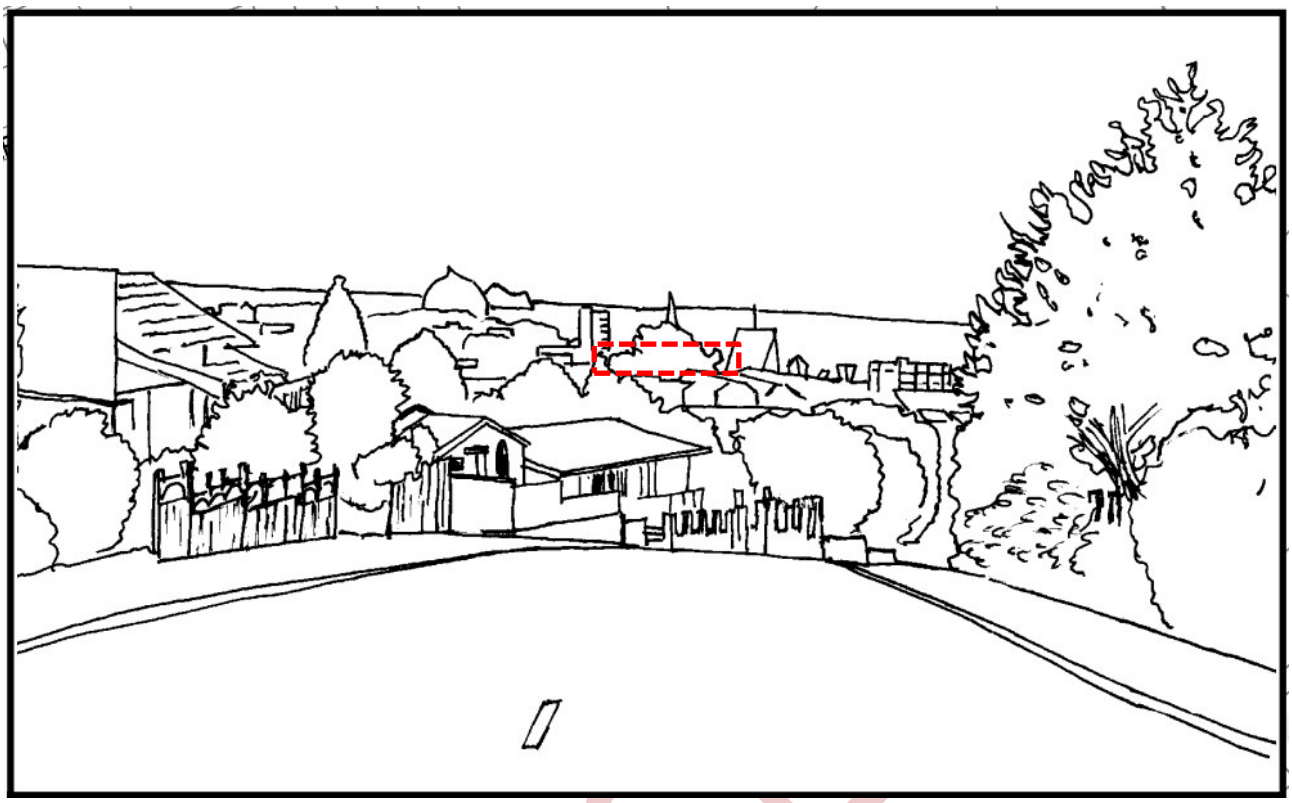

Figure 4.1: ODP Cameron Street Viewshaft Map with approximate building location amongst existing buildings indicated, though building would be behind trees shown (not to scale)

Figure 4.2: Cameron Street Viewshaft from Schedule 5 of PDP, approximate building location indicated (behind trees) (not to scale)

With regard to Marsland Hill/Pukaka Viewshaft, the site is visible from Marsland Hill/Pukaka at a distance of approximately 230m as indicated in Figure 4.3 below and in Appendix J. This results in a significant backdrop of 2-3 further blocks of multi-storeyed buildings between the site and the sea, including the likes of Centre City.

Figure 4.3: Aerial photo indicating view of site from Marsland Hill/Pukaka with background buildings between the site and the sea views (Source: LINZ, 2016-17)

This is further illustrated in Figure 4.4, whereby the proposed building will integrate into this existing high density development backdrop, with no sea view lost. The visibility of the site from Marsland Hill/Pukaka is also just at one point of many as illustrated in Appendix J, and as per Scheduled 5 of the PDP, in this viewshaft "*no single viewpoint (*is*) more significant than another*". Thus, any adverse effects of the proposal on the Marsland Hill/Pukaka viewshaft are considered to be less than minor.

Figure 4.4: One of Marsland Hill/Pukaka Viewshaft images from Schedule 5 of the PDP, approximate site location indicated with a star, nearby Council-owned carpark building of 20 Powderham Street immediately to the right

With regard to Victoria Road viewshaft (Figure 4.5 and Appendix J), the exact proposed building location is unclear from a distance of some 500m+ but it will be located within a mix of other multi-storeyed buildings, several tall trees and the many layers of buildings visible from the Victoria Road Hill down to the sea. The building may obscure a minority area of sea however the sea will remain the dominant feature of the viewshaft, with the Wind Wand remaining the tallest feature after the addition of the proposed building. The building also represents a very small portion of the greater Victoria Road viewshaft. Altogether, potential adverse effects on the Victoria Road viewshaft are considered to be less than minor.

Figure 4.5: Victoria Road Viewshaft image from Schedule 5 of PDP, approximate building location indicated (not to scale)

4.3 Notable Tree

The tree is as described in the ODP Appendix 13, Schedule 4 of the PDP, the Arboricultural Assessment of Appendix E and Notable Tree Dripline Information of Appendix I. To summarise, the tree is not native to New Zealand, is not uncommon but is Notable due to its size particularly its lower trunk. Numerous feeder and larger stabilisation roots are found within 45-51 Brougham Street in essentially the whole soil profile, from the upper soil horizon down to 1m deep and beyond. Above ground, the canopy extends up to some seven metres west into 45-51 Brougham Street and is some 17m+ in diameter north-south. An aerial photo shows the tree as being reasonably large and well-established with a 14m wide diameter by 2001 (Figure 4.6). The tree is not of a long-lived species (up to 30 years as per the Appendix 13 Life Expectancy ranking of 1) and therefore as it was already of a significant size 19 years ago, is anticipated to have a relatively short time remaining in its lifespan, up to a maximum of 20 years. The tree dripline is wholly within private land (the applicant's) and land which, although owned by NPDC, currently has no public access. Access to the tree is therefore restricted and amenity from the tree is essentially visual.

The Arboricultural Assessment of Appendix E provides some assessment of environmental effects based on the Restricted Discretionary assessment criteria for ODP rules OL43 and OL44 and does not take into account the non-complying status under the PDP. However, the issues addressed are considered to be of an appropriate scope and nature to address all effects associated with the removal of the tree.

Figure 4.6: Aerial photo of site and Notable Tree (Source: NPDC, 2001)

4.3.1 Avoidance of Adverse Effects

As per the Arboricultural Report of Appendix E:

> *"To be certain of mitigating any detrimental structural, stability and health impacts to the tree due to construction, the footprint of excavation would need to be an estimated minimum of 8.0m from the base of the tree."* (Page 4)

Consideration of avoiding adverse effects on the tree by way of constructing a smaller building with regard to the above advice has been considered.

As per 'Site Constraints' considerations from BOON in the Design Statement and Plan (Drawing Number A10.01) of Appendix B, a building constructed away from the bulk of the tree dripline and base was considered. To be economically feasible by maintaining the required level of leasable space lost (from subtracting the tree area from each commercial storey), such a building would need to be significantly taller than that proposed. A building greater than the proposed height of 25.5m is considered to potentially be outside the general character of the area and would have greater adverse effects than that proposed. The amenity of a narrower building is also greatly reduced for commercial tenants and also, a timber frame would be unable to support such a structure and less sustainable steel would be required. The proposal is therefore considered to offer an acceptable compromise between building bulk and location that provides for the character and amenity of the site and surrounds, efficiency of the use of the site, economic feasibility, and sustainability in building construction and operation for the long-term.

The option of building construction within the dripline while retaining the tree (as aided by trimming the tree) was also considered. As per the assessment of Appendix M, driven pile foundations and a concrete basement slab are necessary. As per the same report, the nature of the building design proposed dictates driven piles at regular locations under the building, therefore piles are unable to be located away from roots and, as per the Arboricultural Assessment (Appendix E), "*it is likely that pile holes will damage large anchoring roots resulting in heightened chance of tree failure and possible health decline due to root damage*". Considering that the tree is anchored on a steep bank, the Appendix M report concludes that:

> *"a) the extensive root system will be damaged by the proposed piles and foundation beams,*
>
> *b) the tree is located above the existing potential slip plane that extends down to the Huatoki Stream and removing the tree would mitigate potential damage to neighbouring buildings, and*
>
> *c) the short remaining life of the tree is inconsistent with the design life of the proposed new building."*

An economically viable design within the dripline of the tree would still require significant excavation up to around 1.5 – 2.0m within the majority of the area of 45-51 Brougham Street Such excavations "*will cause significant root damage that will impact on both the health and stability of the tree. This will certainly result in health decline and structural instability likely resulting in complete root-ball failure*" as per Appendix E.

Alternative shallow concrete foundations to minimise disturbance of the roots, would be unable to support a multi-storeyed building. Similarly, a building on raised piles may practically be only one to two storeys high and this foundation design does not adequately provide for ground stability within the site. Due to the relatively small size of the Brougham Street site at 478m^2 and other market-driven factors with regard to leasable commercial space in the inner-city, a building on the site is required to be multi-storeyed to be commercially feasible to construct, lease and thereafter maintain. Shallow or raised pile foundations for a one or two-storey building are therefore not feasible options.

Overall, with regard to the advice on building and commercial feasibility from BOON, the considerations of the professional Arboricultural Assessment, and advice from Red Jacket engineers, it is not considered practicable to retain the tree. To enable the development, the proposal is to remove the tree.

4.3.2 Removal of Notable Tree

Potential adverse effects from removal of a Notable Tree include reduction in visual amenity from loss of natural vegetation in an urban built environment, and from services the tree may have offered such as shading or shelter. Trees may also have associated botanical or cultural/historical values.

As the tree is a common variety with no particular historical or cultural significance, adverse effects are considered to be limited to those with regard to visual amenity and on the character and amenity of the site and surrounding Business Environment Area. The location of the tree, wedged between two carparks and on sloping ground with no public access, means the ability for the tree to contribute to amenity is somewhat limited as opposed to a tree located within a public park for example.

The proposal offers significant mitigation of effects in the following ways:

- The building has been designed for high aesthetic quality and connection with people in the surrounding roads, footpaths and on the NPDC site. While the positive amenity effects of the building are different to those of the tree, they are nonetheless considered to be a vast improvement from the current unsealed carpark which is not contributing to a vibrant or active commercial centre. The proposal is for the development of a prominent corner site in the central city which has contributed little to the vibrancy or amenity of the area for decades, except to supply car parking. The proposal offers a modern mixed-use development which will connect with a future public urban open space. The enhanced amenity values offered by the development with regard to commercial, residential and public functions are considered to be such that they will significantly mitigate the loss of amenity values associated with removing the tree.

- It is intended that the redesign of the NPDC site integrates the two uncommon Kentia palms (either in situ or through relocation) which are currently hidden and suppressed within the canopy of the Notable Tree. As per the report of Appendix E "*The palms may be considered an extension of the wider Huatoki Plaza and associate with the Puke Ariki greenspace theme".* As attractive and not unsubstantial trees in their own right, they would become the new visual features of the site once the Notable Tree was removed.
- The Arboricultural Assessment states that "*The tree softens and screens an otherwise unsightly building* [note: the NPDC-owned carparking building at 20 Powderham Street] *and surrounds particularly when viewed from the west*" and also that "*Currently without building development, should the tree be removed the aesthetic contribution would be greatly noticed and missed*". The proposed building will also achieve this screening, therefore the loss of amenity from removal of the tree will be mitigated by the erection of the building, to a greater extent of screening due to the size of the building versus the size of the tree.

Irrespective of the proposed activities, the time the tree has remaining to contribute to the amenity of the area is limited to a maximum of 20 years and thereafter, when it dies and decays, it has the potential to have adverse effects on ground stability, and safety of people and property in the site (both 45-51 Brougham Street and the NPDC-owned land). Conversely, the proposed building has a relatively long (50+ years) anticipated lifespan in which to contribute enhanced amenity to the site and central city.

Additionally, given that the amenity of the tree is predominantly visual, if an alternative proposal saw the tree retained and the building constructed to the permitted 14m height, this situation would also be considered to substantially block views of the tree from Brougham and Powderham Streets, yet these effects would be permitted. The tree bulk that could remain visible above such a building would rationally be well above the level of vision at which most street users observe, which is considered to be at street level and the first two storeys above. The differences between the effects of this development - which could be undertaken as of right - and the proposed activities are not considered to be significant.

Overall, any potential adverse effects resulting from the removal of the Notable Tree are considered to be unavoidable and are mitigated through the enhancement of amenity values that will result from the proposal resulting in adverse effects that are no more than minor.

4.4 Heritage and Culture

The potential to disturb archaeological material has been addressed in Sections 10.1-2 of the Archaeological Assessment in Appendix F, and states:

> *"…there is a low likelihood that archaeological evidence of the earlier occupations of Hughes, Rawson or Mofflin will have survived the later works. Any evidence of pre European land use, such as the "Maori pits" reportedly encountered by Hughes, were likely gardened away upon discovery during his early tenure. Only very deeply cut features, such as wells are likely to have survived at this location and given the close proximity to the nearby Huatoki stream, it is possible that wells were not dug at all here during the early years of European development on this section…."*
>
> *"10.2 It is possible that the removal of the large Agonis Flexuosa will destabilise the stone railway embankment, which may in turn require demolition and/or replacement of that wall. This structure predates 1900 and is by definition part of an archaeological site and will require an archaeological authority to damage destroy or modify this feature."*

To address this risk, in part advised by the recommendations of Section 12 in the archaeological assessment, all proposed earthworks on the site of 45-51 Brougham Street will be undertaken under a precautionary Archaeological Authority, of which an archaeological discovery protocol is part. Under the Authority and Protocol, should archaeological evidence, or suspected archaeological evidence be recovered, all works will cease until the find has been verified by the project archaeologist and approval / authority to proceed has been granted by HNZPT and other relevant parties.

4.5 Parking

The building provides 13 carparks which are screened from view to maintain the character of adjacent sites and Brougham and Powderham Streets. The carpark design and manoeuvring does not meet the design standards of the ODP as it is smaller and more compact. Potential adverse effects could include difficulty manoeuvring, conflicts between vehicles on-site and the potential for people to reverse out of the vehicle crossing.

The parking design does not meet the standards of the ODP however the design complies with AS-NZS standard 2890.1 (2004) which has been accepted by NPDC previously and successfully implemented elsewhere for commercial buildings in New Plymouth. While compact, the proposed design is considered to adequately provide for useable carparks and manoeuvring. The potential for reversing out of the crossing is considered to be nil as this would be more difficult and unattractive to drivers than manoeuvring on-site to leave in a forward gear. Any potential adverse effects are internal to the site.

The provision of this parking is considered to be appropriate in accommodating some of the building's generated demand by tenants so that they are not forced to use the inner-city parking supply elsewhere.

With regard to the proposal not providing a designated loading space on-site, potential effects could occur from loading being undertaken in inappropriate places within the road reserve. The proposal for loading activities to be undertaken in the five-minute loading zone on the opposite side of Dawson Street is considered to be in character with inner-city commercial development whereby on-street loading bays are commonly provided and utilised. The bay is a short distance from a traffic light-controlled crossing, maintaining safety for delivery people getting to and from the site. Any potential effects with regard to loading are considered to be less than minor.

4.6 Site Development and Earthworks

Earthworks are proposed to create the basement parking area and for the installation of foundation piles. Potential adverse effects include visual and noise effects (e.g. disturbed earth, large machinery), the potential to disturb archaeological material, effects on adjacent sites, and runoff to stormwater and Huatoki Stream.

Visual and noise effects will be temporary in nature, to the minimum required to form foundations and servicing for the building and will thereafter be built over, stabilising any disturbed soil.

The potential to disturb archaeological material has been addressed in Section 2.5 and potential effects are considered to be appropriately managed through an Archaeological Authority and Discovery Protocol.

Earthworks in some form are entirely necessary for the development of this site. The alternative, to disturb a lesser depth and utilise a concrete pad base, does not offer maximum efficiency for the use of this site as it would be unable to support a multi-level building.

All earthworks will be undertaken in accordance with the TRC-accepted earthworks and sediment control practices to ensure that sediment is not unduly discharged offsite via dust or in stormwater.

Any potential adverse effects as a result of earthworks on the site with regard to effects on archaeology, adjacent sites and sediment runoff will be appropriately managed and any potential adverse effects will be no more than minor.

4.7 Summary of Effects

Overall and after considering effects and mitigation measures with regard to building bulk and location, viewshafts, character and amenity, the Notable Tree, heritage and culture, parking and loading, and earthworks, actual and potential adverse effects as a result of the proposal are considered to be no more than minor.

5 REGULATORY REQUIREMENTS

The proposal requires consent for numerous rules as set out in Section 1.3 and Appendix D, but to summarise:

- The proposal breaches a number of rules in the ODP, all of which require consent for Restricted Discretionary activities; and
- The removal of the Notable Tree triggers one rule with immediate legal effect in the PDP, resulting in a Non-Complying activity status.

The activities are inextricably linked as the expert assessments provided with the application appendices conclude that for any proposal to construct a commercially feasible building upon 45-51 Brougham Street, it will essentially always prove impractical to retain the Notable Tree.

An application to remove the Notable Tree has not been made independently of the proposal to develop 45-51 Brougham Street as the intention is to proceed with the building as soon as practicable. Also, as explained in Section 4, the contributions to character and amenity of the central city area by the proposed building are considered to significantly mitigate the adverse effects of losing the tree and thus the two are inextricably linked.

In applying the bundling principle for the linked activities across both the ODP and PDP, with the most restrictive activity classification applied to the overall proposal, in this instance the activity status is Non-Complying. The proposal must therefore be considered pursuant to RMA Sections 104B and 104D.

5.1 Section 104D

Section 104D(1) outlines the thresholds of the 'gateway test'. An application for a non-complying activity must pass through one of these gateways in order for it to be considered under section 104 of the RMA:

> *(a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or*
>
> *(b) the application is for an activity that will not be contrary to the objectives and policies of—*
>
> *(i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or*
>
> *(ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or*
>
> *(iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity.*

As summarised in Section 4.7 any actual or potential adverse effects from the proposal are considered to be no more than minor. The proposal therefore passes through (a) above. Assessment against the relevant objectives and policies of the ODP and PDP is provided in the following sections and concludes that, on balance, the proposal is not contrary to both the ODP and PDP. Noting that only one gateway pass is required, the proposal can go on to be considered under Section 104 of the RMA under Section 104D(1)(a) though it is considered to have passed through both gateways.

5.2 Section 104

When considering resource consent applications, RMA Section 104 states that a consent authority *"must, subject to Part 2, have regard to–*

> *(a) any actual and potential effects on the environment of allowing the activity; and*
>
> *(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and*
>
> *(b) any relevant provisions of—*
>
> *(i) a national environmental standard:*
>
> *(ii) other regulations:*
>
> *(iii) a national policy statement:*
>
> *(iv) a New Zealand coastal policy statement:*
>
> *(v) a regional policy statement or proposed regional policy statement:*
>
> *(vi) a plan or proposed plan; and*
>
> *(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application."*

Actual and potential effects on the environment have been assessed in Section 4. There are no National Environmental Standards or National Policy Statements relevant to the application. Assessment of the proposal against provisions of the relevant policy documents (Operative and Proposed District Plans and the Regional Policy Statement for Taranaki) is undertaken in the following sections. While it is recognised that the Section 104D test is for contrariness, the proposal's consistency with the provisions has also been assessed.

5.3 District Plans

5.3.1 Operative District Plan

The following ODP objectives and policies are relevant to this application:

Objective 1 - To ensure activities do not adversely affect the environmental and amenity values of areas within the district or adversely affect existing activities.
Policy 1.1 - Activities should be located in areas where their effects are compatible with the character of the area.
Policy 1.2 - Activities within an area should not have adverse effects that diminish the amenity of neighbouring areas, having regard to the character of the receiving environment and cumulative effects.
Policy 1.3 - New activities that are sensitive to the elements that define the character of the area in which they intend to locate should be designed and/or located to avoid conflict.

Assessment: The proposed development is considered be entirely compatible with both the site and the area which is located in the CBD with the area characterised by multi-storeyed buildings with high site coverage, in predominantly commercial use but with some ancillary residential uses. The proposal significantly enhances amenity for the site and the neighbouring area and provides the opportunity for additional future amenity through connection with the NPDC site. The proposed apartment will be designed to maintain an appropriate noise level for residents and is stepped back from the edges of the site to maintain its privacy and is therefore designed appropriately for the inner-city environment. Overall, the proposal is consistent with and not contrary to the above Objective and Policies.

Objective 5 - To maintain and enhance the character and coherence of the urban areas of the New Plymouth District.
Policy 5.2 - Buildings and structures should not detract from or reduce the visual amenity of the Urban Viewshafts.
Policy 5.3 – The positive contribution vegetation makes to urban amenity should be recognised, maintained and, where possible, enhanced.

Assessment: For the reasons explained in Section 4.2, the proposal is not considered to detract from or reduce the visual amenity of the subject viewshafts and is consistent with and not contrary to Policy 5.2. The proposal is contrary to Policy 5.3 as the notable tree will be removed. Efforts to avoid effects on the tree or incorporate the tree into the development have been explored but a combination of factors prevent retention of the tree being a practicable option. However, overall the proposal is considered to enhance the inner-city character and coherence of the Brougham / Powderham Street area, including a connection and interface with a potential redevelopment of the Huatoki Stream. On balance the proposal is considered to be consistent with and not contrary to the above Objective.

Objective 7 - To ensure the attractive, vibrant, safe, efficient and convenient character of the business environment is maintained.
Policy 7.1 - Buildings, signs and other structures should be designed and/or located to avoid, remedy or mitigate adverse effects on the character and visual amenity of business areas.

Assessment: The building incorporates natural materials and glass facades to maintain visual amenity and connection with the surrounding area, including in the majority of the portion of the building that is above the 14m permitted height limit. Additionally, the apartment on top is smaller in area and sits back from the lower walls of the building to reduce its visibility. Appropriate daylight and sunlight are maintained in pedestrian areas with shading having been demonstrated to fall on areas not occupied by habitable buildings. The design of the building has been demonstrated to enhance the character and visual amenity of this business area and therefore the proposal is consistent with and not contrary to the above Objective and Policy.

Objective 11: To recognise the district's heritage resources, provide for their protection and promote their enhancement.
Policy 11.1: Notable Trees should be protected from destruction or alteration which will adversely affect their significance or health, except where they pose a threat to property, people or services.
Policy 11.4: The Huatoki Stream should be protected from enclosure by development within the New Plymouth CBD, and enhanced to promote its heritage significance.

Assessment: The proposal is contrary to Policy 11.1 due to the proposal to remove the Notable Tree for the reasons explained in Section 4.3. The proposal is considered to provide an opportunity for visual and physical connection between the site and Huatoki Stream through the glass facade and stairs, promoting access and connection to the area and is therefore consistent with and not contrary to Policy 11.4. On balance, it is considered that the proposal is contrary to the above Objective which specifies protection of a feature without allowances for the practicality of actually retaining that feature or consideration of the benefits of the development that might be facilitated by removal of the tree.

Objective 13: To ensure that land use activities do not increase the likelihood or magnitude of natural hazard events.
Policy 13.1: Subdivision, development and other land uses should not result in aggravation of natural hazards.

Assessment: The potential for a slip plane to form under the proposed building is a known natural hazard, potentially exacerbated by the decay of the tree in the future. The proposal is considered to appropriately minimise this hazard potential with the proposed removal of the tree prior to construction of the building, and by using deep driven piles. The proposal is consistent with and not contrary to the above Objective and Policy.

Objective 18: To maintain and enhance public access to and along the coast, lakes and rivers.
Policy 18.1 - Public access should be provided to and along the coast and Priority Waterbodies except where such access should be restricted: • To preserve natural character. • To protect Significant Coastal Areas. • To protect Significant Natural Areas. • To safeguard ecological, intrinsic or recreational attributes. • To avoid conflicts between competing uses. • To protect cultural and spiritual values of Tangata Whenua. • To protect human health and safety. • For reasons of security. • To prevent aggravation of a natural hazard. • To protect the integrity of river and flood control works. • To provide for any other exceptional circumstances that are sufficient to justify the restriction, not withstanding the national importance of maintaining access.

Objective 20 - To ensure that the road transportation network will be able to operate safely and efficiently.
Policy 20.1 - The movement of traffic to and from a site should not adversely affect the safe and efficient movement of vehicles, both on-site, onto and along the road transportation network.
Policy 20.2 - The safe and efficient operation of the road transportation network should not be adversely affected by land use activities that have insufficient or substandard parking or loading areas.
Policy 20.3 - Potential conflict between vehicles, pedestrians and cyclists moving on the road transportation network should be minimised to protect the safety and efficiency of road and footpath users.

Assessment: As addressed in Section 4.5, the proposal will maintain traffic, pedestrian and cyclist safety and efficiency along Brougham Street. Additionally, the proposal provides parking for some of its own generated demand and is overall considered to be consistent with and not contrary to the above Objective and Policies.

5.3.2 Summary

The proposal is contrary to two policies and an objective of the ODP as explained previously. These provisions direct that vegetation in the central city, particularly Notable Trees, be protected. The provisions do not allow for consideration of the practicalities (e.g. social, economic, physical) of retaining the Notable Tree, including its restrictions on the development opportunities of nearby sites, nor the potential for alternative or enhanced amenity from a proposed development to mitigate that lost as a result of removing the tree.

Relative to this is that the proposal is not contrary to, but demonstrates consistency with the majority of the other relevant objectives and policies of the ODP, with regard to:

- General character, amenity and the compatibility of land use activities;
- Visual amenity and maintaining viewshafts;
- The character and amenity of the Business Environment Area;
- The opportunity for connection, access and honouring of the Huatoki Stream as an important place;
- Appropriate building design to address natural hazards; and

- A safe and efficient transportation system.

While the above provisions to which the proposal is consistent with outnumber those to which it is contrary to, the content of the above provisions is more important. As such, overall and considering the proposal holistically, it is considered that the contributions of the proposal to the character, amenity and vibrancy of the central city through commercial working space, apartment living and design that embraces connection with other spaces, is a significant improvement to the current parking lot, such that it outweighs the loss of the tree. It is considered that this demonstrates strong consistency with the provisions of the Plan which have broader aspirations for this central city site and area, which outweighs the loss of the Notable Tree and associated provisions which more narrowly focus on protecting singular heritage features.

Overall on balance the proposal is therefore not considered to be contrary to the Objectives and Policies of the ODP.

5.3.3 Proposed District Plan

Strategic Objectives
HC-1: The district's heritage and cultural values contribute to the district's sense of place and identity, and are recognised and protected.
UFD-13: The district develops in a cohesive, compact and structured way that: 1. maintains a compact urban form that provides for connected, liveable communities; 2. manages impacts on the natural and cultural environment; 3. recognises the relationship of tangata whenua with their culture, traditions, ancestral lands, waterbodies, sites, areas and landscapes and other taonga of significance; 4. enables greater productivity and economic growth; 5. enables greater social and cultural vitality; 6. takes into account the short, medium and long-term potential impacts of climate change and the associated uncertainty; 7. utilises existing infrastructure and/or can be efficiently serviced with new infrastructure; and 8. meets the community's short, medium and long-term housing and industrial needs.
UFD-15: A variety of housing types, sizes and tenures are available across the district in quality living environments to meet the community's diverse social and economic housing needs in the following locations: 1. suburban housing forms in established residential neighbourhoods; 2. a mix of housing densities in and around the city centre, town centres and transport nodes, including multi-unit housing; 3. opportunities for increased medium and high-density housing in the city centre, town centres and local centres that will assist to contribute to a vibrant, mixed-use environment; 4. a range of densities and housing forms in new subdivisions and areas identified as appropriate for growth; and 5. papakāinga housing that provides for the ongoing relationship of tangata whenua with ancestral land and for their cultural, environmental, social and economic well-being.
UFD-16: The district has a hierarchy of vibrant and viable centres that are the location for shopping, leisure, cultural, entertainment and social interaction experiences and provide for the community's employment and economic needs.
UFD-17: The hierarchy of centres in the district is maintained in accordance with the following hierarchy: 1. the city centre is the principal centre that provides a wide range of retail and business service activities, living activities, community facilities, and visitor accommodation that serve the district and the Taranaki region; 2. Waitara and Inglewood are town centres that provide a range of business, retail and entertainment activities that serve the needs of each town centre's community and surrounding rural areas and; 3. local centres are made up of rural service centres, village centres, suburban shopping centres and neighbourhood shops that provide convenience-based business and retail activities which serve the needs of each local centres community and surrounding areas.

UFD-19: Urban environments are liveable, connected, accessible, safe and well-designed spaces for the community to live, work and play, which: 1. integrate and enhance natural features and topography into the design of development to minimise environmental impacts; 2. recognise the local context and character of an area; 3. reduce opportunities for crime and perceptions of crime through design solutions; 4. create ease of movement in communities through connected transport networks, a range of transport modes and reduced reliance on private motorised vehicles; 5. incorporate matauranga Māori principles by involving tangata whenua in the design, construction and development of the built environment; 6. use low impact design solutions and/or healthy, accessible, energy efficient buildings; and 7. are adequately serviced by utilising and/or upgrading existing infrastructure or with new infrastructure.

Assessment: The proposal avoids effects on any known Wahi Tapu sites and the Huatoki Stream but is contrary to Strategic Objective HC-1 due to the removal of the Notable Tree.

However, the proposed design of the building aligns with the need for compact urban form in this central city area and diversifies use of the site for both commercial and residential use, adding to the area's vitality and providing for employment and housing demand in the city centre. Design features have been incorporated in the building to ensure connections and accessibility with the surrounding streets and the Huatoki Stream, recognising its importance. The building will be energy efficient and as an observation point, increases safety of future Huatoki users. The proposal is not contrary to the Strategic Objectives above other than HC-1.

Objective VIEWS-O1: Viewshafts from public places to Mount Taranaki, the sea, Nga Motu/Sugar Loaf Islands and significant landmarks that provide a strong sense of place and identity are recognised and maintained.
VIEWS-P2: Maintain the visual amenity of viewshafts by controlling the height of structures within viewshafts.
VIEWS-P3: Ensure that any structure that exceeds permitted height limits within a viewshaft is appropriately located and does not result in inappropriate adverse visual effects on the viewshaft, having regard to: 1. the extent to which the additional height of the structure will encroach upon the core part of the view and/or compromise the visual coherence or integrity of the viewshaft and its view; 2. the focal elements that will be affected and the ability to interpret the view; 3. the reduction or loss of amenity, vegetation and/or landscaping values; 4. the particular cultural, spiritual and/or historical values, interests or associations of importance to tangata whenua that are associated with the viewshaft which may be affected by the over-height structure; 5. the outcomes of any consultation with tangata whenua, in particular with respect to mitigation measures and/or opportunities to incorporate mātauranga Māori principles into the overall scale, form, composition and design of the structure, to: a) minimise adverse visual effects on any cultural, spiritual and/or historical values, interests or associations of importance to tangata whenua that are associated with the viewshaft; and b) acknowledge and reflect the importance of the viewshaft to tangata whenua. 6. the view's sensitivity to change or capacity to accommodate change; 7. whether the additional height of the structure will enhance the quality of the view through its design; and/or 8. whether the proposed structure and/or additional height of the structure has a functional or operational need to be located within the viewshaft, any alternative locations for the structure on the site and the permenancy of the structure.
VIEWS-P4: Support enhancement planting on Council land that is located within viewshafts to improve the overall amenity of viewshafts.

Assessment: As explained in the Effects Assessment, effects on the Cameron Street, Marsland / Pukaka Hill and Victoria Road viewshafts are less than minor and thus the integrity of these views is considered to be fully maintained. Building height is therefore considered to have been controlled and located appropriately and includes design solutions to manage effects. The opportunity remains for enhancement planting in the future near the Huatoki Stream to improve the amenity of the

viewshafts. Overall, the proposal is considered to maintain the desired sense of place and identity and is not contrary to the above Objective and Policies.

Objective TREE-O1: Trees with notable botanical, landscape, amenity, historical or cultural (including tangata whenua) values are recognised, identified and protected.
TREE-P3: Allow the removal, partial removal or destruction of an unsafe or unsound scheduled notable tree where it has been certified by the Council that the tree is unsafe or unsound as determined by using the International Society of Arboriculture Tree Risk Assessment.
TREE-P5: Avoid the removal, partial removal or destruction of a scheduled notable tree, unless: 1. it is necessary to prevent a serious threat to people or property; 2. it is necessary to enable the ongoing provision of essential infrastructure; 3. it is necessary to ensure compliance with the Electricity (Hazards from Trees) Regulations 2003; and/or 4. the tree is rendering the site incapable of reasonable use.

Assessment: With regard to the above relevant Objective and Policies:

- The proposal is contrary to Objective TREE-01 due to the removal of the Notable Tree as it cannot be protected.
- The proposal is contrary to Policy TREE-P3 as removal of the tree is only allowed where Council have certified it unsafe or unsound and this has not occurred for this application.
- The proposal is not contrary to Policy TREE-P5 due to meeting one of the criteria, that being as explained in Section 4.3, the tree is rendering this site incapable of reasonable use.

Objective CCZ-O2: The city centre is the primary location for a wide range of retail and business service activities, living activities, community facilities and visitor accommodation.
Objective CCZ-O4: The structures in the city centre are well designed and contribute positively to the streetscape.
Objective CCZ-O5: The city centre is an attractive, accessible and safe environment for people to work, live and play.
CCZ-O6: Increased numbers of people live in the city centre.
CCZ-O7: The city centre's historic and cultural heritage is maintained and enhanced and contributes to the city's unique sense of place and identity.
CCZ-O8: The role and function of the city centre is not compromised by incompatible activities and/or built form.
CCZ-P1: Allow activities which are compatible with the role, function and predominant character of the City Centre Zone, while ensuring their design, scale and intensity is appropriate, including: 1. retail activities; 2. business service activities; 3. sensitive activities; 4. medical and health services; 5. sport and recreation activities; and 6. Māori purpose activities.
CCZ-P4: Encourage medium and high density housing developments in the city centre that will contribute to a vibrant, mixed use environment.

CCZ-P5: Maintain the role, function and predominant character of the City Centre Zone by controlling the effects of:

1. inactive frontages;
2. total or partial demolition of structures;
3. the erection of structures;
4. alterations to exteriors of structures;
5. additions to structures;
6. structure height;
7. noise and light; and
8. signage.

CCZ-P6: Require activities on pedestrian streets to maintain an active frontage and to contribute to a vibrant retail area by:

1. providing a verandah and/or other forms of shelter for pedestrians;
2. providing adequate transparent glazing so that goods and services are visible to create engaging, retail focused spaces;
3. providing an obvious public entrance;
4. locating parking and servicing areas within or to the rear of buildings; and
5. ensuring pedestrians can move safely and efficiently along the street and within public places.

CCZ-P8: Require structures and/or alterations to the exterior of or additions to structures to be compatible with the character and amenity of the relevant area by:

1. having an interesting and engaging frontage with variations in form, materials and colour;
2. providing clearly visible and accessible entranceways and connections to pedestrian networks, including safe and practicable access for people with limited mobility;
3. locating utilities and service areas so they are not visible from public areas and are screened or incorporated into the overall structure form;
4. using sustainable design methods, where possible, to minimise the use of energy and water resources and to create healthy living and working environments;
5. incorporating mātauranga Māori principles into the design and construction of the structure and, where appropriate, art works or unique and recognisable features that reflect cultural, spiritual and/or heritage values of importance to tangata whenua; and
6. maintaining similarity of frontage alignment, height and overall bulk, form and scale for structures adjoining a heritage building and/or within the heritage character area.

CCZ-P9: In addition to Policy CCZ-P8, require structures and/or alterations to the exterior of or additions to structures that adjoin a public place to:

1. maximise opportunities for the public to use and access that place;
2. maintain and enhance the city centre's historic and cultural heritage;
3. minimise any adverse shading effects on the public place; and
4. minimise the adverse impacts on the openness, historical and cultural values of the Huatoki Stream.

CCZ-P10: Ensure that structures proposing to exceed permitted height limits are appropriate, having regard to:

1. the prominence of the site's location, the extent of the structure's visibility to the public and its compatibility with the character and amenity of the area;
2. the overall scale, form, composition and design of the structure, the effects of the additional height and the ability to minimise adverse visual effects by breaking up dominant and/or monotonous facades;
3. the proximity of the structure to the coastal environment and its impact on coastal values;
4. the proximity of the structure to the Huatoki Stream and its impact on the openness, historical and cultural values of the stream;
5. the site's size, topography and the orientation of the structure on the site and whether the structure will result in adverse shading effects;
6. the extent to which the structure encroaches into the core part of the view and the focal elements that will be affected within any viewshaft;
7. the impact on any adjacent heritage building and/or the heritage character area, ensuring similarity of frontage alignment, height and overall bulk, form and scale.

CCZ-P11: Ensure any effects generated by activities are of a type, scale and level that are appropriate for the City Centre Zone and that will maintain city centre amenity, having regard to:

1. whether building occupants have adequate access to daylight;
2. the ability to manage noise and light emissions at an acceptable, reasonable level; and
3. the size, design and type of signage and whether it is compatible with the character and amenity of the city centre.

Assessment: The proposal offers a predominant commercial office activity, with diversification into an ancillary apartment use; both of which are compatible with the character of this area. As per the Effects Assessment, effects with regard to building height can be managed to an appropriate scale and intensity which maintains the role, function and character of this proposed Central City area, through methods such as transparent glazing, a verandah and entrances / stairs into public spaces to maintain visual and physical engagement with the street and the Huatoki Stream. The building fits with the many others of multiple storeys in this area however utilises modern sustainable design and function methods and has a stepped-back apartment on top to reduce its dominance. Some parking demand is serviced on-site and hidden beneath the building. Overall, the enhanced amenity to the site and area as a result of the proposal contributes significantly more to the inner city than the current vacant site and will contribute actively to this mixed working and living environment. Overall, the proposal is not considered to be contrary to the above Objectives and Policies.

5.3.4 Summary

Unlike the ODP, the PDP nominates some Strategic Objectives which have more weight than the other provisions of the ODP. The proposal is contrary to one of the Strategic Objectives as explained previously, which (similar to the ODP) directs the protection of heritage values (associated with the Notable Tree). Again, this does not provide for consideration of the practicalities and restrictions that the tree influences, nor mitigation of the effects of removing the tree, but instead requires protection at all costs, which is not provided for in this application. However, the proposal goes on to demonstrate strong consistency with other relevant Strategic Objectives with regard to urban form and development, which directs developments to support an inner-city environment that is compact, connected, productive, vibrant and supports a mixture of commercial and residential uses.

With regard to the remaining Objectives and Policies of the ODP, the proposal is contrary to an Objective and a Policy that again directs the protection of Notable Trees. However, Policy TREE-P5 specifically provides for the removal of a Notable Tree if it is rendering the site incapable of reasonable use, as is the case for the subject Notable Tree. The Objective to protect the tree therefore, unlike the ODP, is required to take into account the practicalities and restrictions Notable Trees can create. The proposal thereafter demonstrates that it is not only not contrary to, but is consistent with the majority of the other relevant objectives and policies of the PDP, with regard to:

- Visual amenity and maintaining viewshafts; and
- The character and amenity of the Central City Zone, which is to have vibrant business and living amenities, an attractive and social streetscape and embraces place and identity.

Again the provisions that the proposal is consistent with outnumber those to which it is contrary, but in recognising the content of those provisions, the same conclusion is reached as for Section 5.3.2. Overall and considering the proposal holistically, it is considered that the contributions of the proposal to the character, amenity and vibrancy of the central city through commercial working space, apartment living and design that embraces connection with other spaces, is a significant improvement to the current parking lot, such that it outweighs the loss of the tree. It is considered that the proposal demonstrates strong consistency with the provisions of the Plan which have broader aspirations for this central city site and area, which outweigh provisions which more narrowly focus on protecting singular heritage features.

Overall, on balance the proposal is not considered to be contrary to the Objectives and Policies of the PDP.

5.4 Regional Policy Statement for Taranaki

The Regional Policy Statement (RPS) for Taranaki came into effect on 1 January 2010 and sets the framework for resource management policies including policies relating to the natural physical resources of Taranaki. It is the second RPS to be prepared by the Taranaki Regional Council. The purpose of the document is to *"promote the sustainable management of natural and physical resources in the Taranaki Region by providing an overview of resource management issues… and identifying policies and methods to achieve integrated management of natural and physical resources in the region"* (Taranaki Regional Council, 2010).

The RPS seeks to promote sustainable development whilst improving the quality of life by improving better social, environmental and economic outcomes.

Objectives and policies of the Land and Soil chapter (Chapter 5) seek to manage adverse effects arising from contaminated sites. In line with this, background research on the site has been undertaken and Appendix G confirms that there is no reason to believe there is any soil contamination on the site.

Enhancing public access to and along rivers is a topic of the Objectives and policies of Chapter 6 (Fresh Water). Recognising that the Huatoki area is to be upgraded in the future to support public access and better appreciation of the Huatoki River, the development provides a connection through from the building to the Huatoki area.

Chapter 10 has regard to natural features and landscapes, historic heritage and amenity value. Objectives and policies centre around protecting and managing natural areas, features and landscapes which have (for example) character, amenity and heritage values. As explained earlier, the loss of amenity values associated with the tree is considered to be mitigated by the contribution of new values compatible with a vibrant the inner-city environment that the improved site will offer.

Objectives and policies within the Built Environment chapter (Chapter 15) of the RPS recognise the need to provide for appropriate development while avoiding, remedying or mitigating any adverse effects on the environment in order to maintain character and amenity values. The proposed high-quality compact development provides for the efficient use of an existing underutilised Business Environment site, stimulating social, environmental and economic vibrancy for this inner-city area with eco-friendly premium leasable commercial space and a modern apartment. The building is a walkable distance (and adjacent) to public spaces and all inner-city facilities, providing passive surveillance of public areas, whilst avoiding and mitigating adverse effects on urban character and amenity.

Overall, the proposal is considered to be consistent with the intent of the RPS.

5.5 Part 2

The recent decision in the Court of Appeal in R J Davidson Family Trust v Marlborough District Council [2018] NZCA 316 has further influenced the way in which Part 2 should be assessed.

In circumstances where it is clear that a plan is "prepared having regard to Part 2 and with a coherent set of policies designed to achieve clear environmental outcomes" the Court envisaged that "the result of a genuine process that has regard to those policies in accordance with s 104(1) should be to implement those policies." Reference to Part 2 would not add anything, and "could not justify an outcome contrary to the thrust of the policies".

In respect of the ODP, PDP and other relevant planning documents, it is considered that they have been prepared with a coherent set of policies designed to achieve clear environmental outcomes and that an assessment of this application against Part 2 would not necessarily add anything to the evaluative exercise required.

However, in case NPDC disagree with this assessment, the application has been assessed against Part 2.

The overriding purpose in Section 5 of the Act is to promote the sustainable management of natural and physical resources. In informing the decision of whether or not a proposal promotes sustainable management, Part 2 of the RMA is paramount and directs reference to the following sections.

With regard to Section 6, there are considered to be no matters of national importance relevant to the proposal.

With regard to Section 7, the following matters are considered to be relevant to the proposal:

> *(b) the efficient use and development of natural and physical resources:*
>
> *(c) the maintenance and enhancement of amenity values:*
>
> *(f) maintenance and enhancement of the quality of the environment:*

The proposal has been designed with a number of elements to ensure it has a relatively light touch (with regard to resource and energy use) on the central city site and area, including the use of renewable materials during construction and utilising renewable and energy efficiency technologies for use of the building thereafter. The proposal is considered to represent efficient mixed-use of this undeveloped site. It balances the loss of amenity and quality of the environment from the removal of a tree by enhancement of amenity and quality of this urban environment achieved for the site and wider area. As such, the proposal is considered to demonstrate that it has been designed with particular regard to the above matters.

6 CONSULTATION

Pursuant to Section 36A of the RMA, there is no duty to consult about a resource consent application. However, it is considered best practice to consult with those parties considered to be potentially adversely affected by a proposal.

6.1 Adjacent Sites

Sites adjacent (43 Brougham Street, Lot 3 DP 15492 and Lot 1 DP 15492) to the proposed activities on the application sites are owned by either the applicant or NPDC. As such:

- The applicant therefore inherently accepts any adverse effects upon them as a result of the proposal; and
- Discussions have occurred with NPDC in their capacity as landowner around the need to remove the tree, and the interface between the development on 45-51 Brougham Street and the concept for redevelopment of the Huatoki Stream area. No formal feedback has been provided by NPDC other than advice on the need to go through the RMA process and demonstrate mitigation for the tree removal.

No other parties are considered to be affected and therefore no additional consultation to that below has been undertaken.

6.2 New Plymouth District Council

At the time of the first site visit as explained below, Lot 2 DP 15492 was owned privately. Sometime soon thereafter, NPDC became the owner of that site. The consultation undertaken with NPDC has therefore been both in their capacity as a regulator as well as a landowner.

6.2.1 Site Visits

A site visit was undertaken on 13 August 2019 with Murali Bhaskar (Design Director - BOON Architects), Conrad Patterson and Josh Pace (Arborists / Parks Team - NPDC), and Darelle Martin (Planner - BTW Company) on behalf of the applicant. Matters of discussion included:

- Likelihood that structural roots are located in the site at 45-51 Brougham Street;
- Potential instability of existing upper block retaining wall (not the railway embankment itself);
- Advice to contact Bruce MacDonald from Asplundh for advice;
- Potential to undertake aquablasting to scope root extent, with first 2m depth of soil likely to contain most root mass; and
- Potential for effects to be greater the closer to the tree the building is located.

A further site visit was undertaken on 04 December 2019 including:

- NPDC staff Liam Hodgetts (Group Manager Strategy), Maya Neeson (Student), Josh Pace (Arborist / Parks Team) and Campbell Robinson (Planner); and
- Cam Twigley (Director, Planning and Environment) and Darelle Martin of BTW Company, and Shaun Murphy (Associate - BOON) on behalf of the applicant.

Matters of discussion included:

- NPDC's recently acquired ownership of the Metroplaza (Lot 2 DP 15492 and Lot 3 DP 15492) and carpark building on the opposite side of Huatoki Stream; and

- Aspirations by NPDC to daylight Huatoki Stream and provide greater public access via demolition of the Metroplaza and development of green space and the importance for the proposed building to tie in with this future development.

The expert reports in the appendices of this report, design of the proposal, and Assessment of Environmental Effects in Section 4 are considered to address the above matters.

6.3 Ngāti Te Whiti

A meeting was held at BOON offices on 19 March 2020 between:

- Ngāti Te Whiti Hāpu Board members Trenton Martin (Chairperson) and Phillippa Fairclough (Secretary);
- Liam Hodgetts of NPDC; and
- Murali Bhaskar and Shaun Murphy of BOON, on behalf of the applicant.

The purpose of the meeting was to discuss master plan concept ideas for the Huatoki redevelopment on the NPDC site between Powderham Street and Devon Street.

The draft masterplan ideas of Appendix L were presented and BOON explained that this masterplan was developed in the context of the proposed new Brougham Street commercial building which sits alongside the Huatoki. The proposal seeks to primarily open up the awa and promote a pedestrian focused space connecting Powderham Street with Devon Street.

The hāpu indicated that they were generally supportive of the ideas presented and of the Huatoki awa being opened up. It is anticipated that they will be involved in the design process for the NPDC Huatoki redevelopment with an opportunity to bring a cultural narrative into the development.

7 CONCLUSION

This report provides an assessment of the application by K.D. Holdings Limited to undertake a commercial building development at 45-51 Brougham Street, New Plymouth, with associated Notable Tree removal on the adjacent NPDC site. An assessment of the proposal has been made against Section 104, 104D and Part 2 of the RMA, and against the rules, objectives and policies of the ODP, PDP and RPS.

Any actual and potential adverse effects on the wider environment resulting from the proposal can be appropriately mitigated such that adverse effects would be no more than minor. Additionally, the proposal on balance is considered to be consistent with and not contrary to the provisions of the ODP, PDP and RPS. The proposal therefore passes both gateway tests for non-complying activities under section 104D RMA and can go on to be considered under Section 104 RMA. It is considered that the proposal will achieve the broad purpose of the RMA to promote the sustainable management of natural and physical resources.

APPENDIX A APPLICATION FORMS

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

FORM 9
Application for a land use resource consent or fast-track resource consent

Section 87AAC & 88, Resource Management Act 1991

This form must be submitted with a completed application cover page form.

1. Applicant details

1a. I am the
- [x] Property owner
- [ ] Lessee
- [ ] Agent authorised by owner/lessee

1b. Full name
- First name(s): K.D. Holdings Limited
- Surname:

1c. Electronic service address - this must be provided for fast-track consent applications
c/o Darelle Martin - BTW Company
darelle.martin@btw.nz

1d. Telephone
- Mobile: 027 205 0301
- Landline: 06 759 5040

1e. Postal address or alternative method of service under Section 352 of RMA 1991
PO Box 551, New Plymouth 4340

2. Property owner details

Provide details below for the property owner if different to 1. above

2a. Full name
- First name(s): K.D. Holdings Limited, and
- Surname: NPDC

2b. Electronic service address
kdoody@xtra.co.nz

2c. Telephone
- Mobile:
- Landline: 06 759 2131

3. Fast-track application details

3a. Is this a fast-track controlled land use application?
- [ ] Yes
- [x] No (proceed to 4.)

3b. If yes, please indicate whether you opt out or do not opt out of the fast-track resource consent process
- [ ] I opt out
- [ ] I do not opt out

Under the fast-track resource consent process the Council must give notice of the decision within 10 working days after the date the application was first lodged, unless the applicant opts out of the process at the time of lodgement. A fast-track application may cease to be a fast-track application under Section 87AAC(2) of the RMA.

4. Description of proposed activity

4a. Description of activity
Commercial building with apartment, with associated earthworks, car parking and loading, viewshaft breaches, and removal of Notable Tree, fully described in attached application.

4b. Description of the site at which activity is to occur
45-51 Brougham Street and Lot 2 DP 15492

4c. Description of any other activities that are part of the proposal
Fully described in attached application.

4d. Details of additional resource consents required for this activity
- [x] No additional resource consents are required.
- [ ] Additional resource consents are required.
  Please provide details of the resource consents required, and whether these have been lodged.

Please turn over

OFFICE USE ONLY

Date received		Application #	
Time received		Document #	
Received by		Property ID	
Receipt #		Land ID	
Amount paid	$		

Planner's Pre-check
- Signature:
- Date:

Liardet Street, Private Bag 2025, New Plymouth 4342, New Zealand. Telephone 06-759 6060, Fax 06-759 6072, Email enquiries@npdc.govt.nz, Website www.newplymouthnz.com

4. Description of proposed activity - continued

4e. District Plan rule(s) not being met

Bus12, Bus58, Bus87, Bus88, Bus90, OL50, OL63, OL71, OL75 - all Restricted Discretionary.
TRE-R10 (Proposed District Plan) - Non-Complying

4f. Proposed start date

5. Information included in application

I confirm that I have assessed my proposed activity against the relevant matters of the RMA:

- [x] Part 2 Purpose and Principles.
- [x] Section 104 Consideration of Applications.
- [x] Schedule 4, including an Assessment of Environmental Effects (AEE).

I have attached this assessment and all other required information as listed below:

- [x] Site plan. Your site plan must show the following items:
  - Scale and north orientation.
  - Existing and proposed buildings.
  - Building dimensions and distances to boundaries.
  - Trees, fences, landscaping, screening and contours.
  - Car parking, loading facilities and access points.
  - Signs.
- [x] Floor plan.
- [x] Elevation plan. Your plan must show the groundlines and the view of your site, from the ground up, from all boundaries.
- [ ] Written approvals from affected parties. Contact the Council if you are unsure of who the potentially affected parties might be.
- [x] Application fee. Refer to the land use consents fees and charges schedule.

6. Post-approval contact details for monitoring purposes

6a. Full name

Kevin (First name(s)) | Doody (Surname)

6b. Electronic service address

kdoody@xtra.co.nz

6c. Telephone

Mobile | 06 759 2131 (Landline)

7. Privacy statement

The Privacy Act 1993 applies to the personal information provided in this application. For the purposes of processing this application the Council may disclose that personal information to another party. If you want to have access to, or request correction of, that personal information, please contact the Council.

8. Applicant's declaration and privacy waiver

By signing this application, or by submitting this application electronically, I confirm that I am authorised to make such an application, that the information contained in this application is true and correct and that I have read, understood and agree to such terms and conditions applying to this application. I acknowledge and agree to the disclosure of my personal information in respect of this application.

A signature is not required if this application is submitted electronically.

If signing on behalf of a trust or company, please provide additional written evidence that you have signing authority.

Darelle Martin on behalf of K.D Holdings Limited (First name(s)) | (Surname)

Signature | 29/04/2020 (Date)

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

FORM
Application cover page
(required with all other forms)

1. Property details

1a. Site address
(Specify unit/level number, location of building within site/block number, building name and street name)
45-51 Brougham Street and 33 Devon Street West

1b. Current lawfully established use
Commercial

1c. Legal description
Part Sections 683 Town of New Plymouth and Part Lots 6 DP 3466, Lot 2 DP 15492

1d. Rapid number

2. Property owner details

2a. Owner name
K.D. Holdings Limited (First name(s)) | (Surname)

2b. Name of additional owner(s)/company/trust
New Plymouth District Council

2c. Contact person
(if different from above)
Kevin Doody

2d. Postal address
(include postcode)

2e. Contact details
06 759 2131 (Phone) | (Mobile) | (Fax)

2f. Email
kdoody@xtra.co.nz

3. Payer details

3a. Required for invoice
☑ Applicant - proceed to 4 ○ Owner - proceed to 4 ○ Other - provide details below

3b. Name in full
K.D. Holdings Limited

3c. Postal address
14 Brougham Street, New Plymouth

4. Description of project

4a. Detailed description of the development/ project
Commercial building with apartment, with associated earthworks, car parking and loading, viewshaft breaches, and removal of Notable Tree, fully described in attached application.

4b. Will business activities take place when building is completed? ☑ Yes ○ No

Please turn over

Liardet Street, Private Bag 2025, New Plymouth 4342, New Zealand. Telephone 06-759 6060, Fax 06-759 6072, Email enquiries@npdc.govt.nz, Website www.newplymouthnz.com

5. Council applications for this project

OFFICE USE ONLY

	Application attached	Have applied already (write the application number if known)	Information provided
5a. Common applications			
Project information memorandum	○		●
Building consent	○		●
Vehicle crossing	○		●
Encroachment licence	○		●
Land use resource consent	✓		●
Deemed permitted boundary activity notice	○		●
Subdivision resource consent	○		●
Sewer connection/disconnection	○		●
Stormwater connection/disconnection	○		●
Water connection/disconnection	○		●
5b. Non-residential applications			
Discharge of trade waste consent	○		●
Alcohol licensing	○		●
Food premises registration	○		●
Health Act registration (Hairdressing, camping ground, funeral parlour, offensive trade)	○		●
Beauty registration	○		●
5c. Other project authorisations			
Swimming pool registration	○		●
Temporary obstruction on road reserve	○		●
Temporary road closure	○		●
Easements through Council-owned reserve land	○		●
5d. Other project requirements			
Rapid number request	○		●
Contractors parking space reservation	○		●
Existing street damage declaration	○		●

APPENDIX B PROPOSED PLANS AND DESIGN STATEMENT

BROUGHAM STREET DEVELOPMENT

51 Brougham Street, New Plymouth

Dwg No.	Rev.	Dwg Name
A1.01		Proposed Site Plan
A2.01		Proposed L0 Plan
A2.02		Proposed L1 Plan
A2.03		Proposed L2,3,4,5 Plan
A2.04		Proposed L6 Floor Plan
A3.01		Elevations
A3.02		Elevations
A4.01		Cross Sections
A9.01		Shade Diagram - Mid Summer
A9.02		Shade Diagram - Mid Winter
A9.03		3D Views- Render
A10.01		Alternative Design with Tree Preserved

ISSUED FOR:
Resource Consent

6488

BOON
teamarchitects
A / 131 Courtenay St, New Plymouth 4310, New Zealand
P / 06 757 3200 **E** / office@boon.co.nz **W** / boon.co.nz

Site Description

PT Section 683 Town of New Plymouth
Zone: Business A
Wind Zone: TBC
Earthquake Zone: TBC
Exposure Zone: TBC

Site Coverage

Site area: 478m²
Total proposed building floor area 491m² approx

Line to perimeter of site indicates construction demarcation line. Construction confined to within this area.

Site Finishes Key

Proposed Building

New concrete paving slab

Site Plan - Proposed

Scale 1 : 200 (A3)

Brougham Street Development
51 Brougham Street, New Plymouth
Resource Consent
April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	As indicated	A1.01		Proposed Site Plan	23/04/2020 6:15:22 PM

BOON teamarchitects
A/131 Courtenay St, New Plymouth 4310, New Zealand
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz

Proposed L0 Plan

Scale 1 : 100 (A3)

Building Floor Areas:

LEVEL 0:
- 13 Carparks (covered)
- Floor area 54m² approx

LEVEL 1:
- Floor Area (total): 463m² approx
- Tenancy 1: 233m²
- Tenancy 2: 121m²

LEVEL 2,3,4,5:
- Floor Area (total): 450m² approx
- Tenancy 1: 239m²
- Tenancy 2: 139m²

LEVEL 6:
- Aparment: 221m²

Parking Notes

Parking to comply with AS/NZS 2890.1:2004

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 100	A2.01		Proposed L0 Plan	23/04/2020 6:15:24 PM

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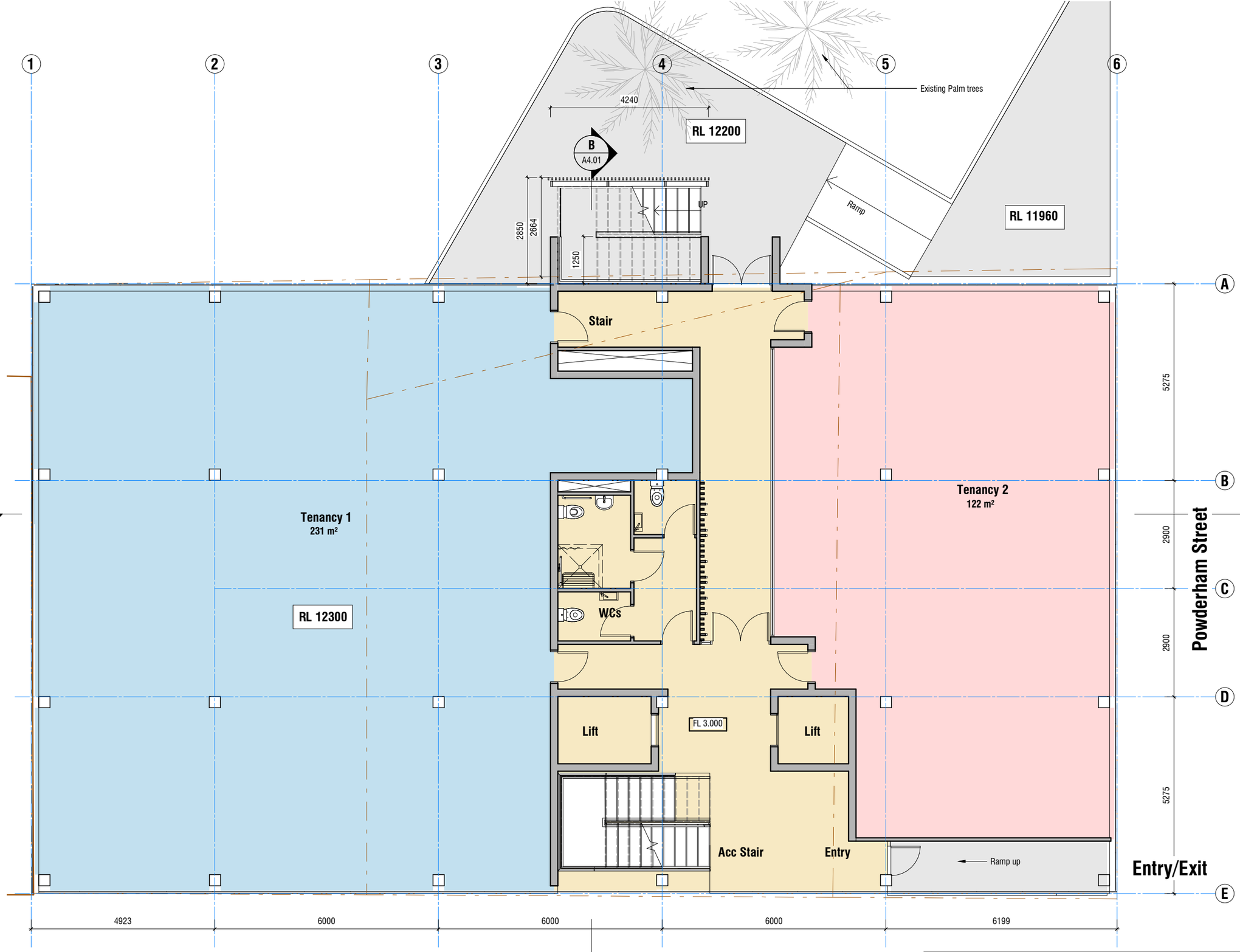
A/131 Courtenay St, New Plymouth 4310, New Zealand
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz



Building Floor Areas:

LEVEL 0:
- 13 Carparks (covered)
- Floor area 54m² approx

LEVEL 1:
- Floor Area (total): 463m² approx
- Tenancy 1: 233m²
- Tenancy 2: 121m²

LEVEL 2,3,4,5:
- Floor Area (total): 450m² approx
- Tenancy 1: 239m²
- Tenancy 2: 139m²

LEVEL 6:
- Aparment: 221m²

Proposed L1 Plan

Scale 1 : 100 (A3)

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 100	A2.02		Proposed L1 Plan	23/04/2020 6:15:27 PM

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A/131 Courtenay St, New Plymouth 4310, New Zealand
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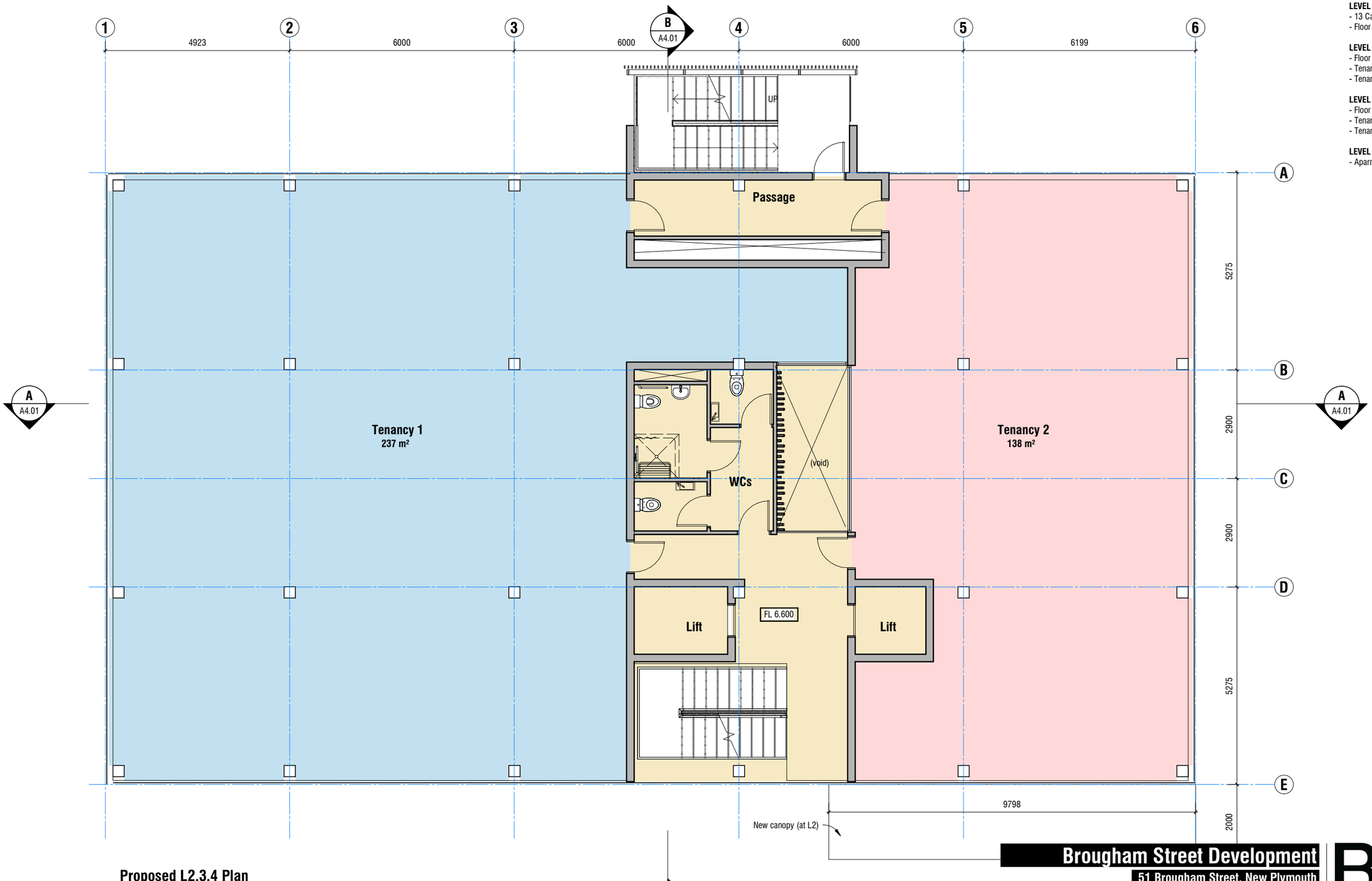

Proposed L2,3,4 Plan

Scale 1 : 100 (A3)

Building Floor Areas:

LEVEL 0:
- 13 Carparks (covered)
- Floor area 54m² approx

LEVEL 1:
- Floor Area (total): 463m² approx
- Tenancy 1: 233m²
- Tenancy 2: 121m²

LEVEL 2,3,4,5:
- Floor Area (total): 450m² approx
- Tenancy 1: 239m²
- Tenancy 2: 139m²

LEVEL 6:
- Aparment: 221m²

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 100	A2.03		Proposed L2,3,4,5 Plan	23/04/2020 6:15:29 PM

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L06 Proposed Apartment Floor

Scale 1 : 100 (A3)

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 100	A2.04		Proposed L6 Floor Plan	23/04/2020 6:15:31 PM

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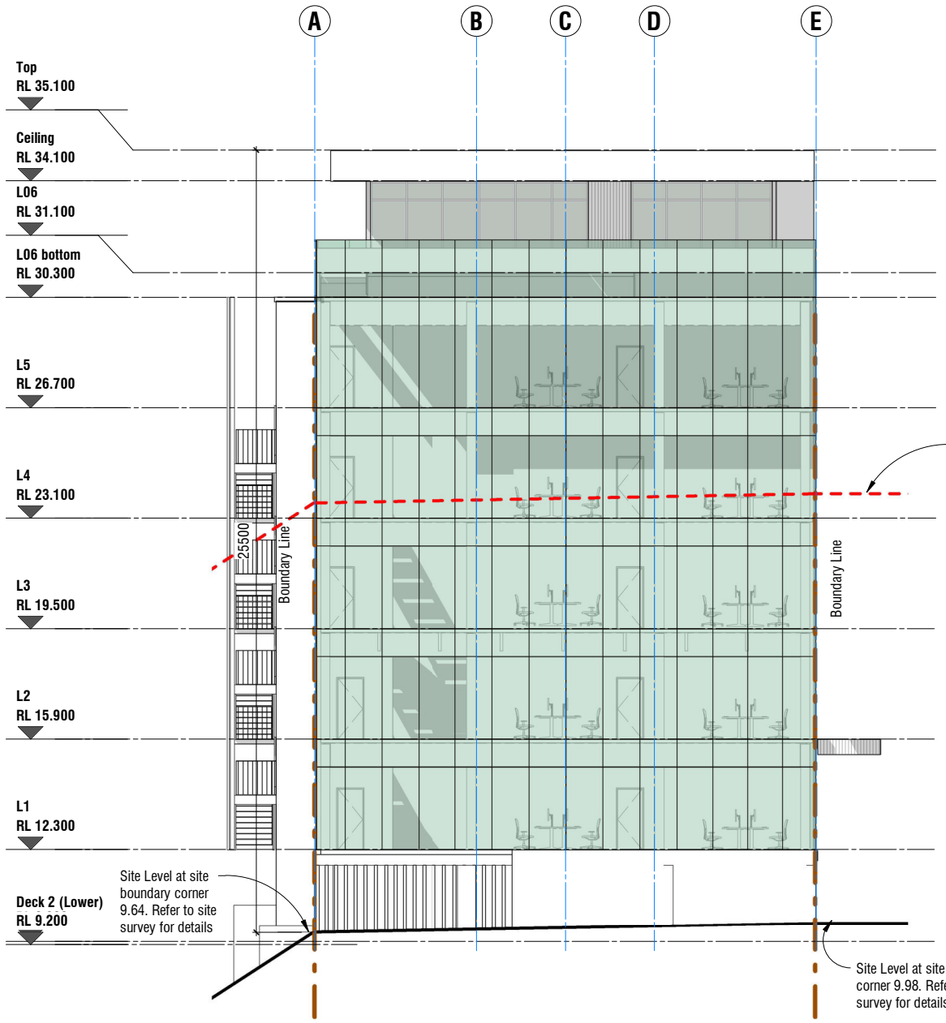
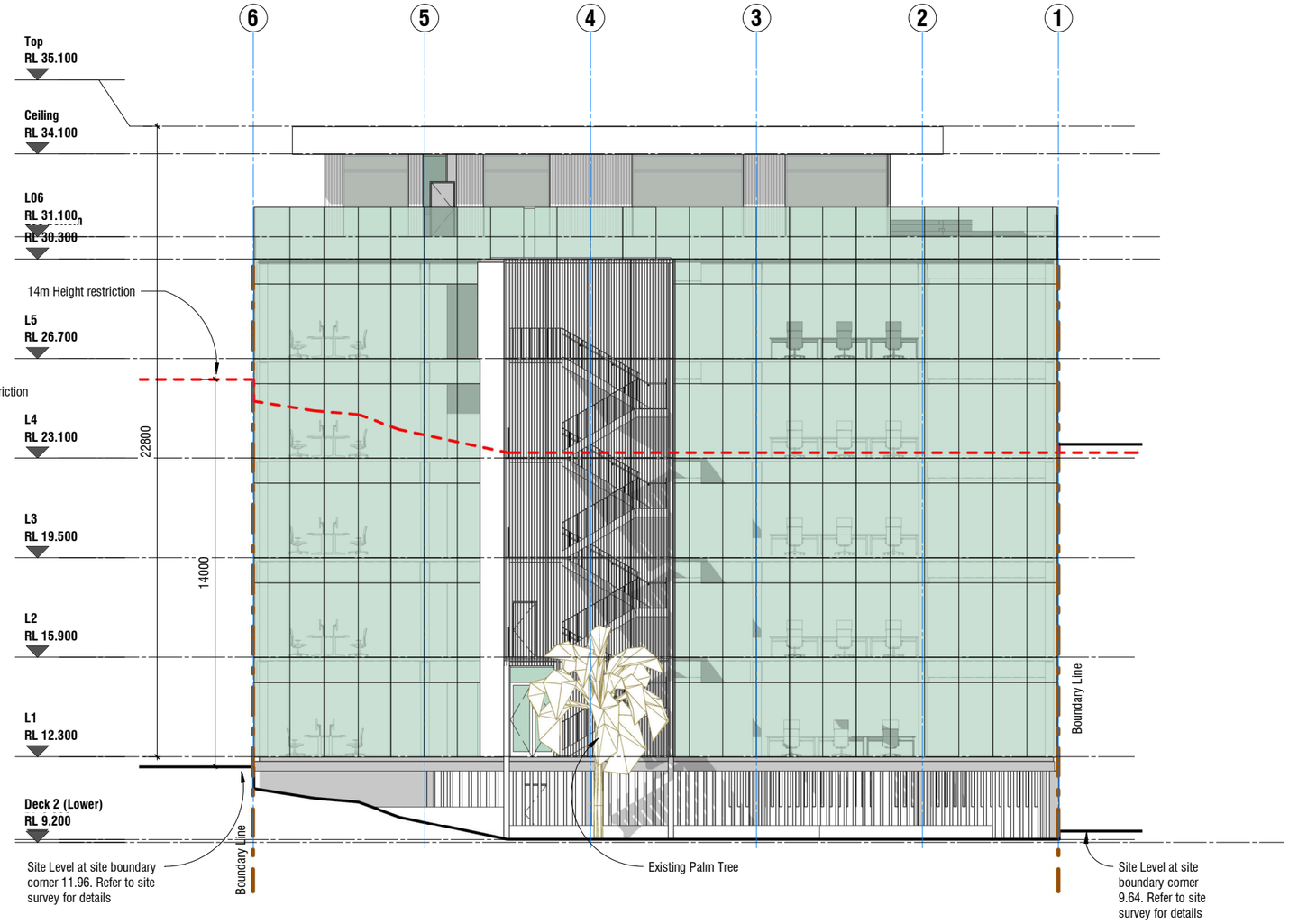
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz



North Elevation

Scale 1 : 200 (A3)



East Elevation

Scale 1 : 200 (A3)

Brougham Street Development

51 Brougham Street, New Plymouth

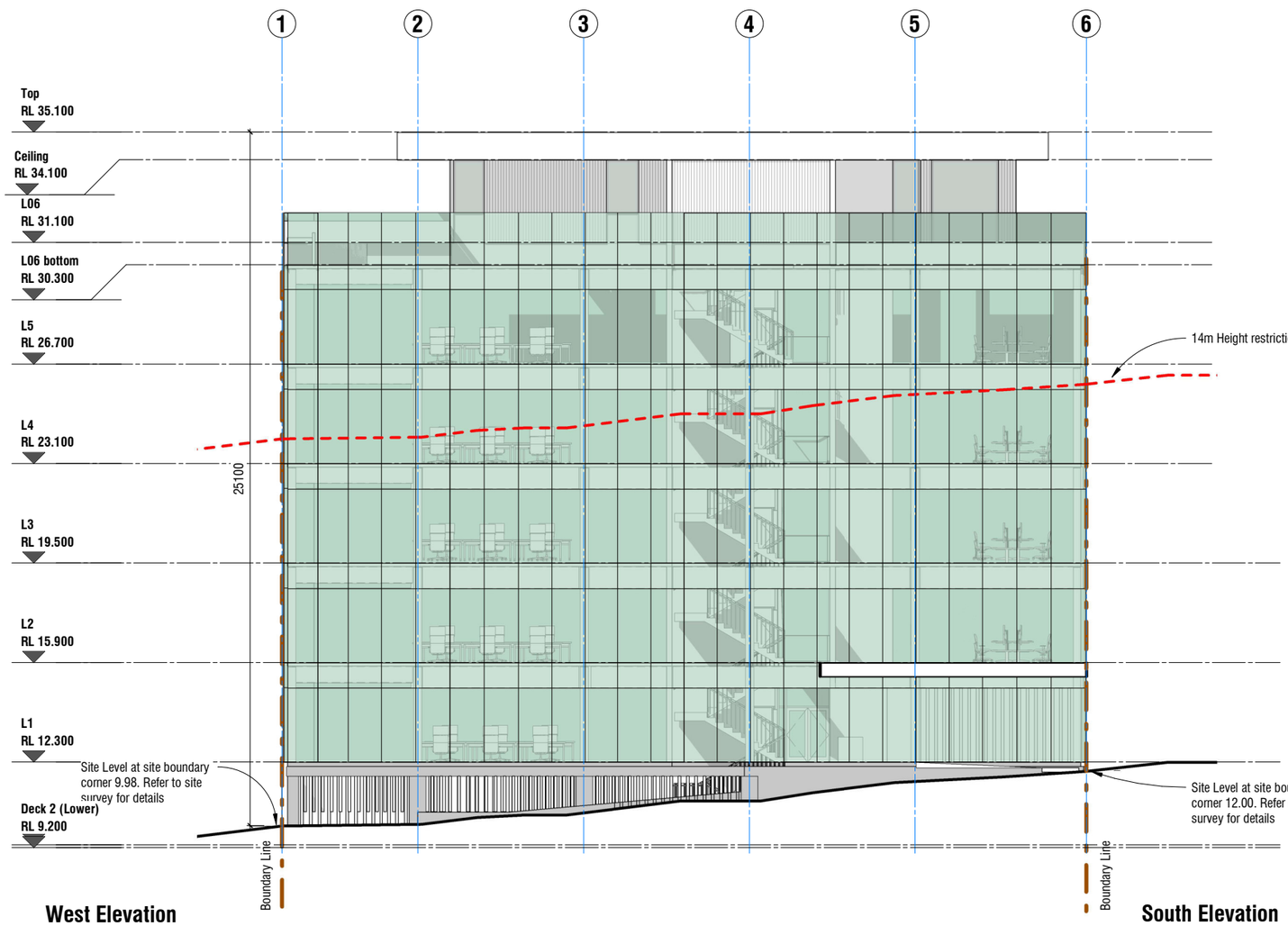
Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 200	A3.01		Elevations	23/04/2020 6:15:37 PM

BOON teamarchitects

A/ 131 Courtenay St, New Plymouth 4310, New Zealand
P/ 06 757 3200 E/ office@boon.co.nz W/ boon.co.nz



West Elevation

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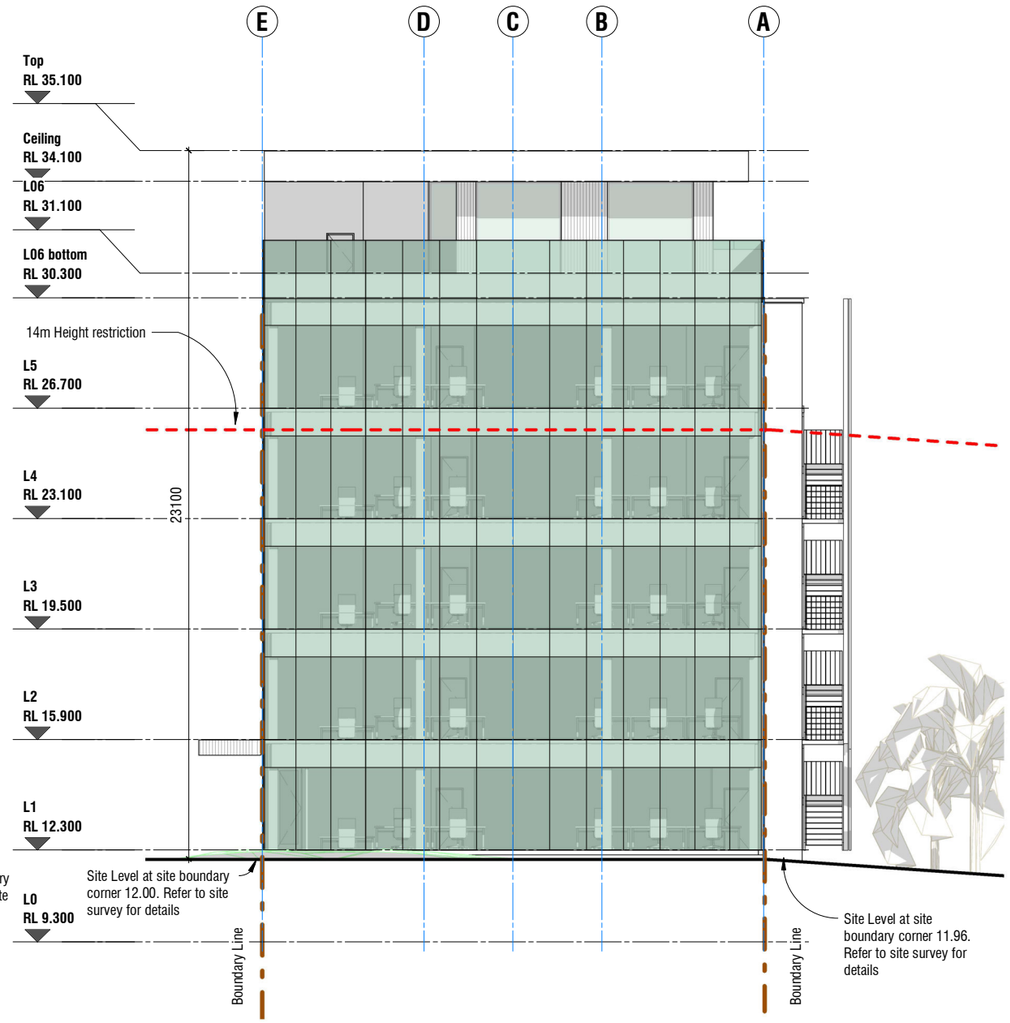

South Elevation

Scale 1 : 200 (A3)

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 200	A3.02		Elevations	23/04/2020 6:15:51 PM

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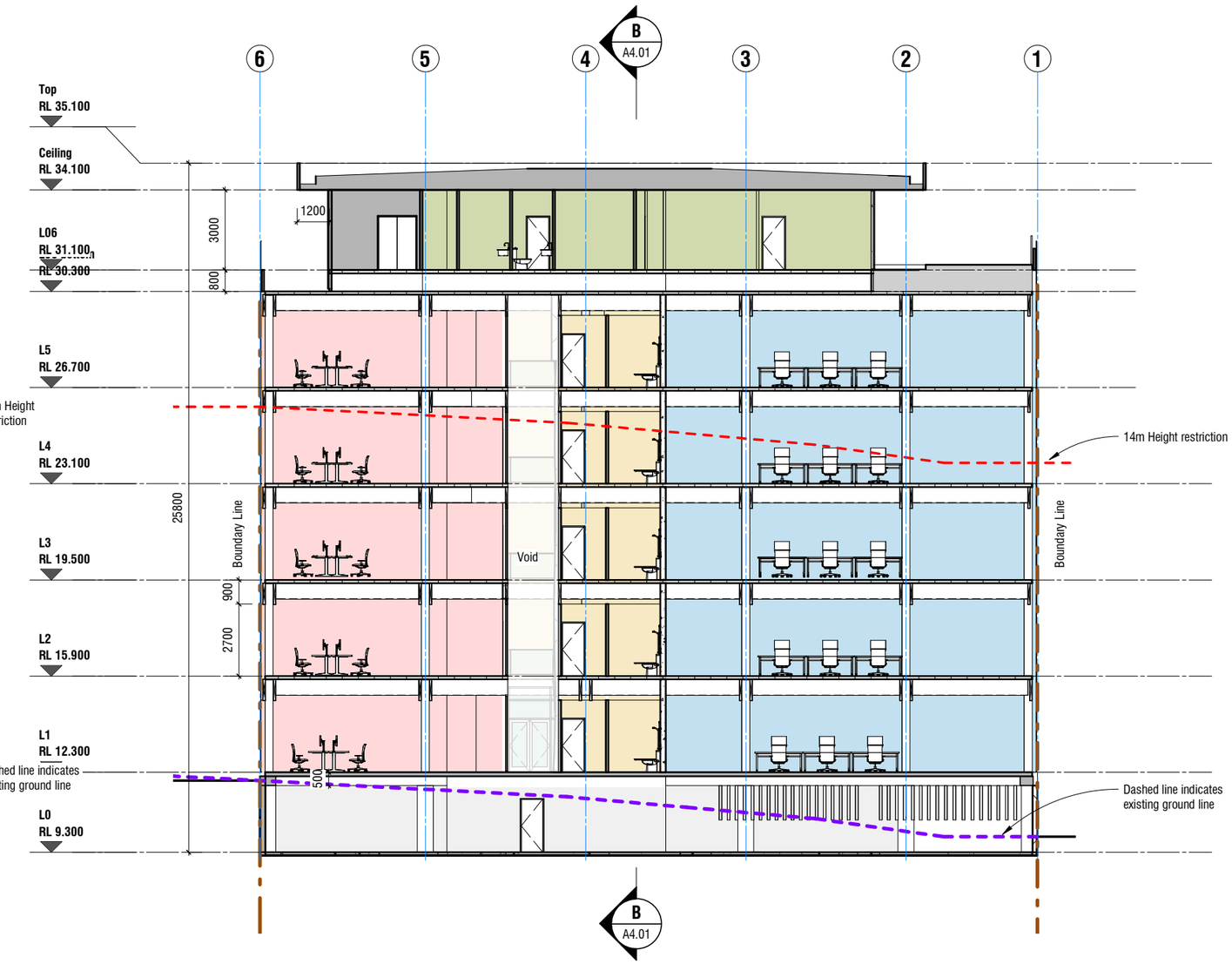
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz

Section B

Scale 1 : 200 (A3)



Section A

Scale 1 : 200 (A3)

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 200	A4.01		Cross Sections	23/04/2020 6:16:03 PM

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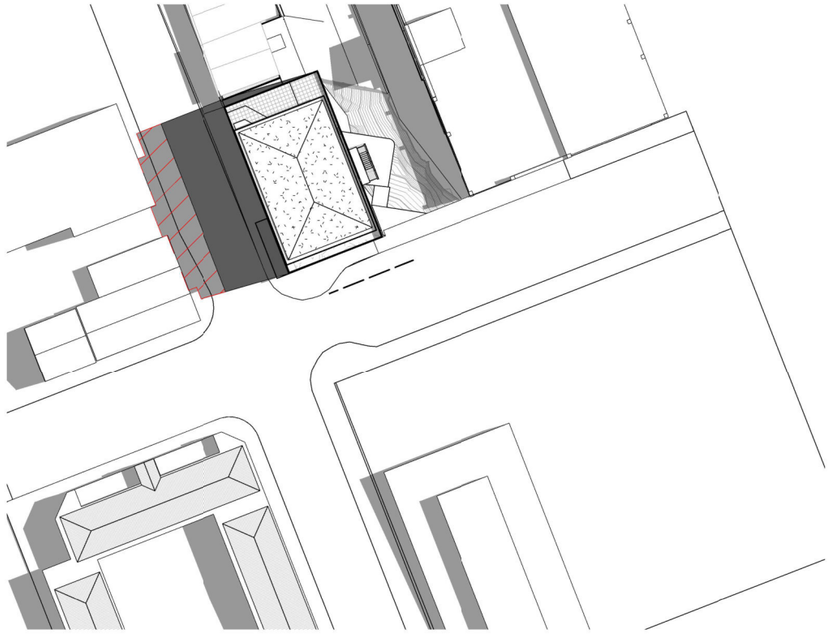
P / 06 757 3200 E / office@boon.co.nz W / boon.co.nz



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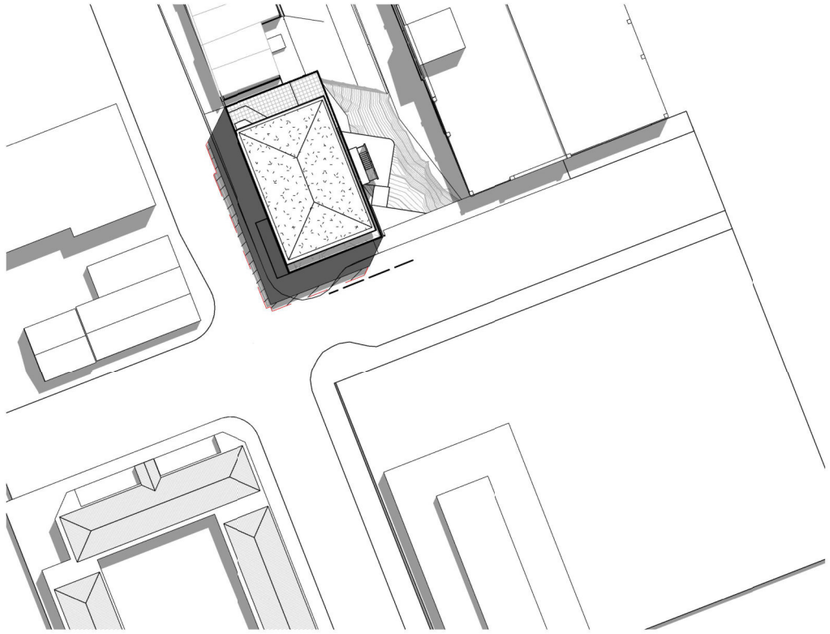
Scale 1 : 1000 (A3)



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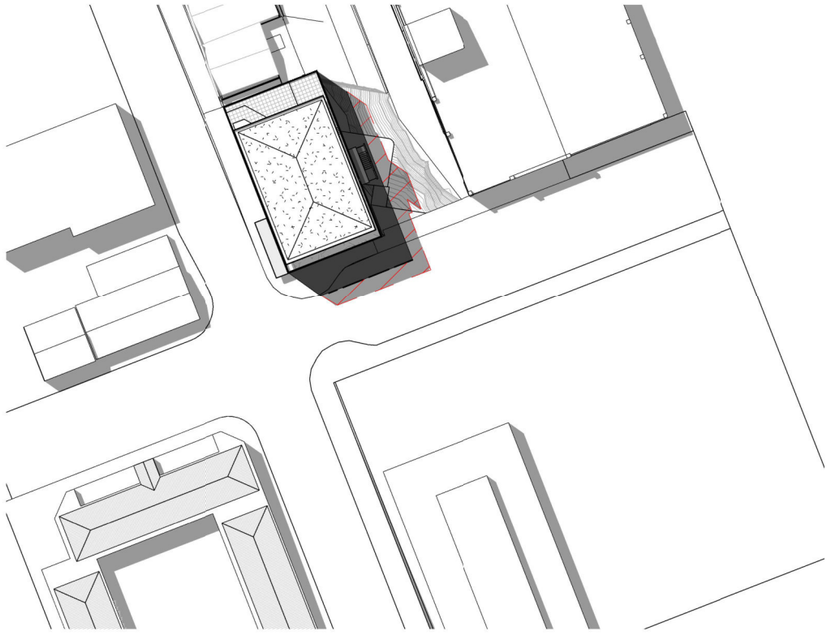

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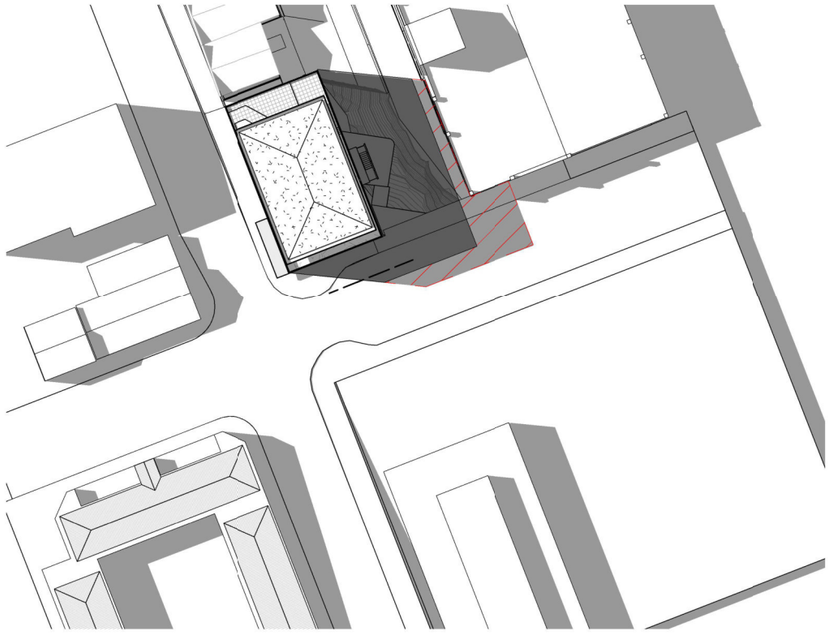


21 Jan 4pm
Scale 1 : 1000 (A3)

N

Key

Projected shade for 14m height building

Projected shade above 14m (infringment)

Brougham Street Development

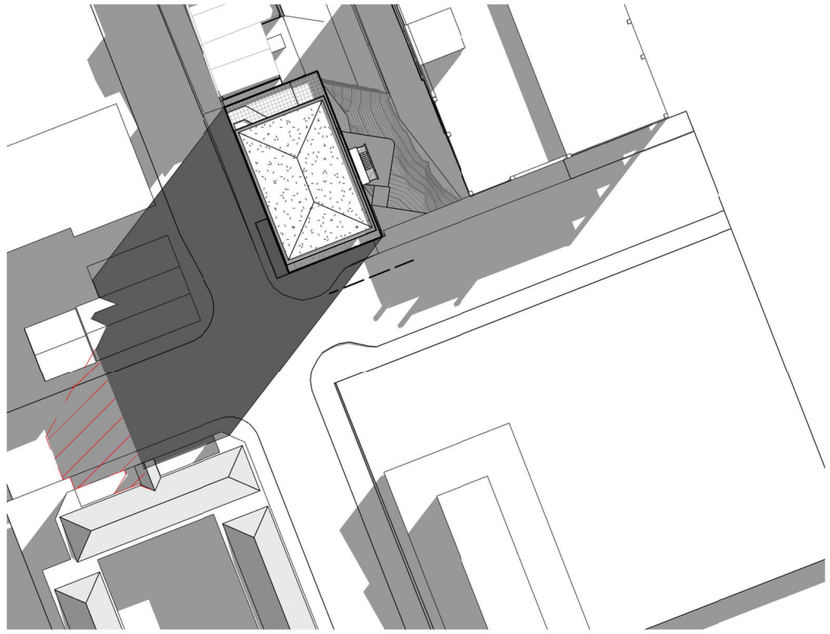
51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	As indicated	A9.01		Shade Diagram - Mid Summer	23/04/2020 6:16:16 PM

BOON teamarchitects
A/131 Courtenay St, New Plymouth 4310, New Zealand
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz



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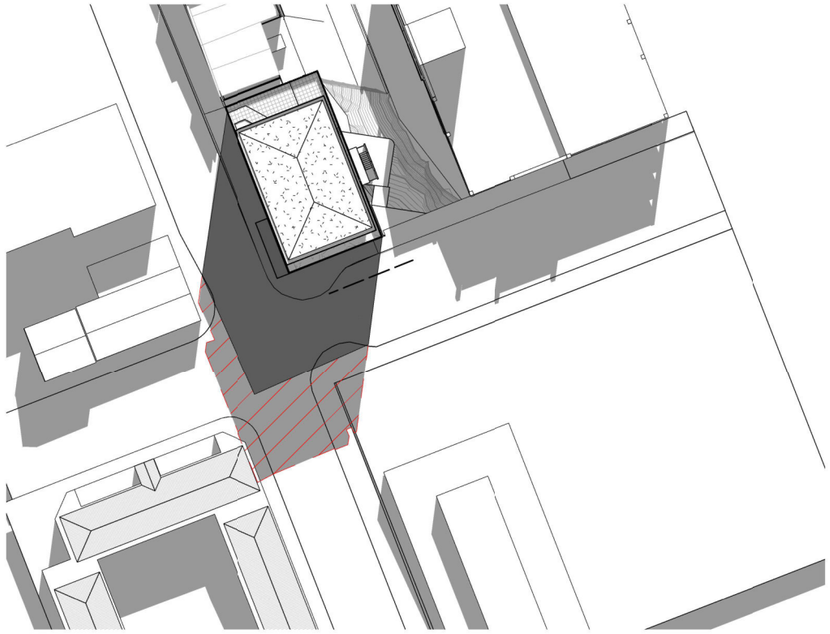

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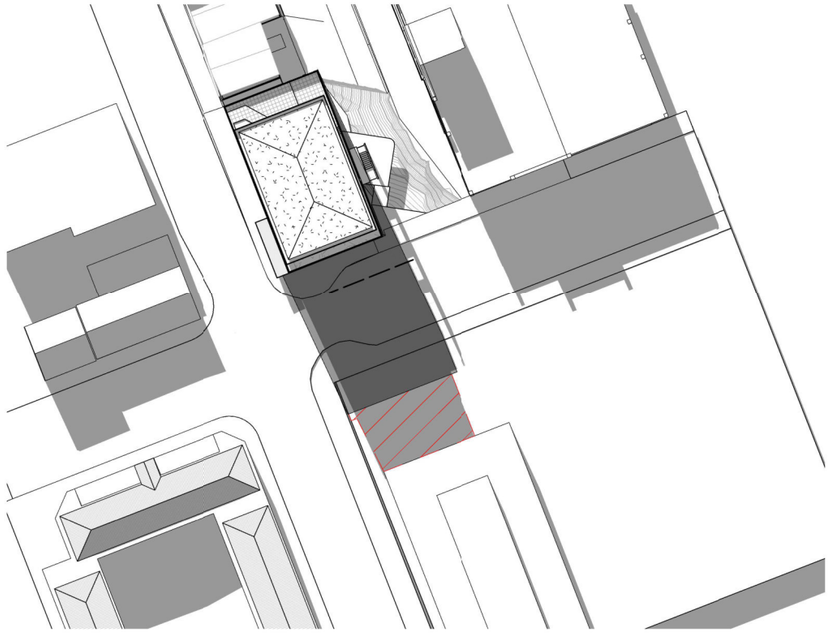

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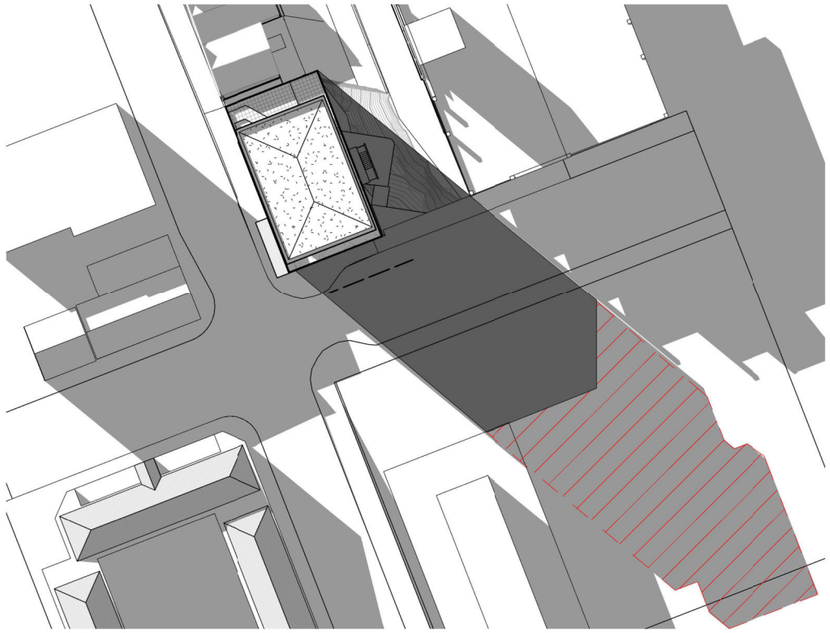

21 Jul 4pm
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N

Key

Projected shade for 14m height building

Projected shade above 14m (infringment)

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	As indicated	A9.02		Shade Diagram - Mid Winter	23/04/2020 6:16:31 PM

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Proposed Building - Southeast View

Proposed Building -Southwest View

Brougham Street Development

51 Brougham Street, New Plymouth

Resource Consent

April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488		**A9.03**		3D Views- Render	**23/04/2020 6:16:33 PM**

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A/131 Courtenay St, New Plymouth 4310, New Zealand
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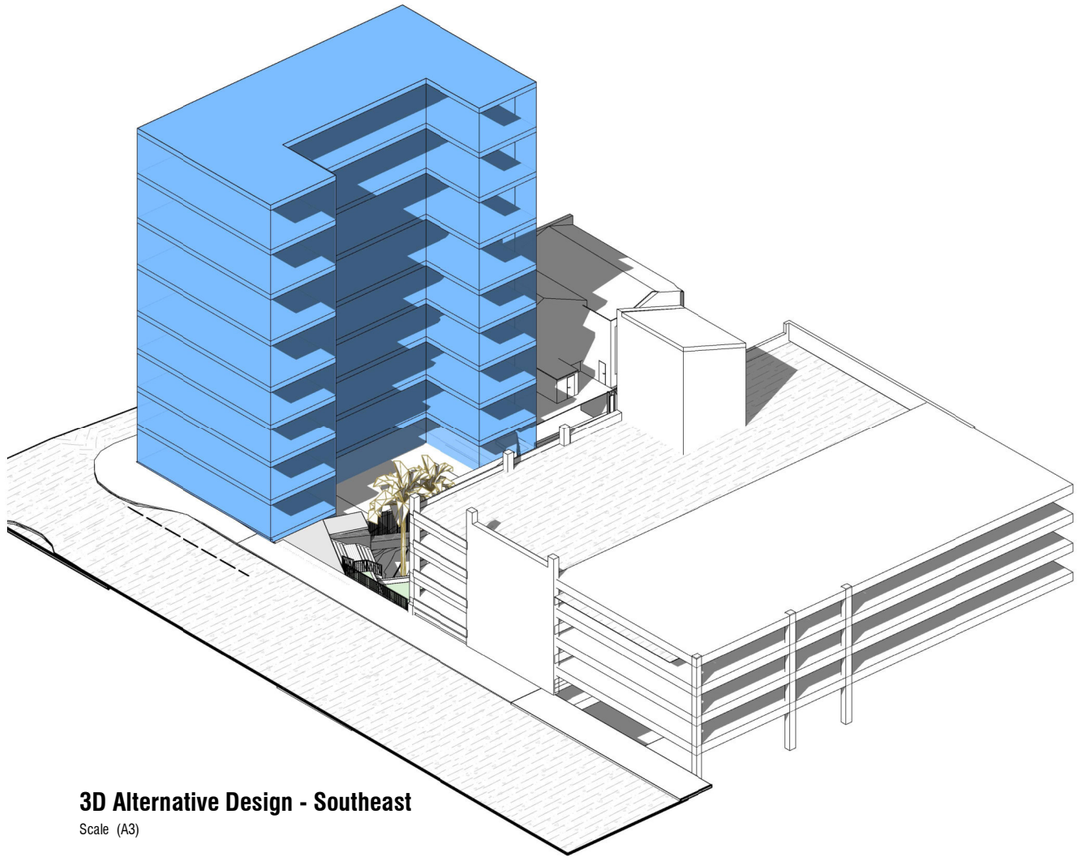
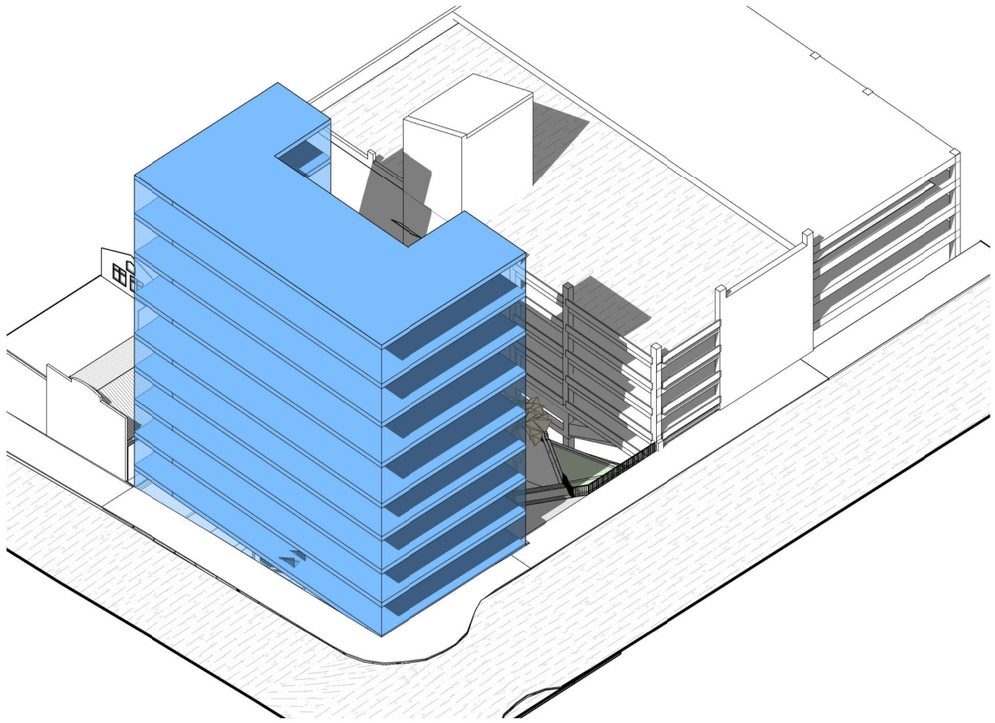
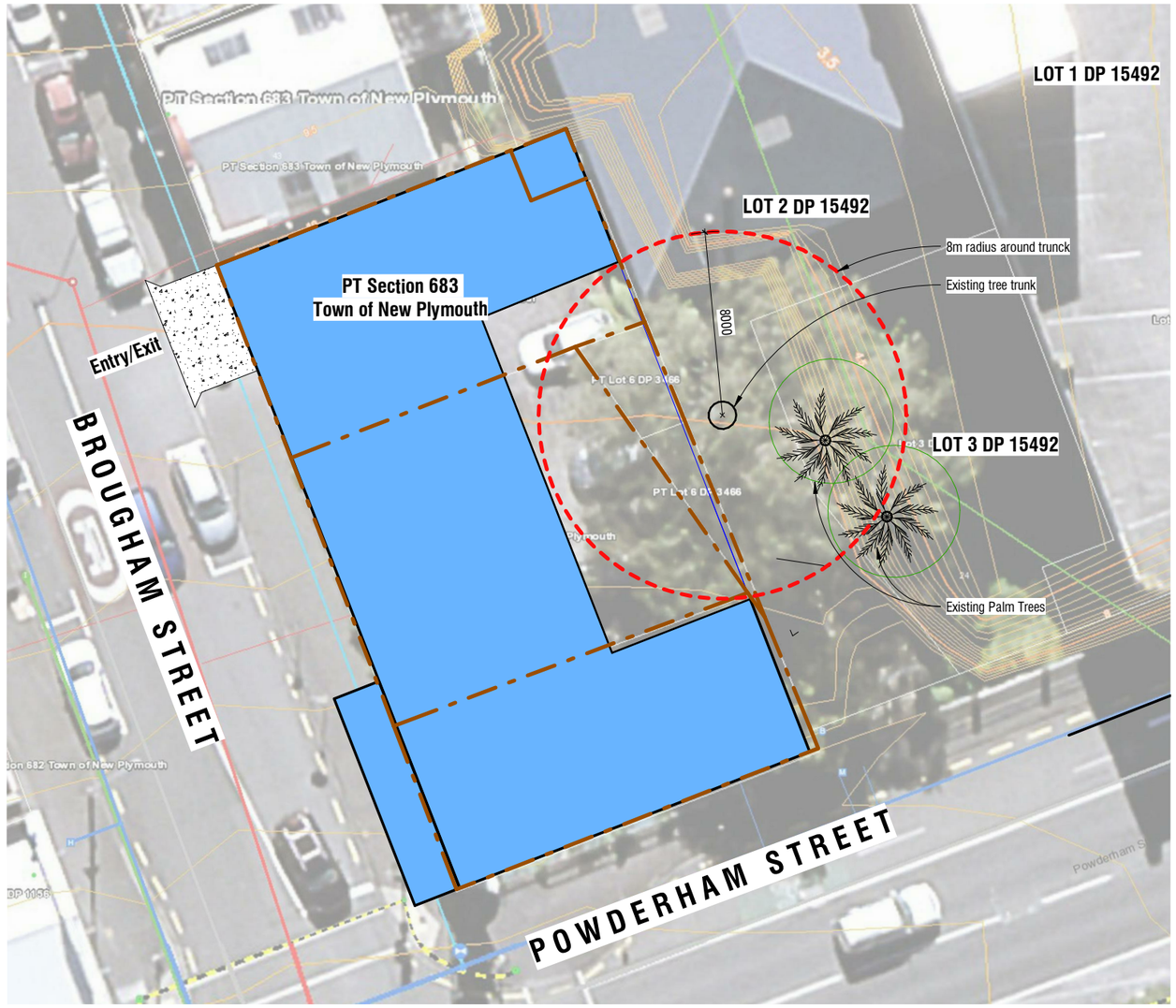


3D Alternative Design - Southeast
Scale (A3)



3D Alternative Design - Southweast
Scale (A3)



Site Plan - Alternative with Tree Preserved
Scale1 : 250 (A3)

Areas
Original Proposal = 490m² per pavement x 7 = 3230m²
Alternative Proposal = 375m² per pavement x 9 = 3375m²

Brougham Street Development
51 Brougham Street, New Plymouth
Resource Consent
April 2020

job no.	a3 scale	drawing no	rev	drawing title	print date
6488	1 : 250	A10.01		Alternative Design with Tree Preserved	23/04/2020 6:16:39 PM

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BOON
teamarchitects

A / 131 Courtenay St, New Plymouth 4310, New Zealand
P / 06 757 3200 E / office@boon.co.nz W / boon.co.nz

24th April 2020

New Plymouth District Council
Private Bag 2025
New Plymouth 4342

Attention: NPDC Planning Department

Brougham Street Development – 51 Brougham Street, New Plymouth Architectural Design Statement

Site:

The site is located on the corner of Brougham & Powderham Streets in the New Plymouth CBD. The 478m² site slopes north/south away from Powderham Street. The existing site currently consists of an unsealed carpark, accessed from the north west corner of the site and the Halamoana sculpture (proposed to be relocated as part of this proposal).
There is currently a two-level commercial building to the northern boundary, road boundaries to the south and to the west lies New Plymouth's historic Huatoki awa.

Proposal:

This project involves demolishing all existing structures, including the relocation of the existing Halamoana sculpture to construct a new six level mixed use development consisting of basement carparking, five levels of premium CBD commercial office space and a three-bedroom apartment on the 6th level. The development encompasses the entire 478m² footprint of the site, and includes a verandah over Brougham St and a secondary egress stairwell in neighbouring eastern property (refer to architectural site plans for details).

Site constraints:

The proposed site shares a boundary which holds the root structure of a protected tree (refer to Arborist report for details). Based on the Arborist's report we initially tested some concept options that considered retaining the tree (refer to architectural drawings for details).
Through design development and rigorous testing of various options with separate consultants (structural engineers) it established that the project was not feasible in it's current form due to:

- Irregular floorplate due to the 8m setback was not feasible for modern office design
- NLA of the floorplate too small to make the development economically viable
- Proposed height required to make the development economically viable well above current proposal and structurally incredibly difficult to create a workable solution

Whist we acknowledge there is some significance of the protected tree adjoining the proposed site, through this design feasibility study this ruled out any possible option of retention and led us to the only feasible design option being removal of the tree.

Design Statement:

Considered urban design sees buildings, places and spaces not as isolated elements but as part of the whole town or city. The wider context of the surrounding urban environment has been taken into consideration in the proposed design outcome The Brougham St Development design is minimalist and contemporary in style, taking what was a rundown brownfield site carpark and transforming it into an architectural showpiece in the New Plymouth CBD for modern and sustainable mixed-use urban design.

The complete glazed façade provides direct connectivity to the adjoining streets and the awa to the east, stimulating vibrant activity in the CBD by creating direct visual connections between people working in the building and people walking past on the street and down the proposed future walkway development. Connections through the buildings core open directly onto the eastern side of the façade, creating active edges to both facades of the building, and creating a direct link to the awa and the proposed Huatoki public space developments to come.

Whilst the building covers the entire footprint of the site, the complete glazed façade (ie. with no breaks between floors/walls etc), gives the building a lightness in feel and reduces the perception of the proposed height by creating a seamless façade face. The upper level apartment is also setback from the façade to further reduce the bulk/scale of the development.

Good urban design principles call for ‘active edges’, particulary at inner city corner sites. The proposed design pushes the carparking into a semi-basement level, allowing the building entry to sit near the corner of Powerham & Brougham, creating a vibrant edge to the street corner.

Passive surveillance to the area is also greatly improved, through the transparency of the proposed façade creating visual links between inside and outside, and the mixed use nature of the development means that the building will be occupied and therefore operational 24 hrs a day.

The proposed structural design for the Brougham St Development is to be constructed entirely from timber (excluding the basement carpark), including: all floors, columns, beams and bracing elements within the building.
The benefits of such a construction methodology include:

- Sustainable source of material
- Locally sourced and manufactured
- Predominantly timber construction significantly reduces embodies energy/carbon & construction waste
- Offsite manufacturing improves approval quality and significantly speeds up construction
- Reduces the overall weight of the building meaning smaller foundations & less disturbances to surrounding buildings during construction

I / We confirm the above details of the brief and Architects terms of engagement and request that you proceed.

....

CLIENT SIGNATURE: DATE:

Quality urban design reduces the environmental impacts of our towns and cities through environmentally sustainable and responsive design solutions. The Brougham St Development has been designed with key environmental sustainability frameworks at its core, which includes:

- **Energy & Emissions**
  Targeting minimum 5 Star NABERSNZ Energy base building energy certification
  Targeting Net Zero Energy Certification via the International Living Futures Institute
  Roof mounted solar PV generation
  Avoidance of on-site fossil fuel combustion
  High efficiency hybrid variable refrigerant flow heating & cooling system
  Enhanced roof, floor and wall insulation
  Automatic lighting controls, demand control ventilation
  Mixed mode ventilation, heat recovery ventilation
  Air source heat pump domestic hot water heating
  High efficiency LED lighting
- **Comfort, Health and wellbeing**
  IGU low e solar control double glazing offers superior thermal comfort, daylight availability and external views
  Low VOC and low formaldehyde materials and specifications offer improved air quality
  Natural ventilation provides good air quality and physical connection with the natural environment
  Timber structure provides visual connection with the natural environment
- **Water Efficiency & Conservation**
  Water efficiency WELS rated fittings and fixtures
  Rainwater harvesting system reduces peak stormwater runoff and provides flushing water
  Water sub-metering with leak detection capability
- **Management & Operations**
  Energy & water sub-metering
  Building Management System
  Post-occupancy building tuning improves energy and comfort performance
- **Local Emissions**
  100% electric heating avoids on-site combustion for improved local air quality
  Rainwater harvesting reduces peak stormwater run-off
  Environmental management plan
- **Materials & Waste**
  Predominantly timber construction significantly reduces embodies energy/carbon & construction waste
  Minimised operational waste to landfill through recycling provisions and tenant engagement
  Zero ozone depletion refrigerants and insulation
  Low environmental impact materials specification
  Minimised operational waste to landfill through recycling provisions

I / We confirm the above details of the brief and Architects terms of engagement and request that you proceed.

....

CLIENT SIGNATURE: DATE:

Overall the proposed design provides for a high-quality urban development in central New Plymouth, providing tangible socio and economic benefits to the wider community. Ultimately providing for a modern contemporary design that will add positively to the evolving urban fabric of New Plymouth.

Yours faithfully
BOON TEAM ARCHITECTS LTD

SHAUN MURPHY (B.Arch Hons, ANZIA)
ARCHITECT

On behalf of Murali Bhaskar – Design Director

I / We confirm the above details of the brief and Architects terms of engagement and request that you proceed.

....
CLIENT SIGNATURE: DATE:

APPENDIX C RECORDS OF TITLE

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**TNF1/436**
Land Registration District	**Taranaki**
Date Issued	04 June 1980

Prior References
TN87/40

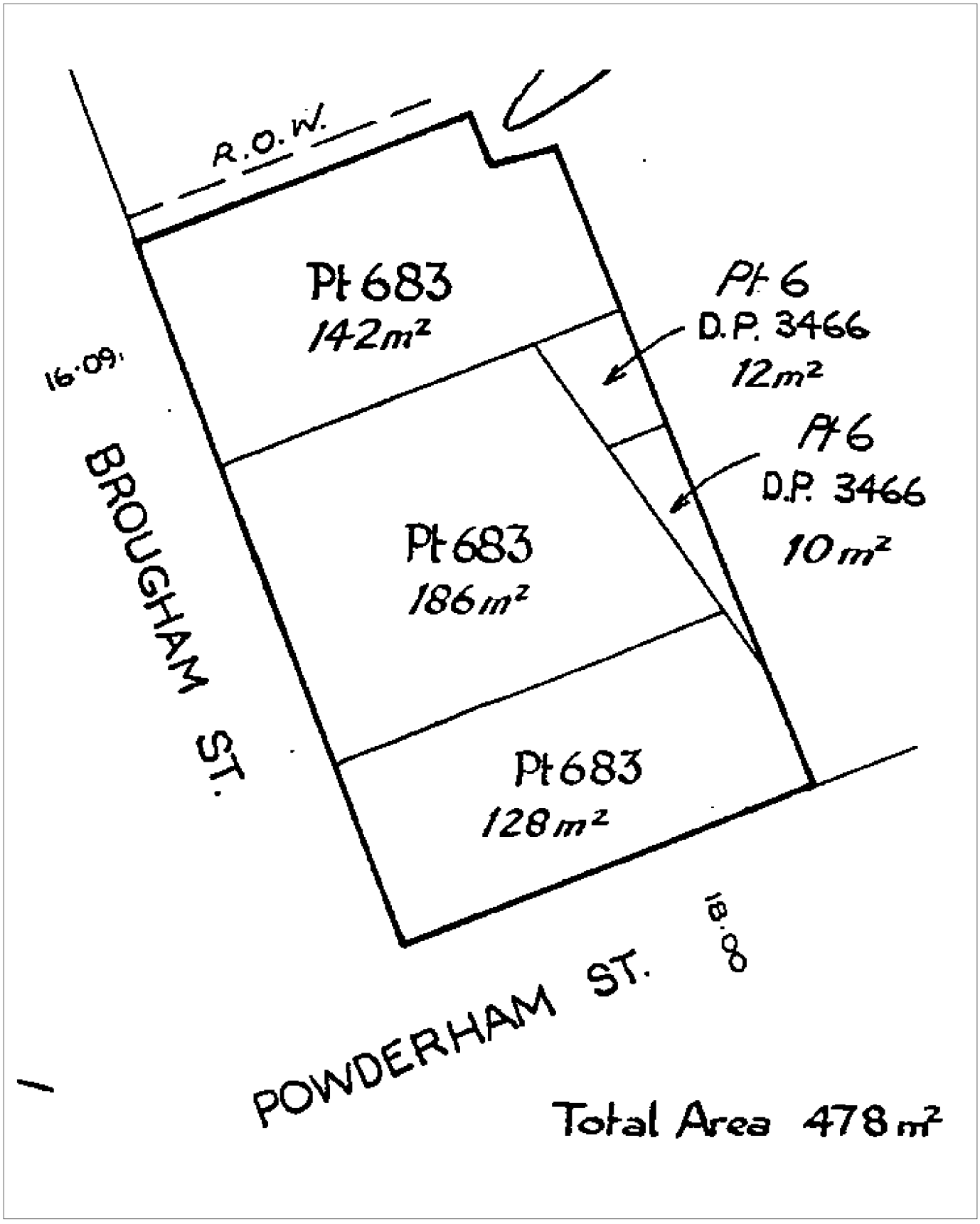
Estate	Fee Simple
Area	478 square metres more or less
Legal Description	Part Lot 6 Deposited Plan 3466 and Part Lot 6 Deposited Plan 3466 and Part Section 683 Town of New Plymouth and Defined On Deposited Plan 132 and Defined On Deposited Plan 2399 and Defined On Deposited Plan 3466

Registered Owners
K.D. Holdings Limited

Interests

Appurtenant hereto is a right of way created by Conveyance 27616 (R29/151)

11582641.1 Mortgage to TSB Bank Limited - 21.10.2019 at 9:08 am


R.O.W.
Pt 683
142m²
Pt 6
D.P. 3466
12m²
Pt 6
D.P. 3466
10m²
16.09
BROUGHAM ST.
Pt 683
186m²
Pt 683
128m²
18.08
POWDERHAM ST.
Total Area 478m²

RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy

R.W. Muir
Registrar-General
of Land

Identifier	**TNH4/976**
Land Registration District	**Taranaki**
Date Issued	25 June 1990

Prior References

TN168/127 TN168/128 TNA2/99
TNB4/1010

Estate	Fee Simple
Area	1132 square metres more or less
Legal Description	Lot 2 Deposited Plan 15492

Registered Owners

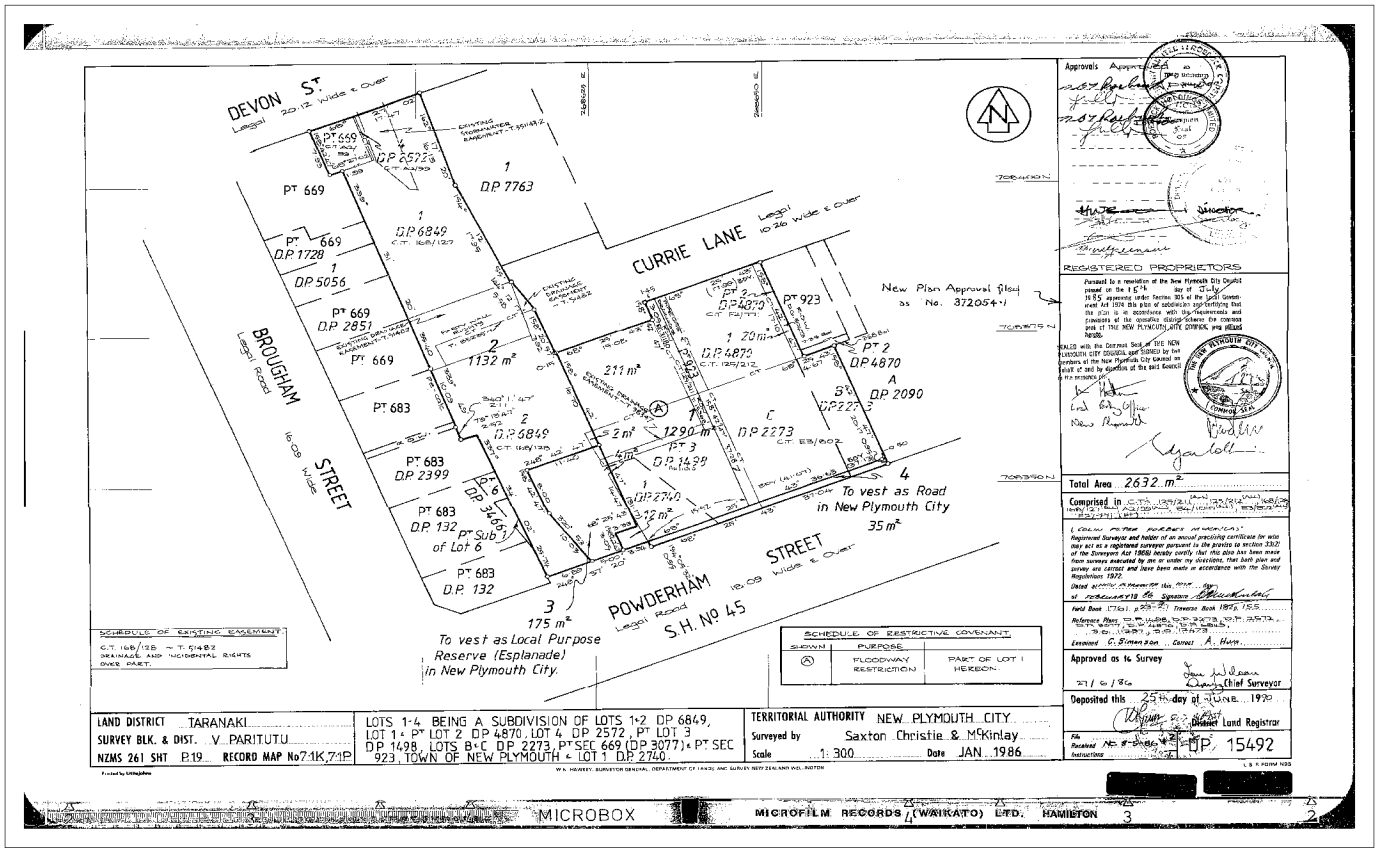
New Plymouth District Council

Interests

Subject to stormwater and other drainage rights (in gross) over part in favour of The New Plymouth District Council created by Transfer 51482 (affects formerly part CsT TN168/127 and TN168/128)

Appurtenant hereto are stormwater and soil drainage rights created by Transfer 92697 (affects part formerly in CT TNA2/99)

Subject to a right (in gross) to convey flood water over part marked C on DP 16090 in favour of The New Plymouth District Council created by Transfer 351143.2


DEVON ST
Legal 20.12 Wide & Over
CURRIE LANE
Legal 10.26 Wide & Over
BROUGHAM STREET
Legal Road
16.08 Wide
POWDERHAM STREET
Legal Road
16.08 Wide & Over
S.H. No 45
New Plan Approval filed as No. 372054.1
To vest as Local Purpose Reserve (Esplanade) in New Plymouth City.
To vest as Road in New Plymouth City
35 m²
175 m²
211 m²
1290 m²
SCHEDULE OF EXISTING EASEMENT
SCHEDULE OF RESTRICTIVE COVENANT
REGISTERED PROPRIETORS
Total Area 2632 m²
LAND DISTRICT TARANAKI
SURVEY BLK. & DIST. V PARITUTU
NZMS 261 SHT P19 RECORD MAP No7:1K,7:1P
LOTS 1-4 BEING A SUBDIVISION OF LOTS 1-2 DP 6849, LOT 1 & PT LOT 2 DP 4870, LOT 4 DP 2572, PT LOT 3 DP 1498, LOTS B & C DP 2273, PT SEC 669 (DP 3077) & PT SEC 923, TOWN OF NEW PLYMOUTH & LOT 1 DP 2740.
TERRITORIAL AUTHORITY NEW PLYMOUTH CITY
Surveyed by Saxton Christie & McKinlay
Scale 1:300 Date JAN 1986
Approved as to Survey
Deposited this 25th day of JUNE 1990
DP 15492
MICROBOX
MICROFILM RECORDS (WAIKATO) LTD. HAMILTON

APPENDIX D NEW PLYMOUTH DISTRICT PLAN RULES ANALYSIS

Table D 1: ODP Rules Analysis

Rule	Parameter	Assessment	Status
Bus12	Maximum height excluding temporary buildings in the Business A Environment Area	*Permitted: 14m (with other conditions)* The proposed building is a maximum of 25.5m high above the modern surveyed ground level, exceeding the permitted standard by 11.5m	Restricted Discretionary
Bus22	Requirement for sound attenuation of any building (excluding temporary buildings)	*Permitted: Shall be designed and constructed in accord with an acoustic design certificate from an acoustic engineer so that the level of noise received within a NOISE SENSITIVE ROOM, excluding noise from CONSTRUCTION WORK, does not exceed 40 dBA L10 between 10pm and 7am on any day.* The building will be designed and constructed to achieve the specified noise levels and the proposal will therefore comply. A condition of consent is proposed for an acoustic design certificate prior to construction commencing.	Permitted
Bus58	Earthworks - maximum quantity, measured in non-compacted form	*Permitted: 20m^3 per 100m^2 of SITE area in any 12 month period* Site area: Total 1610m^2 / 100m^2 = 16.1, x 20m^3 = 322m^3 permitted earthworks volume. The proposed earthworks volume is 650m^3 which exceeds permitted levels.	Restricted Discretionary
Bus59	Reinstatement of earthworks for any excavation or filling of greater than 150m^3 per site in any 12 month period	*Permitted: All bare earth shall, as soon as is practicable, but not later than six months from the date of disturbance, be: 1) stabilised so that no earth moves off-site or presents a danger to life or property; and 2) vegetated, sealed, paved, metalled or built over* Bare earth will be built over and the proposal will comply.	Permitted
Bus86	Vehicle access point	*Permitted: Meets the conditions for a permitted activity as specified in Part A in Appendix 23* *23.1(d) Where the vehicle access point is onto a local road, collector road, or arterial road, table 23.5 and diagram 23.6 shall be complied with.* With regard to Table 23.5, there are no applicable standards for this 30 km/h zone with regard to sight and intersection distances. *Maximum total combined width of vehicle access points on any site is 4m or 50% of the road boundary, whichever is the greatest* The crossing will be some 4m wide at the 29m long boundary (which would permit crossings up to 14.5m), which complies.	Permitted

Rule	Parameter	Assessment	Status
Bus87	Parking	*Permitted: Meets the conditions for a permitted activity as specified in Part B in Appendix 23* 23.7(1) The site is in the Parking Exemption Area of Diagram 23.14a and therefore is not required to provide a specific number of car parks. *23.7(2) Design and construction standards:* *a) Vehicle and bicycle parking shall be designed and constructed in accordance with Table 23.8. For vehicle dimensions less than medium service vehicles, the required parking space(s) and parking area shall:* *a) Not include any space used for on-site queuing, tracking curve, manoeuvring, loading or standing space or vehicle access point; and* *b) For vehicles of dimensions less than a medium service vehicle meet the requirements specified in table 23.10 and diagram 23.11.* Car parks will be formed to an all weather standard (sealed), not exceed a gradient of 1:20 and have a sealed entrance as per Table 23.10 for more than four parking spaces in site in a Business Environment Area. This construction standard complies. Diagram 23.11 requires 90 degree parks with nose in turns to be 4.9m deep, 2.6m wide and have an aisle width of 7 to 7.9m. The proposed parks are some 4.9m deep, 2.6m wide and have an aisle width of 5.8m. These have been designed similarly to standard AS/NZS 2890.1:2004 of Appendix H and do not comply with the ODP standards.	Restricted Discretionary
Bus88	Loading and standing space	*Permitted: Meets the conditions for a permitted activity as specified in Part C in Appendix 23.* *23.15(c)(i) and (ii) requires a loading and standing space for a light service vehicle, of specific construction standards.* The commercial (excluding retail) activities to occur in the building will require the services of a courier van at most (e.g. for office supplies). No designated loading or standing space is proposed for this site, instead the five-minute loading zone on the opposite side of Brougham Street will be utilised.	Restricted Discretionary
Bus90	On-site manoeuvring space	*Permitted: Meets the conditions for a permitted activity as specified in Part E in Appendix 23* Manoeuvring space is required as the site has greater than four parking spaces (23.20(1)(a)(iii)). Manoeuvring space is provided in the aisle of the carpark and cars will enter and exit the site in a forward-facing direction. This is not specifically to the standard of the ODP due to the parking layout being designed alternatively.	Restricted Discretionary

Rule	Parameter	Assessment	Status
Bus91	On-site queueing space	*Permitted: Meets the conditions for a permitted activity as specified in Part F in Appendix 23* The proposal provides more than 6 but less than 30 parking spaces and provides an appropriate queueing space some 11.2m long from the edge of the site boundary into car park number 1.	Permitted
OL50	Removal or destruction of a Category 2 Notable Tree	*Permitted: where the council or an approved arboricultural contractor determines that: 1) a notable tree is unsafe or unsound; or 2) the removal or destruction would benefit the health and growth of a more desirable notable tree* The proposal is to remove the tree after advice from an approved Arboricultural Contractor regarding its likely state of safety and soundness after site development has been undertaken. The tree has not been deemed unsafe or unsound in its current state, nor will its removal benefit another notable tree.	Restricted Discretionary
OL63	Maximum height within Cameron Street Viewshaft	*Permitted: Section 2: 14m, or the maximum height for the underlying environment area, whichever is the lesser.* The proposed building breaches the 14m limit by a maximum of 11.5m at 25.5m high.	Restricted Discretionary
OL71	Maximum height within Marsland Hill Viewshaft	*Permitted: Sec 3: 14m, or the maximum height for the underlying environment area, whichever is the lesser.* The proposed building breaches the 14m limit by a maximum of 11.5m at 25.5m high.	Restricted Discretionary
OL75	Maximum height within Victoria Road Viewshaft	*Permitted: Section 2: 14m, or the maximum height for the underlying environment area, whichever is the lesser.* The proposed building breaches the 14m limit by a maximum of 11.5m at 25.5m high.	Restricted Discretionary

Table D 2: PDP Rules Analysis

Rule	Parameter	Assessment	Status
TREE-R10	Removal, partial removal or destruction of a scheduled notable tree not otherwise provided for in this table.	*Rule TREE-R5: Removal, partial removal or destruction of an unsafe or unsound scheduled notable tree.* *Permitted where:* *(1) the scheduled notable tree is unsafe or unsound as certified by the Council and in accordance with the International Society of Arboriculture Tree Risk Assessment Form; and* *(2) the removal, partial removal or destruction of the tree is undertaken by the Council or a Council approved arboricultural contractor.* The proposal is to remove the tree, which has not been deemed unsafe or unsound in its current state, nor will its removal benefit another tree. The proposal therefore does not comply with the permitted standards of rule TREE-R5.	Non-complying

APPENDIX E ARBORICULTURAL ASSESSMENT

ASPLUNDH

ARBORIST REPORT
51 Brougham St, NPL

ARBORICULTURAL ASSESSMENT

19 September 2019

Attn: Murali Bhasker
BOON Team Architects
131 Courtenay Street
New Plymouth 4310

Dear Murali

RE: ARBORIST ASSESSMENT OF NPDC PROTECTED TREE, 49 BROUGHHAM STREET, NPL

On 7th September 2019 Asplundh senior arborist Bruce MacDonald carried out a sustainability assessment of one NPDC protected tree (Agonis flexuosa, DP Item 97) growing on the embankment of 51 Brougham St, New Plymouth. The assessment included an exploratory excavation within the dripline to determine root depth and type. The purpose of this report is to assist the reader in making informed decisions regarding the sustainability in relation to proposed development of the site. The assessment was carried out with information provided from onsite meetings with stakeholder expertise, including NPDC arboricultural officers and reference to architectural and survey plans. The inspection process was in line with recognised international arboricultural assessment practices.

This report is based on observations made at the time of inspection and is assessed against councils District Plan, which includes:

Overlay 43 - Erection of Structures (including buildings) within the drip line of a Notable Tree (protected).

Overlay 44 - Excavation and Filling (including impervious surfaces) within the drip line of a Notable Tree (protected).

It follows internationally recognised Visual Tree Assessment guidelines endorsed by the International Society of Arboriculture (ISA).

Please contact me direct if you have any further queries.

Kind regards

Bruce MacDonald
Quality Manager NZ / Senior Consulting Arborist
DDI 06 769 6451| Fax 06 769 6452 | Mob 027 244 5282
PO Box 3179| 57 Hurlstone Drive | Fitzroy | New Plymouth

ARBORICULTURAL ASSESSMENT

1.0 SUMMARY

BTW and BOON has engaged external arboricultural expertise to assess the solitary agonis growing on an undeveloped site at 51 Brougham St, New Plymouth. The tree is listed within New Plymouth District Council District Plan as being and Category 2 Protected tree. It grows on council owned land. The tree, although common has a larger than normal stem, particularly at the base. The size of the tree has given it merit as a protected item over and above normal CBD Amenity Zone blanket protection.

The proposed development site at 51 Brougham Street neighbours council reserve land in which the tree grows, within the Huatoki stream embankment and adjacent the Down Town carpark. Currently the site is used as a gravel carpark. The proposed development involves the construction of a multi-level building encompassing the entire footprint of the existing carpark. Construction of the building includes an estimated 2.0m excavation within the dripline of the protected tree.

The protected tree is growing out of the embankment below the gravel carpark, the upper root flare is approximately 400mm below the embankment apex. Although the direction of roots and extent can somewhat be assumed from the basal root flare above ground, to accurately determine the root size and horizons required exploratory trenching. There are several other self-seeded agonis growing on site that have now formed a single canopy.

It must be noted at the time of inspection, the tree was identified as not being an imminent risk to existing structures.

2.0 TREES A COMMUNITY BENEFIT

Trees, especially within urban environments contribute numerous benefits. These can be summarised as aesthetic, environmental, climatological, ecological, economic and social factors. It is well proven and documented that trees used in the landscape will achieve substantial positive outcomes for the wider community and visitors. These proven outcomes ensure trees are continued to be used as an important tool in urban design to soften the often visually chaotic built character of towns and cities.

It should be recognised that some trees are of high value due to their species, age, history, and overall contribution to the landscape both as individuals and a collection, while other trees are of low value and can be removed and replaced as required. The key to ensuring amenity trees remain an asset is to apply consistency in methods of evaluation and decision making on issues related to all trees within a given landscape.

While in order to avoid significant degradation of urban tree cover it is necessary to maintain trees across a range of age classes. However, while it is necessary to maintain the quality of existing tree cover, it should be recognised that trees are not everlasting permanent features.

3.0 TREE SPECIFICS

Species: *Agonis flexuosa*
Common name: Willow myrtle
Location: Adjacent 51 Brougham street Huatoki embankment, council owned land.
Height: est 13.0m
Spread: est 12.0m
Health: Good
Form: Moderate
Structure: Moderate
Coordinates: Lat 39°03'31.46"S / Lon 174°04'24.94"

4.0 DISTRICT PLAN OVERLAY RULES - NOTABLE TREES

4.1 OVERLAY 43 - ERECTION of STRUCTURES

OL 43.1 Whether the ERECTION of the STRUCTURE is likely to damage the NOTABLE TREE or endanger its health and stability.

***Above Ground*:** According to supplied draft architectural concept plans (BOON), the proposed new building will impact on the notable trees above ground. According to the design, the building will be constructed within the western-side drip-line. The height of the structure will require modification of the tree in the form of branch removal and reduction on the west side to allow construction. Once established the proposed building is not expected to negatively impact on the structural stability of the trees upper canopy and scaffolds.

***Below Ground*:** The proposed development necessitates the excavation of foundation footings to a depth of approximately 2.0 meters. These excavations will cause significant root damage that will impact on both the health and stability of the tree. This will certainly result in health decline and structural instability likely resulting in complete root-ball failure.

Exploratory excavation findings: An exploratory excavation on 7th September 20919 using a 5t rubber tracked digger and hand tools was carried out to a depth of 1.0m and approximately 10.0m in length. The excavation focused on the area within the car park above the root flare on the west side of the tree stem. A large mass of feeder roots were observed immediately below the gravel basecourse within the upper soil horizons. At approximate depth of 1.0m, larger roots (>50mm ⌀) were exposed. The larger roots are considered 'cable' anchors that stabilise trees growing on embankments. Should these roots be severed, there is higher likelihood of total tree failure due to root-plate instability. The excavation depth did not surpass 1.0m for risk of unnecessary root damage, it is expected many more larger diameter roots are present below the depth of 1.0m.

OL 43.2 Any alternative methods and locations available to the APPLICANT for carrying out the works.

The footprint of the concept design uses the entire available space within the site. To be certain of mitigating any detrimental structural, stability and health impacts to the tree due to construction, the footprint of excavation would need to be an estimated minimum of 8.0m from the base of the tree. Undoubtedly there are numerous building design alternatives that would enable the trees continued health & stability, however any alternative methods and locations would significantly lessen the potential of the site.

OL 43.3 The extent to which the NOTABLE TREE contributes to the amenity of the neighbourhood.

This notable tree in its current site contributes greatly to the community and CBD aesthetics. The tree softens and screens an otherwise unsightly building and surrounds particularly when viewed from the west. The prominence of the tree has excellent visual amenity from the key approaches of upper Brougham and Powderham Streets. Currently without building development, should the tree be removed the aesthetic contribution would be greatly noticed and missed. However, several self-seeded agonis will continue to provide vegetation screening of a lesser degree.

***OL 43.4 The effect of the ERECTION of the STRUCTURE on the visibility of the NOTABLE TREE from a ROAD or public place*.**

The effect of the proposed new building will have on the visibility of the tree from a public place will be significant. The height and positioning of the proposed building will screen the tree from all the main approaches and visual corridors. The visible effects will be reduced to a small view shaft immediately to the south of the tree. This view shaft would be limited to pedestrians walking either side of Powderham Street towards the west (opposite direction of one-way system).

4.2 OVERLAY 44 – EXCAVATION and FILLING

OL 44.1 Whether the EXCAVATION is likely to damage any part of the NOTABLE TREE including its roots or endanger its health and stability.

The required excavations to a depth of 2.0m is certain to cause damage to tree roots. This damage will result in likely health decline and probable instability of the root structure. In addition to the 2.0m ground excavation, pile wells are required to be evenly spaced which rules out the option of positioning piles around any known roots. Any deep excavations are certain to cause both health decline and root-ball instability.

5.0 TREE REMOVAL

The removal of a high value tree should only be carried out after all other mitigating options have been explored in consultation with other arboricultural expertise. Many high value amenity trees are removed from the landscape unnecessarily when remedial arboricultural intervention would have sufficed. Generally, trees should only be removed if pruning or other remedial work is not practically possible and/or for one of the following reasons:

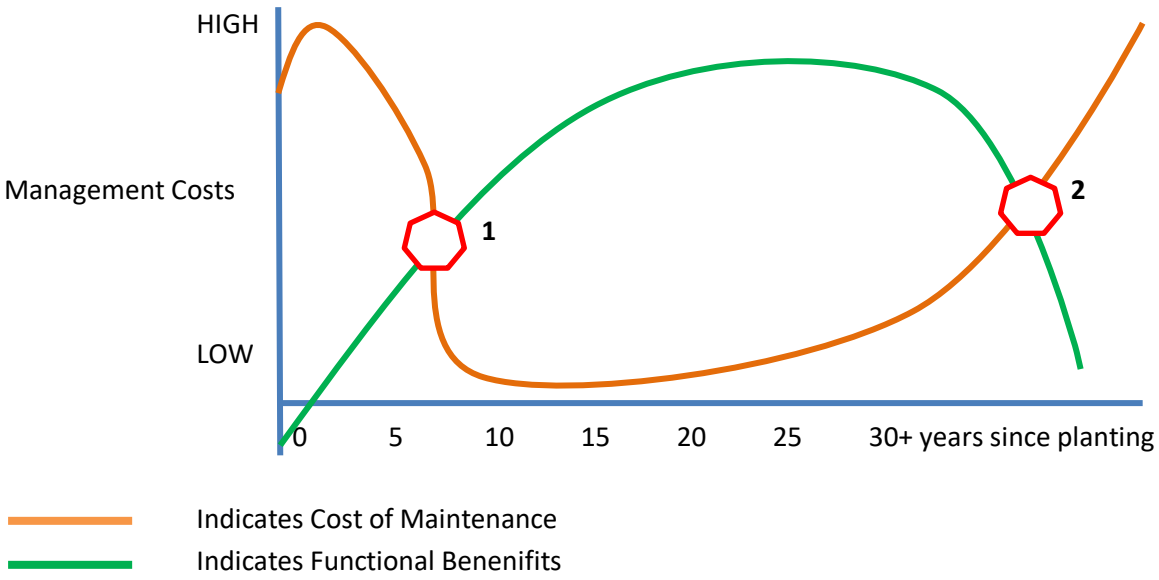
- Presents an immediate or potential danger to people or property or is shown to be a potentially severe health or safety risk.
- Is dead, dying, diseased, significantly decayed or disfigured with no realistic chance of recovery.
- Is causing uncontrollable structural damage to property and or services and remedial work to prevent further damage is impractical or of greater value than the tree.
- Is encroaching into the carriageway in such a manner that visibility is reduced or clearly causing a significant hazard and remedial work cannot mitigate the hazard.
- Is inhibiting the proper management or maintenance, or suppression of other trees of greater value.
- Is deemed to be of low amenity value, is poorly sited and/or requires unduly high levels of maintenance.
- Is unsustainable for the site due to its long-term potential to cause problems or the inappropriateness of the species.
- Is recognised as a species of high weed dispersion potential.

Rationalising the removal of low value high maintenance trees and redirecting funding to develop high value low maintenance plantings should be a priority for tree asset managers.

6.0 TREE ASSET MANAGEMENT

Establishing amenity trees within urban environments requires a significant level of intensive maintenance throughout the early phase of the trees life cycle. Management and maintenance costs are necessarily high during the initial stages, but progressively reduce over time. The probability of ongoing management, and associated costs must be forecasted throughout development to maturity. The lifespan of a tree is continuously subjected to both planned and unplanned works, whether by pruning, damage or other intervention.

The relationship between functional (aesthetic) benefits and management costs is shown in the following table (indicative only):



Area 1: is the point where the tree becomes an asset as the functional (aesthetic) benefit becomes greater than the cost of management.

Area 2: is the point where the tree is no longer sustainable and the cost of management exceeds the functional benefit.

For higher level tree asset management, the asset manager must be able to identify the point of transition when the functional benefits derived from the tree are reduced, and when maintenance costs outweigh retaining the tree. Due to the biodynamic nature of trees, this transition may take many years of slow decline, or can be instantaneous e.g. by means of storm damage or sudden realisation.

7.0 CONSIDERATIONS

Agonis flexuosa are generally not considered a long-lived tree. The NPDC District Plan Notable Trees Report has rated the Life Expectancy of this tree (DP Item 97) the lowest rating of 1, providing consistency to its known longevity. Across Powderham Street growing on the fringe of Sir Victor Davies Park is a similar Agonis flexuosa of comparative age and size, this senescent tree has numerous weakened decay pockets with loss of vigour and vitality. It is difficult to estimate the lifespan of any given tree and this agonis is no different. Given the trees age and its known inherent growth and development specifics coupled with observations of other locality agonis, best estimate of useful future lifespan would be 20 years.

The design concept of the new building incorporates numerous new and environmentally friendly construction materials and techniques into a design that is aesthetically pleasing. Given the limited beneficial life of the protected agonis, the aesthetic design of the building may well neutralize the loss of the tree. Should the proposed building be built, and the tree retained, the tree will no longer contribute the desired amenity effects for which it was originally protected, it is instead envisioned the building design would enhance the immediate locality.

Growing adjacent the protected Agonis within the Huatoki embankment are two uncommon kentia palms (*Howea forsteriana*). These palms are currently hidden and suppressed within the canopy of the agonis. There is great potential for enhancing this landscape and integrating the existing palms as botanical features. However, should the landscape design be such that the kentia palms are inhibiting landscape development, and should the landscape design's holistic value be greater than the amenity value offered by the kentia palms consideration should be given to their relocation. The species of palm is known to have a high transplant success rate. However, should this option be considered, it is advisable to engage the expertise of a palm specialist.

Should development occur on the site and the tree is retained and knowing the tree is not long-lived, consideration should be given to understanding the root decay process within ground embankments. Should this occur, there is possibility of the embankment being undermined and soil subsidence as the root system decays.

After meeting with geotechnical expertise and having a better understanding of the geotech requirements I can confirm that the foundation piles set in a gridline will likely affect the tree roots. The close proximity of the piles to the base of the tree and the gridline pattern of piles, it is likely that pile holes will damage large anchoring roots resulting in heightened chance of tree failure and possible health decline due to root damage.

ARBORICULTURAL ASSESSMENT

It will be at councils discretion, but knowing the limited life of the agonis I believe removal of the tree is a viable option given limited useful life of the tree, the long term development and greenspace enhancement potential of the site.

My findings are the tree will no longer be considered a stable & sustainable asset if retained as a landscape feature when assessed against the provided geotech information, the design concept and with the known root structure (exploratory excavation).

APPENDIX 1. AREIAL OVERLAY

Aerial Image. The aerial image above depicts the location of the protected Agonis (within red circle) and the proposed development site on the immediate left (west-side). The tree is a prominent feature when approaching the Brougham Street intersection from the west, and from the south along Brougham Street.

APPENDIX 2. SUPPORTING IMAGES

Image 1. The protected agonis as seen when approaching from Powderham St. The main section of the protected agonis is highlighted within the red circle, the vegetation to right is predominately self-seeded agonis with the parent tree likely being the protected agonis.

ARBORICULTURAL ASSESSMENT

Image 2 (left). The base of the tree growing out of the embankment is larger than normal. It is the size of the lower stems and the trees prominence that merit the tree to be a Category 2 protected item.

Image 3 (right). The rooting structure of the tree extends into the bank with numerous small feeder roots growing up towards the carpark surface. The weight loading of the tree away from the carpark, is expected to be counteracted by anchoring roots also extending below the carpark at a deeper level.

ARBORICULTURAL ASSESSMENT

Image 4 (left). Growing below the agonis on the embankment are two kentia palms, these palms are not considered common and should be preserved within their current location. The palms may be considered an extension of the wider Huatoki Plaza and associate with the Puke Ariki greenspace theme.

Image 5 (right). This image depicts the protected agonis and adjacent vegetation when viewed across Powderham Street, (looking north).

ARBORICULTURAL ASSESSMENT

Image 6 (left). The exploratory excavation confirmed the presence of both small feeder roots and larger anchoring roots. Most feeder roots were found within the top 30cm of soil below the gravel basecourse. Larger anchor roots were encountered at about a depth of 1.0m. To minimise root disturbance the excavation did not proceed beyond this depth .

Image 7 (right). The exploratory excavation found most roots were radiating from the base of the tree within the central part of the excavation trench. The larger and deeper roots were found either side of the tree.

APPENDIX 3. NPDC NOTABLE TREES REPORT - DP ITEM 97

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

Notable Trees Report

DP Item:	97
DP Map No:	C24b
Name (Common/Botanical):	WILLOW MYRTLE AGONIS FLEXUOSA
Site Address:	33 Devon Street West NEW PLYMOUTH 4310
Legal Description:	LOT 2 DP 15492

Species Size:	Medium	Category:	2
Single Or Group?:	Single	Number of Trees:	1

Q1. Is the tree a good specimen?

Height: 13.0
Width: 12.0
Girth: 0
Charateristics: Multi-stemmed.

Life Expectancy:	1
Health/Vigour:	4
Form/Shape:	2
Structural Integrity:	2
Stature:	4

Specimen comments: Stability in ground may lessen as tree grows. Usual inclusions in stem unions.

Subtotal: 13

Q2. Does the tree have visual/landscape value?

Prominence of Position:	4
Presence of Other Trees:	4
Role in Location:	3

Visual comments: Very interesting growing situation at top of low rock wall. Leans over Huatoki stream.

Subtotal: 22

Q3. Does the tree have heritage value?

Historic:	1
Cultural:	1
Approximate Age of Tree:	2

Heritage comments:

Subtotal: 8

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Report printed on: 23/09/2019 Page 1 of 3

Te Kaunihera-ā-Rohe o Ngāmotu
NEW PLYMOUTH DISTRICT COUNCIL
newplymouthnz.com

Notable Trees Report

Q4. Does the tree have botanical/rarity value?

Occurrence of the Species:	2
Botanical Value:	2
Botanical comments:	

Subtotal: 12

Q5. Is the tree manageable in its location?

Relation to Other Structures:	2
Manageability comments: Possible instability.	

Subtotal: 2

Q6. Is the tree part of a group?

Ecological/Climatic Contribution:	0
Stand/Landscape Value:	0
Contribution to Group:	0
Group comments:	

Subtotal: 0

Total Score: 57

Notes:

Additional Notes:

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Report printed on: 23/09/2019

Page 2 of 3

ARBORICULTURAL ASSESSMENT

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Notable Trees Report

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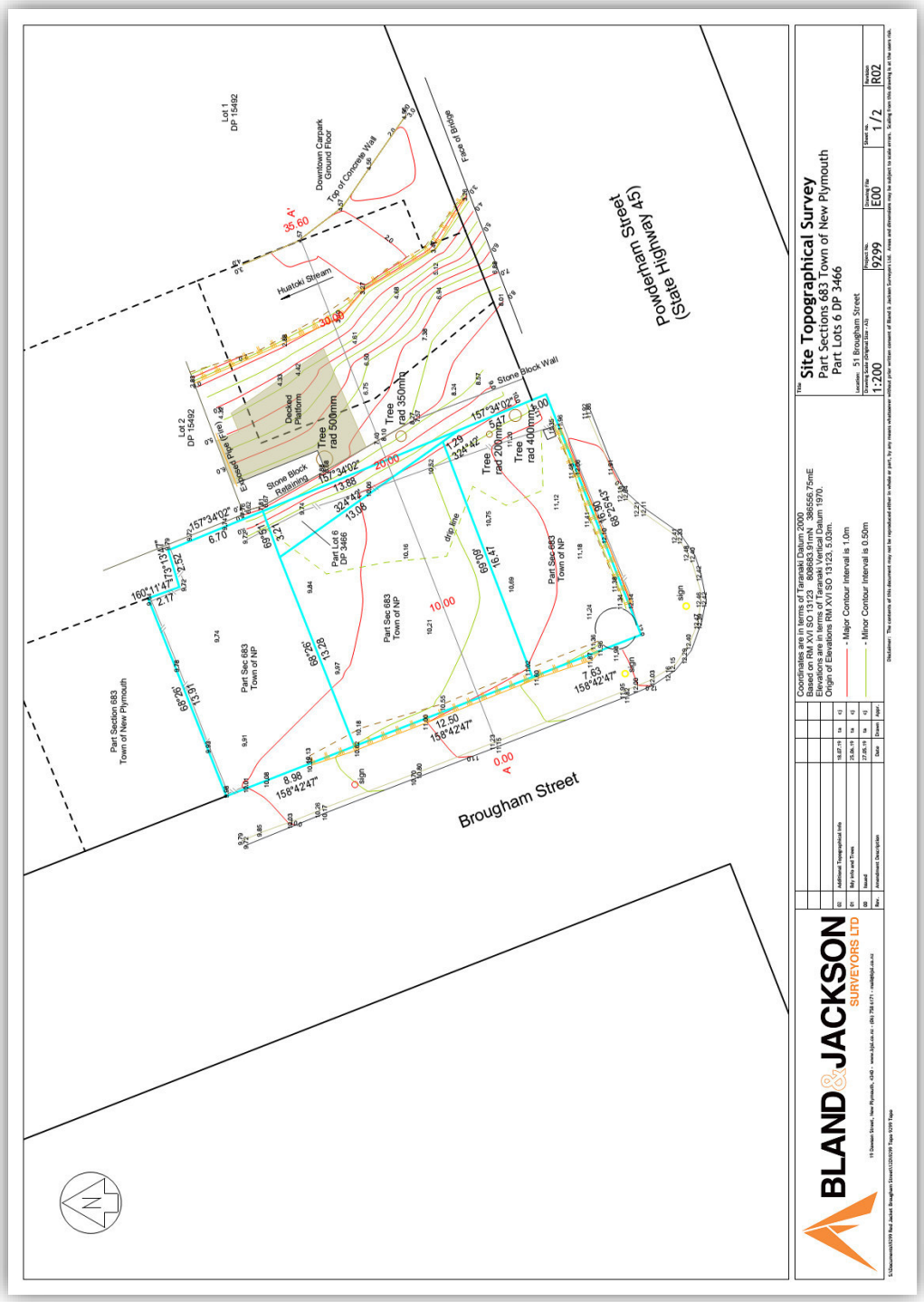
Report printed on: 23/09/2019

Page 3 of 3

APPENDIX 4. SITE TOPOGRAPHICAL SURVEY



Arborists Disclosure Statement

ARBORICULTURAL ASSESSMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the appearance and the health of trees of trees and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services such as property boundaries, property ownership, site lines, disputes between neighbours and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. The arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all the risk associated with trees, is to eliminate all trees. Trees that are regularly inspected by competent, knowledgeable arborists, and maintained in accordance with modern arboricultural practices are far less likely to experience unexpected failures than unmanaged trees.

Assumptions and Limiting Conditions

1. Any legal description provided to the consultant is assumed to be correct. Any titles and ownerships to any property are assumed to be good and marketable. No responsibility is assumed for matters legal in character, nor is any opinion rendered as to the quality of any title. Any and all existing liens and encumbrances have been disregarded and any and all property is appraised/evaluated as though free and clear, under responsible ownership, and competent management.

2. It is assumed that any property is not in violation of any applicable codes, ordinances, statutes or other governmental regulations.

3. Care has been taken to obtain all information from reliable sources. All data has been verified as much as practically possible; however, the consultant can neither guarantee nor be responsible for the information provided by others.

4. The consultant shall not be required to give testimony or attend court by reason of this report unless subsequent contractual arrangements are made.

5. Loss or alteration of any part of this report invalidates the entire report.

6. Possession of this report, or a copy thereof does not imply right of publication or use for any purpose by any other than the person to whom it is addressed, without the expresses written consent of the consultant.

7. Neither all or any part of the contents of this report, nor copy thereof, shall be used for the purpose by anyone but the person whom it is addressed, without the prior written consent of the consultant; nor should it be conveyed by anyone, including the client, to the public through advertising, public relations, news, sales to the media, without the prior written consent of the consultant.: particularly as to value conclusions, identity of the consultant, or any reference to any professional society or institute, or to any initialled designation conferred upon the consultant stated in his qualifications.

8. This report and any values expressed herein represent the opinion of the consultant and the consultant's fee is in no way contingent upon the reporting of a specified value, a stipulated result, the occurrence of a subsequent event, nor upon any finding to be reported

9. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessary to scale and should not be construed as engineering or architectural reports or surveys.

10. Unless otherwise expressed: 1) information contained in this report covers only those items that were examined and reflect the condition of those items at the time of inspection; and 2) the inspection is limited to visual examination of accessible components without dissection, excavation, or probing unless otherwise noted. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the plants or property in question may not arise in the future.

APPENDIX F ARCHAEOLOGICAL ASSESSMENT

Brougham Street Development

Project Area: 51 Brougham St, New Plymouth

Proposed Works: Commercial development.

Commissioned by: K.D. Holdings Limited.

Authors: Ivan Bruce and Hamish Crimp. November 2019.

Current car parking area 51 - 45 Brougham St, image taken looking south towards Powderham St (Image: Ivan Bruce, 2019).

ARCHAEOLOGICAL RESOURCE MANAGEMENT
33 Scott Street/ Moturoa/ NEW PLYMOUTH
(0274) 888215
itmustbesointeresting@xtra.co.nz

Executive Summary

K.D. Holdings Ltd are proposing to construct a commercial premises at 51 - 45 Brougham St, New Plymouth, an undeveloped gravelled section currently used for car parking. This assessment was undertaken in order to advise K.D. Holdings Ltd whether these works will affect archaeological sites and to instigate any Heritage New Zealand Pouhere Taonga (HNZPT) authority process required in this case. Despite the history of colonial domestic and mercantile occupation at this site, significant site modification has occurred on this property since 1906 and the likelihood of recovering in-situ archaeological evidence on the property has been assessed as low. No archaeological site has been recorded on the property to date.

Recommendations are made to make an application for a general archaeological authority to HNZPT should the need arise to modify a pre 1900 railway embankment on the neighbouring property to the east as a consequence of this development.

Figure 1: Concept drawing of the proposed building.

1. Introduction

1.1 This archaeological assessment was undertaken in order to advise K.D. Holdings Ltd on the archaeological and historic record of the property, and to advise of any likelihood that the development of this project will affect archaeological sites.

1.2 The assessment is based on desktop research and pedestrian survey.

1.3 Affected property appellations are as follows:

- PT Section 683 Town of New Plymouth
- PT Lot 6 DP 3466
- PT Lot 6 DP 3466

1.4 The project will require earthworks for the installation of piles for the proposed section; the provision of amenities; and potentially the construction of retaining walls and the removal of a large tree.

1.5 The archaeological assessment was conducted specifically to identify surface archaeological evidence.

1.6 Waahi taonga and sites of cultural significance to Maori are outside the scope of this assessment.

1.7 The pedestrian archaeological assessment was undertaken by Ivan Bruce and a review of the historic land use of the property was completed by Hamish Crimp, between September and November 2019 . This report outlines the results.

2. Statutory requirements

2.1 There are two pieces of legislation in New Zealand that control work affecting archaeological sites. These are the *Heritage New Zealand Pouhere Taonga* Act 2014 (HNZPTA) and the *Resource Management Act* 1991 (RMA)

2.2 HNZPT administers the HNZPTA. It contains a consent (authority) process for any work affecting archaeological sites, where an archaeological site is defined as:

> Any place in New Zealand, including any building or structure (or part of a building or structure), that
>
> a. Was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
>
> b. Provides or may provide, through investigation by archaeological methods,

evidence relating to the history of New Zealand; and

c. Includes a site for which a declaration is made under section 43(1)

2.3 Any person who intends carrying out work that may modify or destroy an archaeological site, must first obtain an authority from HNZPT. The process applies to sites on land of all tenure including public, private and designated land. The HNZPTA contains penalties for unauthorised site damage or destruction.

2.4 The archaeological authority process applies to all archaeological sites, regardless of whether:

- The site is recorded in the New Zealand Archaeological Association Site Recording Scheme or included in the Heritage New Zealand List.
- The site only becomes known about as a result of ground disturbance, and/ or
- The activity is permitted under a district or regional plan, or a resource or building consent has been granted

2.5 The heritage places assessed in this report are prehistoric and historic archaeological sites as defined under the HNZPTA.

2.6 The protection of archaeological sites and waahi taonga are specifically provided for within the operative New Plymouth District Plan:

"Rules OL81 to OL87 relate to waahi taonga and archaeological sites. The rules state that a land use or subdivision resource consent may be required from the council before carrying out the following activities on, or in close proximity to, a waahi tapu or archaeological site listed in the District Plan.

2.7 The proposed NPDC district plan identifies also heritage buildings and items; heritage character areas; and archaeological sites within the proposed plan. These are contained within the Historic Heritage chapter of the plan. This plan contains objectives, policies and rules to protect and manage historic heritage and provisions to manage activities that may impact on historic heritage values. All rules relating to historic heritage have had legal effect since the plan was notified on 23 September 2019.

3. Physical environment and setting

3.1 The development will take place on an area of gravelled vacant land. The area has been cut down and levelled at some time, possibly following the removal of the last commercial building on the property in 1984.

3.2 The property is situated on the left bank of the Huatoki Stream land naturally slopes steeply downwards from Brougham St to the Huatoki, however no unmodified original ground surface exists today. The current level parking area has been created by cutting the down the original ground surface up to 1m on the Brougham and Powderham St boundaries and retaining the property and importing up to 1.5m fill along eastern boundary. This recent fill sits on top of a stone railway embankment (built between 1873-1875), situated on DP 15432, the neighbouring property to the east.

4. Resources and limitations

4.1 This assessment includes a review of the NZAA site recording scheme (Archsite 2019); archival material held at Puke Ariki; historic literature; and a pedestrian survey of project area.

4.2 The assessment is based on background research and non invasive field survey. No subsurface excavation or test excavations have been undertaken on the project area to date.

4.3 Due to previous earthworks and the gravelled surface, the project presented generally poor conditions for the identification of surface archaeological features.

5. Project outline

5.1. This project involves the construction of a four storied commercial building, covering the entirety of the ground space contained with the property titles.

5.2 Attached plans show that the property will be constructed on piles. However it can be expected that surface disturbance to the project area will be more widespread and the ground surface will likely be modified further by mechanical excavation for the purposes of levelling the existing ground surface and the installation of amenities.

5.3 A large tree (Agonis Flexuosa) is situated on the eastern boundary, that may require removal. The main supportive piles for this building will be required to be driven some 8m+ deep to reach suitably firm ground. Pile locations are not yet confirmed but will be located around the perimeter of the building and underneath it, making it unlikely that piles can be

installed to avoid damage to this tree's roots. Should the tree require removal earthworks may be required to remove the in ground stump and root system. These same earthworks may require either full or partial demolition of the 1875 era railway embankment.

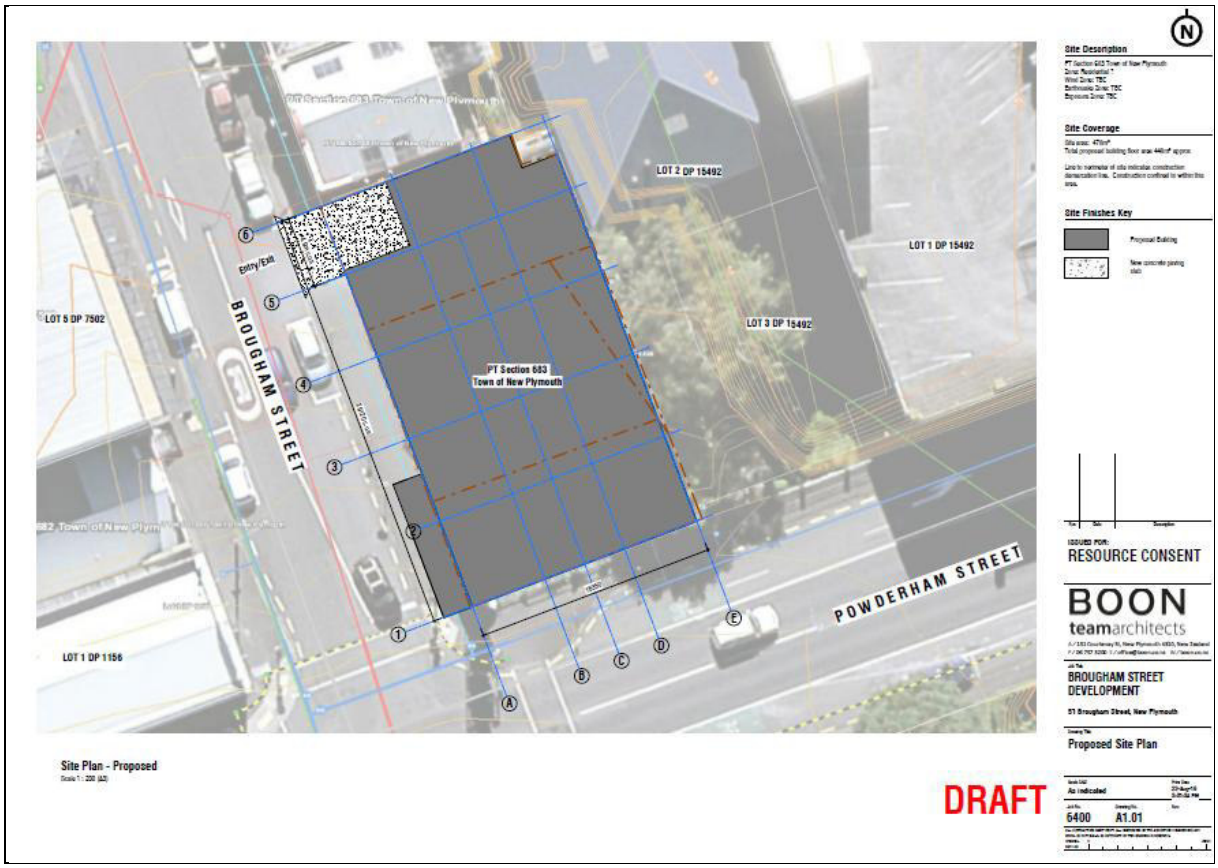


Figure 2: Footprint of the proposed building.

6. Māori Occupation

6.1 The land at the south-eastern corner of Brougham and Powderham Streets appears to have been utilised by Māori prior to the establishment of the settlement of New Plymouth in 1841. Evidence for this use was uncovered by early occupier Robert Hughes, who, it was reported some years later, often came upon "Maori pits", whilst working in his garden.[1] Although no specific evidence of Māori occupation has otherwise been recorded at this site, the Huatoki basin was in pre-European times (since at least the 17th Century), a densely populated landscape boasting several fortified pā, notably Pukaka[2], Puke Ariki[3] and Waimanu[4], occupied by hapu of the Te Atiawa tribe.

[1] "Town Improvements: Messrs Macky, Logan, Caldwell and Co." *Taranaki Herald*, 27 June 1907, p.7.
[2] Pukaka pā was located atop the present site of Marsland Hill, its top levelled in 1855 to enable construction of Military Barracks

6.2 By the early decades of the nineteenth century, it is said that "all the lands extending from [the future site of] St Mary's Church to the Manga-o-tuku stream, and on the north side of the Huatoki stream, about where the Kawau pa[5] stood in the early forties was all cultivated in kumara, taro, and small patches of potatoes".[6] This cultivated area would likely incorporate the site of Town Section 683 and may account for the presence of the storage pits discovered by Hughes. The pre-European pā within central New Plymouth were last occupied during early-1832, when invading Waikato taua forced their occupants to retreat to the relative safety of Otaka pā at Ngāmotu, with many Te Atiawa refugees later migrating south to the Wellington region.[7]

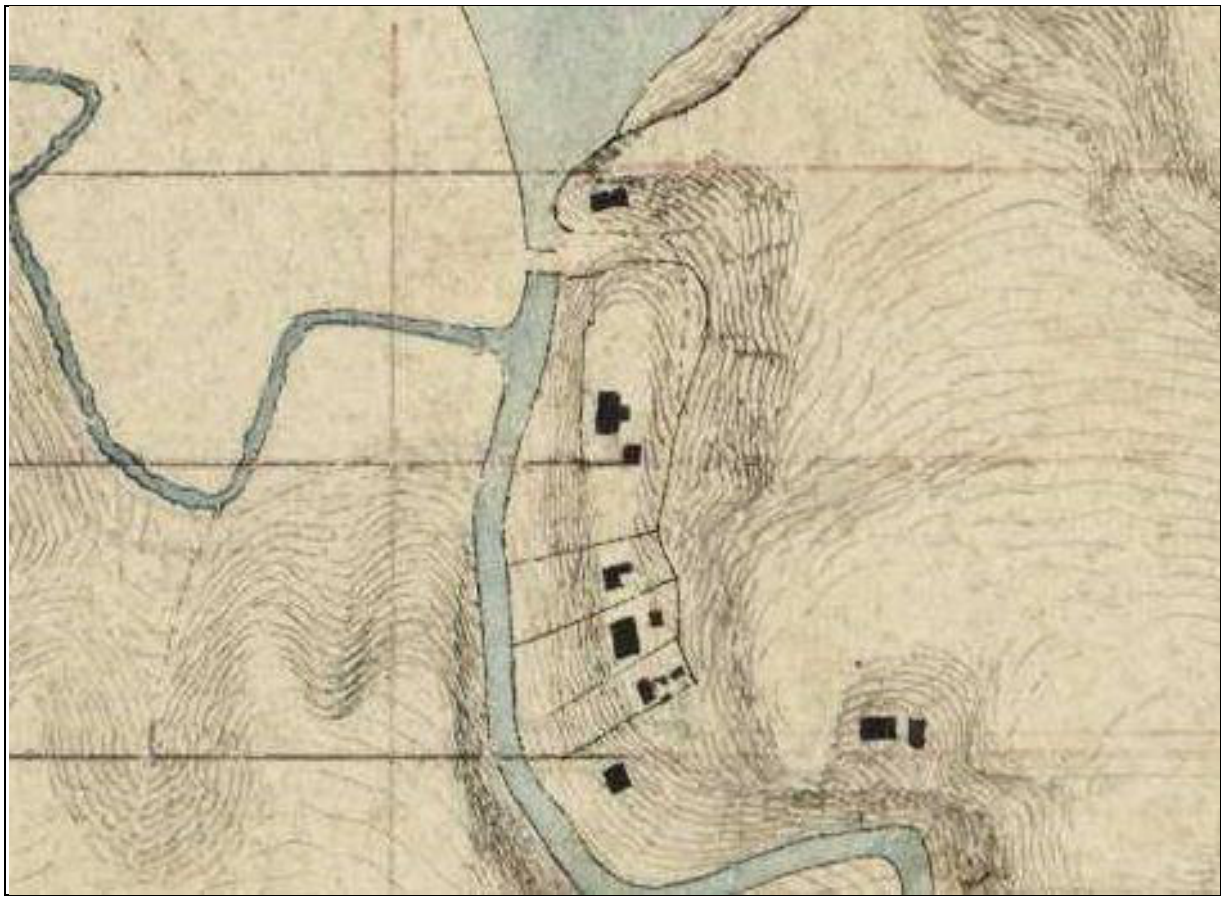


Figure 3: Detail showing structures erected on the eastern bank of the Huatoki Stream soon after European settlement commenced (likely including company stores, cottages etc.); no structures or earthworks are indicated on the later site of Town Section 683 at this time.

[3] Hill (since levelled) incorporating present site of Puke Ariki Museum & Library
[4] Near site of present 69-73 Gill Street (since levelled)
[5] Located on eastern bank of Huatoki estuary (now reclaimed), approximate site of Centre City car park
[6] Smith, *History and Traditions of the Maoris of the West Coast North Island of New Zealand Prior to 1840*, p.482.
[7] ibid.

(Topographic Map by F. A. Carrington. "Rough Sketch of Ground at New Plymouth". 1841. Alexander Turnbull Library).

7. Early European Occupation

7.1 Organised European settlement in Taranaki was co-ordinated by the Plymouth Company in 1839-40, with the Plymouth Company purchasing land from the New Zealand Company for the settlement of immigrants from Devon and Cornwall.[8] The site of the Town of New Plymouth was chosen and laid out by Chief Surveyor Frederic Alonzo Carrington in February 1841, with settler ships arriving from March 1841 onwards.[9] At the time of Carrington and his survey party's arrival, the area now encompassing central New Plymouth was devoid of permanent inhabitants, although a small number of Māori and whalers were living nearby at Otaka pā.[10]

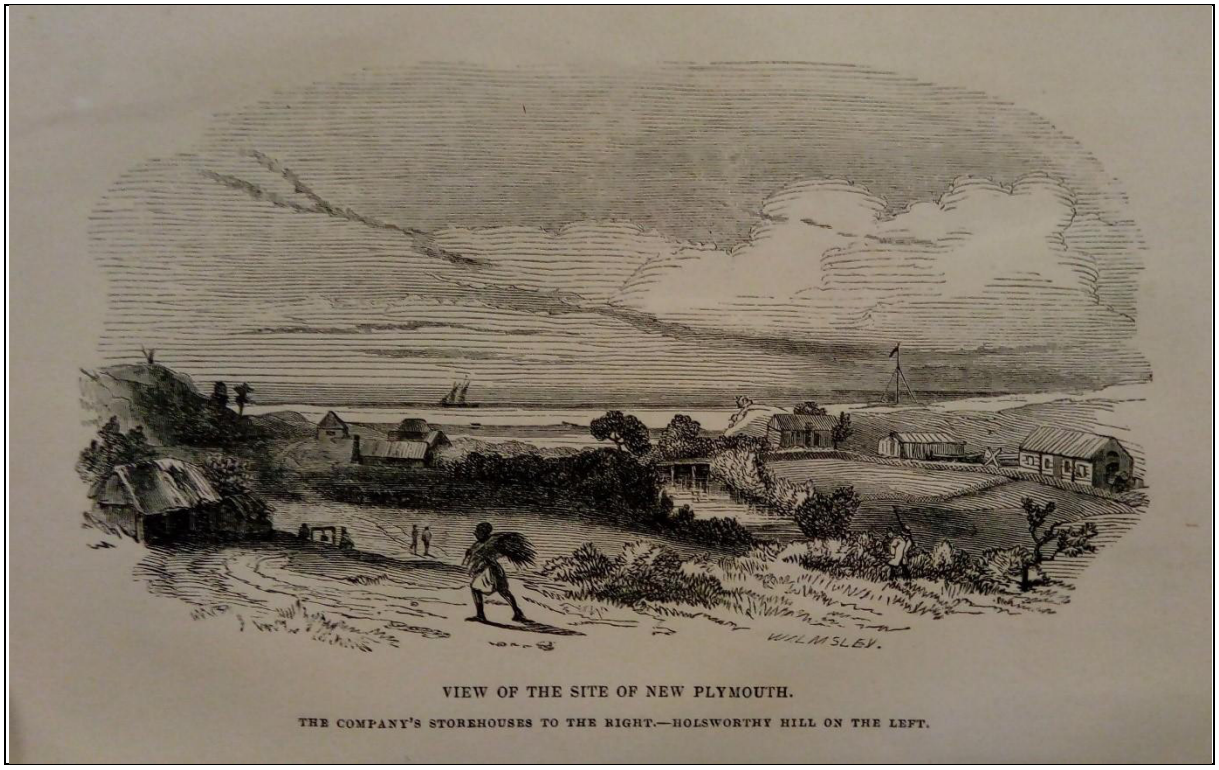


Figure 4: 1841 view of New Plymouth from about the intersection of Brougham and Powderham Streets, Huatoki Stream and Company stores etc on right, with Mt Eliot/Holsworthy Hill/Puke Ariki pa at left. Later site of Town Section 683 roughly at left in foreground. (Woodcut engraving by Walmsley. View of the Settlement of New Plymouth, West England Board of the New Zealand Company, Latest Information from the Settlement

[8] Tullett, *The Industrious Heart: A History of New Plymouth*, pp.8-10
[9] ibid.
[10] ibid.

of New Plymouth on the Coast of Taranake, New Zealand. Comprising Letters from Settlers there, with an Account of its General Products, Agricultural and Commercial Capabilities &c, frontispiece)

7.2 Town Section 683, of which this property is part, was one of the original New Plymouth Town Sections laid out by surveyor Frederick Carrington in 1841. A sketch map of the New Plymouth area produced by surveyor Carrington during 1841, and indicating buildings established since arrival, records a number of structures located on the eastern bank of the Huatoki, immediately opposite this site; however, no structures are shown as being present on the site of Town Section 683.[11] A list of town section allocations dated 3 September 1842 notes that Town Section 683 was originally allocated to "Company" (Plymouth Company).[12]

7.3 During 1850, the northern portion of Town Section 683 was purchased by Mr Robert Hughes from a Mr Johnston, who had seemingly acquired the property sometime previously.[13] The southern portion of Town Section 683 appears to have been acquired by Dr. St George during the 1840s or 1850s. From about 1856, Robert Hughes, in addition to owning the northern portion of Town Section 683, leased the southern portion from St. George.[14] Hughes soon attempted to purchase the southern portion from St. George, however the offer was declined.[15] Later, Hughes attempted to sell his half of Town Section 683 to St. George, however, this offer was also declined.[16] In a final attempt to settle the matter, Hughes suggested that St. George and himself should toss a coin to decide who should sell to who; this was, like the previous offers, also rejected by St. George.[17]

7.4 At some point during the 1850s, Hughes had a house constructed on each half of Town Section 683, with a small shop/workshop between. It seems the first building was constructed by Hughes soon after acquiring the northern portion of Town Section 683 in 1850, with Hughes operating a boot store from the building as early as 1854.[18] All three buildings were in existence by 1859 and can be distinguished in the background of two photographs taken that year.[19] It is reported that the southernmost house, nearest the intersection of Brougham and Powderham Streets, was occupied by the military during the

[11] Carrington, *Rough Sketch of Ground at New Plymouth*.
[12] Reference to the Sections Comprising the Town of New Plymouth, New Zealand, 1842, Puke Ariki, ARC2001-365/5
[13] "Town Improvements: Messrs Macky, Logan, Caldwell and Co." *Taranaki Herald*, 27 June 1907, p.7.
[14] ibid.
[15] ibid.
[16] ibid.
[17] ibid.
[18] *Taranaki Herald*, 22 February 1854, p.1.
[19] Webster, "View of New Plymouth from Liardet Street"; Webster, "Part of South Side Devon Street, N. P"

Taranaki Wars of the 1860s.[20] It is unclear when Hughes lease of Rawson's property ceased, however, this was likely before 1867, when the southern portion of Town Section 683 (including one of the houses/shops constructed by Hughes), was purchased by surgeon Thomas Edward Rawson.[21]

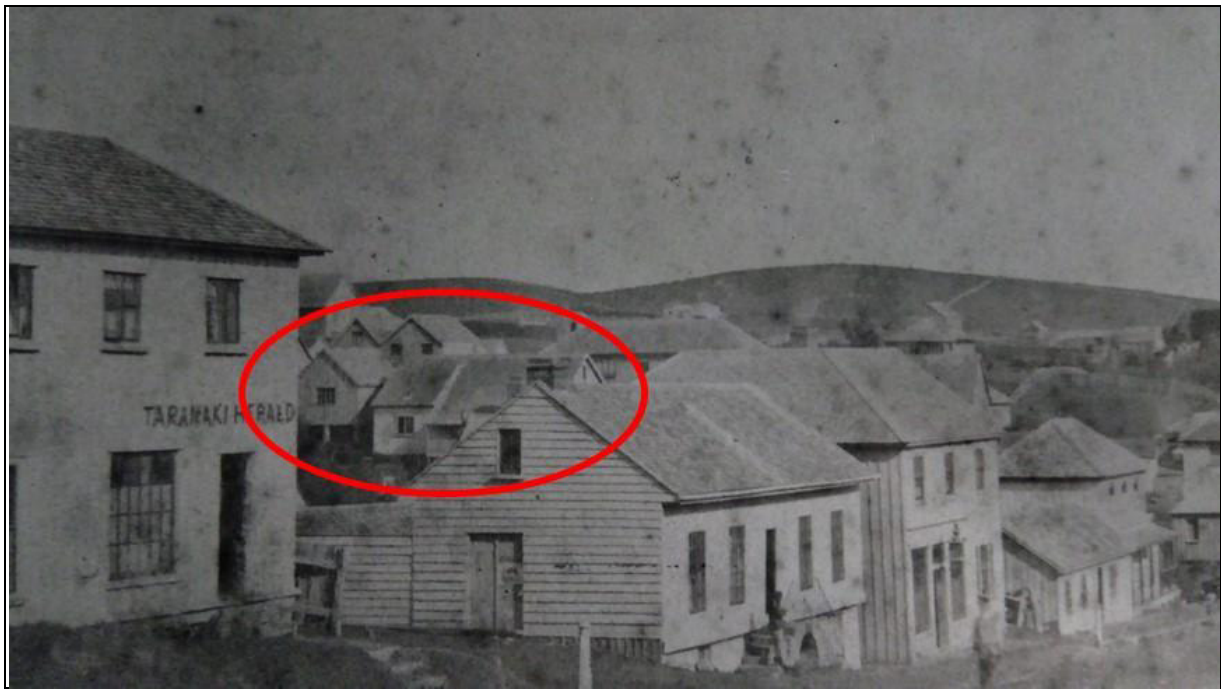


Figure 5. Detail showing rear of Robert Hughes Brougham Street buildings from Devon Street. (Photograph by Hartley Webster. "View of New Plymouth from Liardet Street". 1859. Puke Ariki).

7.5 From the 1870s onwards, ownership of the various portions of Town Section 683 becomes increasingly complex, with each half subdivided several times throughout the ensuing decades. The first subdivision occurred in 1871, when the northern portion of the southern half of Town Section 683 (containing the southernmost house/shop), was conveyed from Thomas Rawson to one of his sons, chemist Frederic George Rawson.[22] Following the sale, Frederic Rawson relocated his chemist store from Currie Street to Brougham Street, with later advertisements noting Rawson practised as both a chemist and dentist.[23]

7.6 Robert Hughes continued to operate his boot store, by now known as "The Old House", from the larger shop on the northern portion of Town Section 683.[24] In January 1873, Hughes announced he was retiring from the boot trade, with the property advertised

[20] "Town Improvements: Messrs Macky, Logan, Caldwell and Co." *Taranaki Herald*, 27 June 1907, p.7.
[21] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[22] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[23] "Removal." *Taranaki Herald*, 24 June 1871, p.3.; "Dentistry." *Taranaki Herald*, 2 March 1872, p.3.
[24] "The Old House", *Taranaki Herald*, 2 December 1871, p.3.

for sale later that year.[25] The property didn't initially sell and it seems Robert Hughes continued to operate his boot shop from the building until relocating to new premises in July 1874.[26] Meanwhile, in March 1874, the southern part of the northern portion of Town Section 683 (containing the small shop/workshop), was conveyed from Robert Hughes, to his son, solicitor Robert Clinton Hughes.[27] It is unclear if R. C. Hughes ever occupied the smaller shop, as it seems he took over his father's former boot shop premises, which he later purchased in 1877, soon after the boot shop relocated to Devon Street.[28]

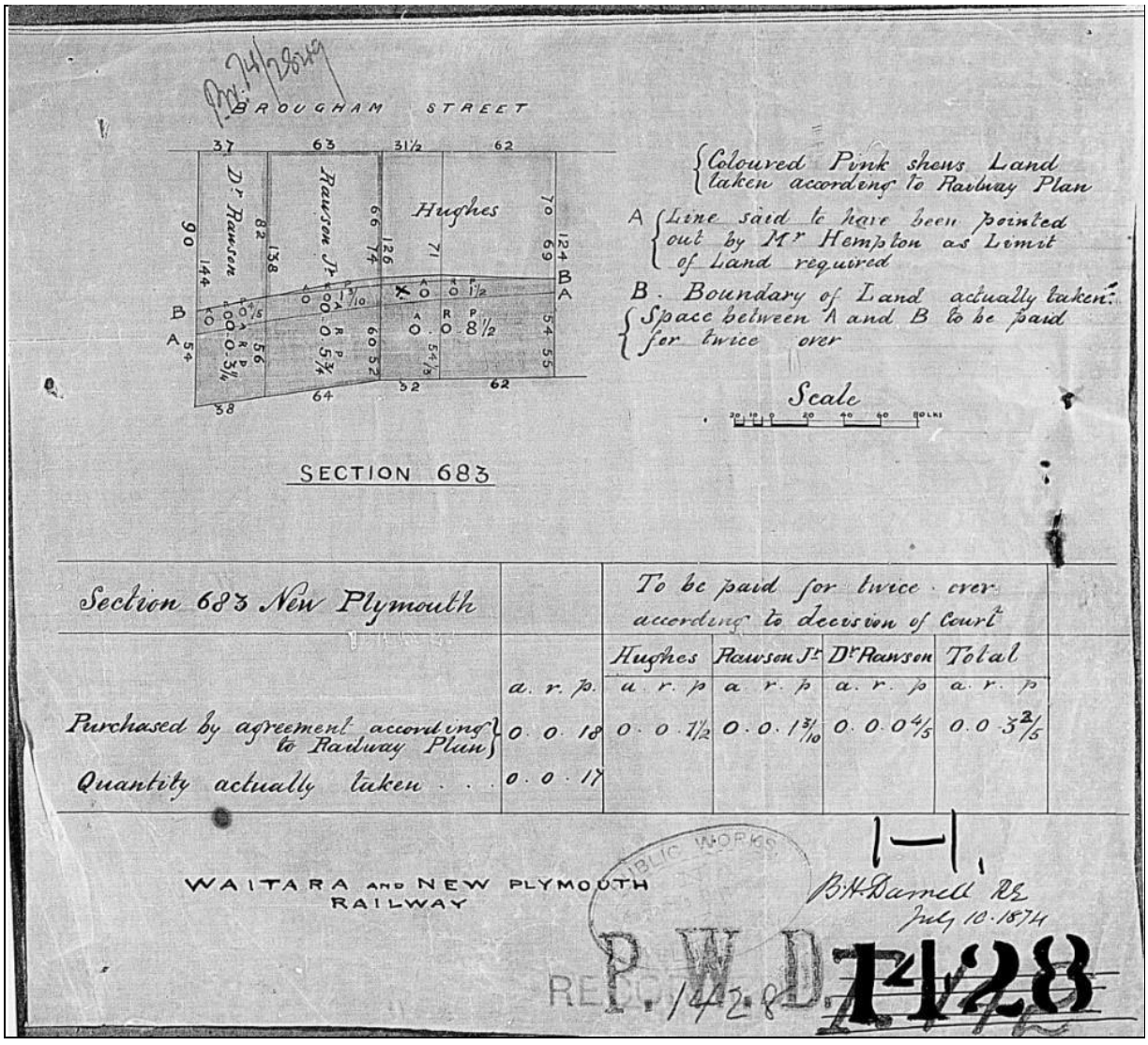


Figure 6: Public Works Department Plan showing parts of Town Section 683 taken for Waitara and New Plymouth Railway (Plan by B. H. Darnell. Darnell. "Waitara and New

[25] *Taranaki Herald*, 4 October 1873, p.1.
[26] *Taranaki Herald*, 15 July 1874, p.4.
[27] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[28] ibid.

Plymouth Ryl [Railway], maps of Hughes and Rawson's premises". 1874. Archives New Zealand).

7.7 During May 1873, a proclamation was issued describing the lands to be taken to enable construction of Taranaki's first railway between New Plymouth and the northern river town of Waitara.[29] This proclamation noted that New Plymouth Town Section 683 would be one of the properties required for construction of the railway line.[30] Whilst it is unclear if the initial intention was to acquire the entire section, only the eastern portion of the section was ever taken for railway purposes.[31] It seems there was some dispute over the amount of compensation to be received for the land taken, with Robert Hughes taking a claim to the Compensation Court.[32]

Figure 7: Plan of the Town of New Plymouth with outline of extant buildings – detail showing three main buildings present on Town Section 683 during 1880. (T. K. Skinner. "Plan of New Plymouth in New Zealand". 1880. Puke Ariki).

[29] "Limits and Description of the Railway from Waitara to New Plymouth, Being a Portion of the Line from Waitara to Wanganui." *Taranaki Herald*, 10 May 1873, p.6.
[30] ibid.
[31] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[32] "District Court", *Taranaki Herald*, 13 May 1874, p.2.

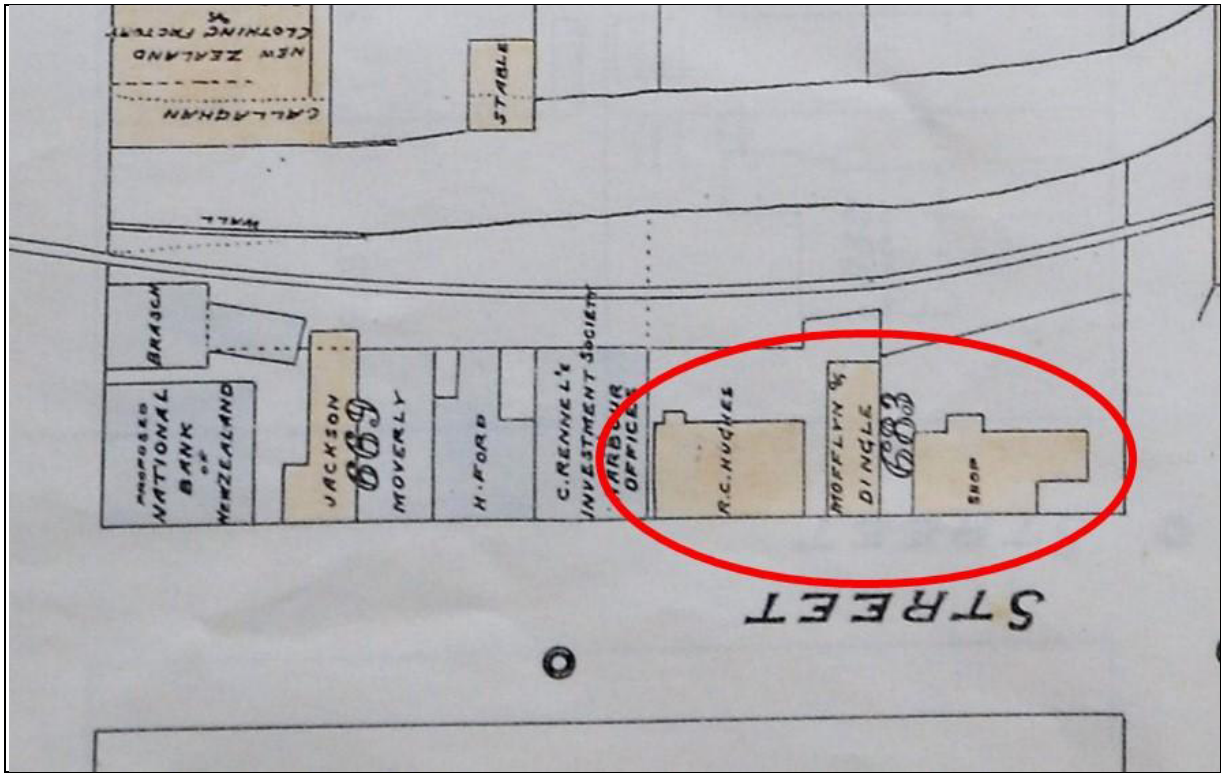


Figure 8: Plan of central New Plymouth with outline of extant buildings – detail showing three main buildings present on Town Section 683 during 1884. (Skinner & Sole. "Plans of the Centre Portion of New Plymouth". 1884. Puke Ariki).

7.8 In 1876, the remaining southern portion of the southern half of Town Section 683 was gifted to Frederic Rawson from his father Thomas.[33] In 1879, Rawson sold both his portions of Town Section 683 to local businessman William Courtney.[34] However, bankruptcy proceedings were initiated by a creditor of Courtney's during January 1880, with this property seemingly transferred to the trustees of his assigned estate as part of a deed of arrangement.[35] The property was later conveyed to solicitor Henry Robert Richmond during January 1881.[36] In September 1883, cabinetmaker Arthur Mofflin relocated his business to the small central shop owned by R. C. Hughes, later joining in partnership with Mr William Dingle during January 1884.[37]

7.9 In the early hours of May 19th, 1885, disaster struck central New Plymouth, a large fire, originating in Devon Street, spread to Currie Street, Currie Lane and Brougham Street, destroying or damaging 18 buildings.[38] Mofflin and Dingle's workshop caught fire and was

[33] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[34] ibid.
[35] "In Bankruptcy", *Taranaki Herald*, 14 January 1880, p.3.
[36] Taranaki Land Deeds Indexes, c.1858 - c.1928, Series 23516, Archives New Zealand
[37] *Taranaki Herald*, 27 September 1883, p.3.; *Taranaki Herald*, 4 January 1884, p.3.
[38] "Disastrous Fire." *Taranaki Herald*, 19 May 1885, p.2.

pulled down to try and halt the spread of the inferno.[39] It also seems the southernmost building near the intersection with Powderham Street, which appears to have been occupied by Mofflin and Dingle as a shop, also caught fire, with the *Taranaki Herald* reporting that both Mofflin & Dingle's furniture shop and workshop had been destroyed.[40] Whilst the partnership of Mofflin & Dingle ceased two months later, during July 1885, Mofflin continued to operate the business as a sole proprietor.[41]

Figure 9: Brougham Street looking south with buildings on Town Section 683 at rear prior to 1885 fire. Unknown Photographer. "Brougham Street from Devon Street Corner". Circa December 1884. Puke Ariki.

7.10 It appears that the southernmost shop, then owned by Henry Richmond, was re-built shortly after the fire, with Mofflin advertising during late-July 1885 that he had re-opened his shop in Brougham Street following the completion of alterations to his business premises.[42]

7.11 The southernmost portion of Town Section 683 was surveyed for Henry Richmond in 1886, with DP132 clearly indicating the frontage of a building, occupied by Mr Mofflin, on the

[39] ibid.
[40] ibid.
[41] "Dissolution of Partnership", *Taranaki Herald*, 31 July 1885, p.3.
[42] *Taranaki Herald*, 29 July 1885, p.3.

property at this time.[43] Mofflin later acquired ownership of a portion of Town Section 683 on which his furniture factory and shop was located. He occupied the building until mid-1894, when he advertised it for let; from 1895 cabinetmaker Robert Hooker is noted as the occupier.[44]

Figure 10: Looking north down Brougham Street from Powderham Street corner before 1885 fire - three buildings on Town Section 683 at front on right. Unknown Photographer. "Upper Brougham Street". Photograph taken between mid-1884 and May 1885. Puke Ariki.

7.12 In 1895-96, Robert Clinton Hughes had new business premises constructed at the northern end of Town Section 683; these comprise the present building at 43 Brougham Street. To enable construction of the new offices, R. C. Hughes old premises, constructed in the 1850s and earlier occupied by his father's boot store, were demolished. The new building was designed by William Francis Brooking in the Italianate style and constructed by local firm Boon Bros.[45] 43 Brougham Street, along with its earlier neighbour, the former New Plymouth Investment and Loan Society building at 41 Brougham Street (1883-84), are listed

[43] DP 132, Land Information New Zealand (LINZ)
[44] Wises Post Office Directory, 1895
[45] Wagstaff, "Deficient Registration Report for a Historic Place: Brougham Street Offices (Former), New Plymouth (Record no. 888)".

as Category II with Heritage New Zealand[46]; Category A in the operative New Plymouth District Plan; and is a scheduled heritage building in the proposed district plan.

7.13 In 1906-07, all the buildings on Town Section 683 located south of R. C. Hughes Offices were demolished to make way for construction of a new two-storied warehouse for Macky, Logan & Caldwell.[47] Demolition of the buildings was welcomed by a *Taranaki Daily News* reporter, who described them as "almost an eyesore in the heart of town".[48] Macky, Logan & Caldwell occupied the building until the early-1960s, at which time it was taken over by Bing, Harris & Co.[49] On the 4th of March, 1983, the warehouse was destroyed by a large fire, and demolished the same day; at the time it was the premises of hardware firm Bennett and Sutton Limited.[50]

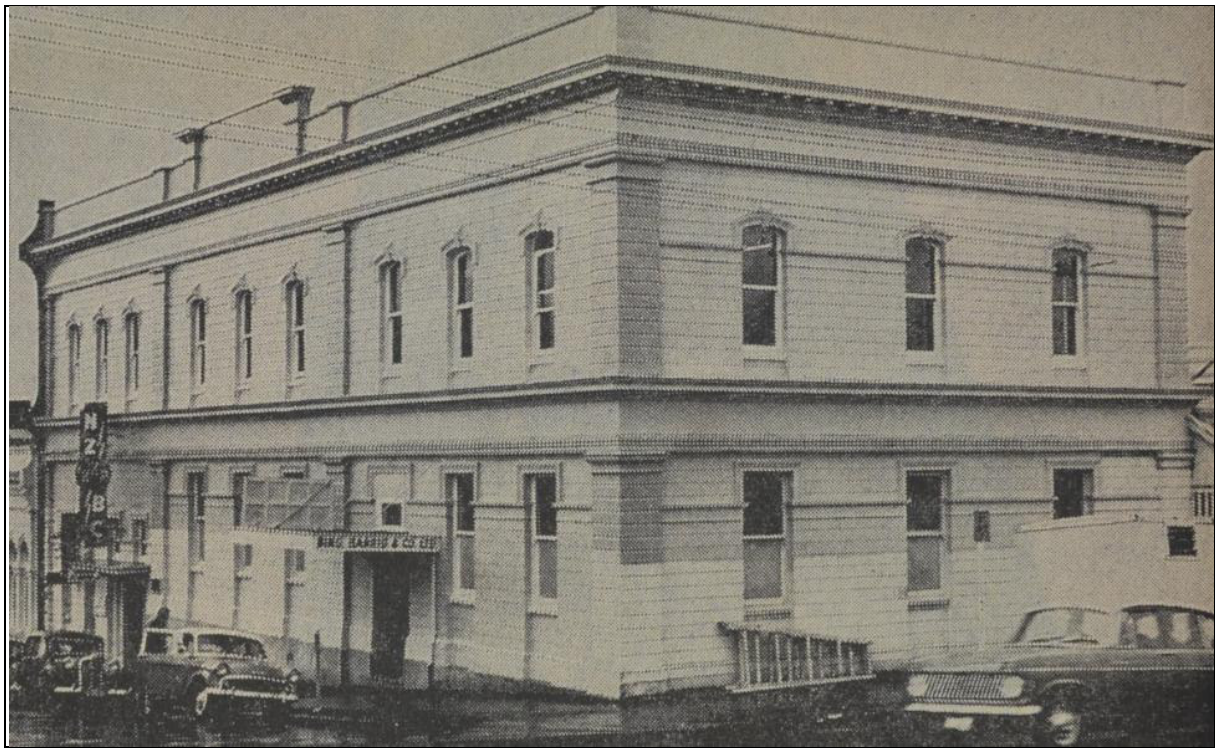


Figure 11: Macky, Logan & Caldwell building (Taranaki Herald 06/06/1964).

7.14 Following the fire it seems the section was levelled (and possibly lowered), with a Modulock show home erected on the property during 1984.[51] Following removal of the show home until the present time (2019), the section has been used as a private car park. In 2003, a sculpture called Halamoana, by artist Filipe Tohi, was erected near the Powderham

[46] ibid
[47] *Taranaki Herald*, 20 November 1906, p.4.
[48] *Taranaki Daily News*, 18 June 1907, p.2.
[49] *Taranaki Herald* on 06/06/1964, p.1.
[50] "Building Toppled After Marathon Fire Fight", *Taranaki Herald*, 4 March 1984, p.1.
[51] Wyatt, "Site of proposed car park, Currie Lane"

intersection; the sculpture was commissioned and paid for by New Plymouth architect, Terry Boon.[52]

8. Archaeological record

8.1 The NZAA site recording scheme currently contains no record of archaeological sites recorded on the project area.

8.2 No archaeological sites, sites of significance to Maori, or heritage structure or items are scheduled on either the operative or proposed New Plymouth District plans.

9. Survey results

9.1 The project area presents a heavily modified surface, consisting of a gravelled car park, sloping slightly to the north and east. There are no surface indications of the former historic structures that stood here.

Figure 12: Project area, photo taken looking north (Image: Ivan Bruce, 2019).

9.2 An inspection of the profile offered along the Powderham St exposed a section of up to 1.2m in depth, showing roading material overlying modified topsoil and "Taranaki ash"

[52] Gooch, "Macky, Logan, Caldwell & Co Building (cnr Brougham and Powderham Streets)"

subsoil. The Brougham St section is lower and showed only slumped pavement overlying mixed topsoils. No historic material was noted in either section.

Figure 13: Powderham St profile to the left of shot (Image: Ivan Bruce, 2019).

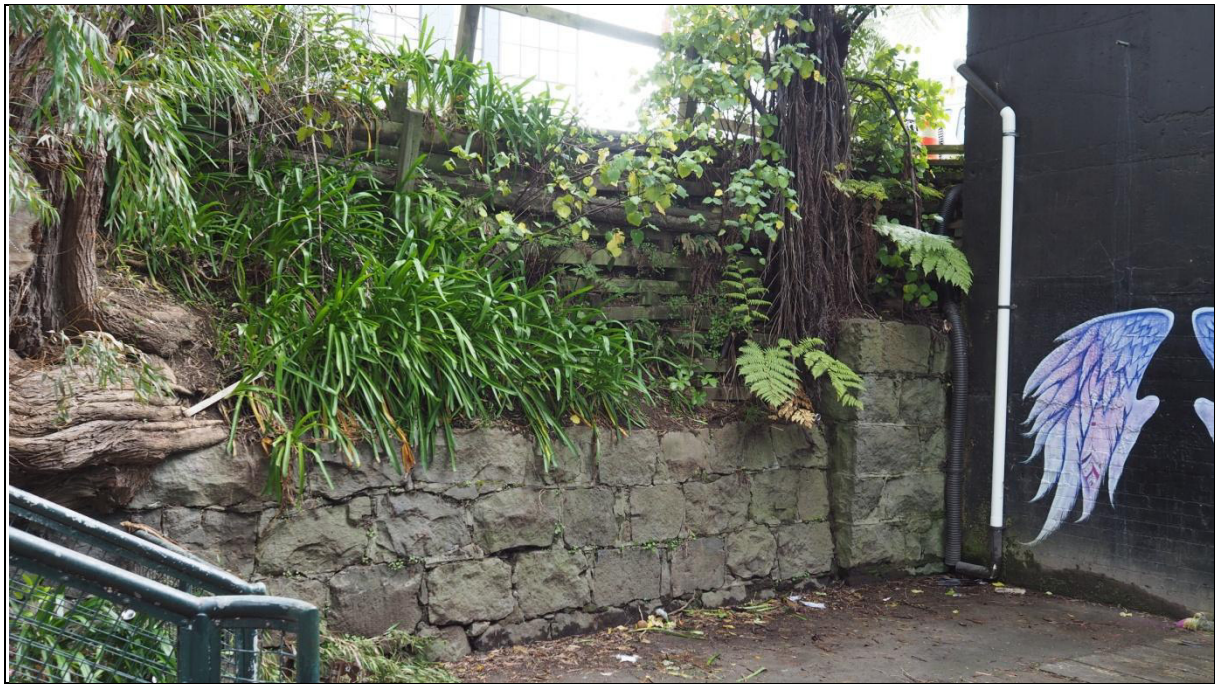


Figure 14: Remnant section of stone railway embankment, retained eastern boundary of project area above (Image: Ivan Bruce, 2019).

9.3 The eastern section has been retained and backfilled with relatively recent material, as stated in section 3.2. The retaining is supported by the former railway embankment,

constructed from blocks of split andesite stone. This embankment was constructed as part of the New Plymouth to Waitara Railway line, which opened in 1875, is by definition an archaeological feature, part of the former railway line assemblage. This section of embankment appears to be located on DP 15432, the property immediately east of the project area.

9.4 The northern boundary of the site could not be accessed during this field inspection, but has been retained and backfilled along the north east corner where the natural contour falls very steeply to the Huatoki Stream.

10 Assessment of effects

10.1 Any recovery archaeological evidence relating to the 19th Century land use of 51 Brougham St, if at all, is unlikely to be extensive and would be considered a chance find. Due to the extensive earthworks that have occurred on this section since the 1906-07 construction of the Macky, Logan & Caldwell warehouse, its demolition in 1984, and subsequent works in constructing the car parking facility, there is a low likelihood that archaeological evidence of the earlier occupations of Hughes, Rawson or Mofflin will have survived the later works. Any evidence of pre European land use, such as the "Maori pits" reportedly encountered by Hughes, were likely gardened away upon discovery during his early tenure. Only very deeply cut features, such as wells are likely to have survived at this location and given the close proximity to the nearby Huatoki stream, it is possible that wells were not dug at all here during the early years of European development on this section. The later installation of the New Plymouth Water supply in 1883 obviated any requirement for any other form of water supply from then on.

10.2 It is possible that the removal of the large Agonis Flexuosa will destabilise the stone railway embankment, which may in turn require demolition and/or replacement of that wall. This structure predates 1900 and is by definition part of an archaeological site and will require an archaeological authority to damage destroy or modify this feature.

11. Archaeological significance

11.1 Surface earthworks have already modified the project area and any surviving archaeological features are be expected to limited deeply cut archaeological features, i.e. wells. Due to the history of multiple European owners the ability for archaeological

investigation to identify discrete occupations or to clearly define a sequence of development at this site will be limited.

11.2 A range of artefacts such as commercial bottle glass, china and earthenware, glass bottles and earthenware crocks, clay tobacco pipes, shell and bone midden, clothing, footware, tools, and iron objects could potentially exist as backfill in wells. Most objects found by archaeologists in situations like this are recovered in a broken or fragmented state; but can potentially have high archaeological value, depending on the rarity and context of the artefact.

11.3 The stone railway embankment is part of a wider, largely unrecorded archaeological assemblage relating to the 1875 New Plymouth to Waitara Railway line. The short section of wall is one of a few sections of the stone embankment that survive in the New Plymouth CBD. However longer and substantially better presented sections of the same embankment do survive on publically accessible areas, notably on the right bank of the Huatoki Stream at the Huatoki Plaza and on the western side of Sir Victor Davies Memorial Park. The latter is listed as a heritage feature (ID 70) on the proposed NPDC District Plan. The heritage values of this remnant section of wall are low - medium and given that representative samples of the same assemblage are protected in the district plan, conditional modification of this feature could be reasonably expected to proceed under an archaeological authority.

12. Recommendations

12.1 All earthworks undertaken on the PT Section 683 Town of New Plymouth, PT Lot 6 DP 3466 and PT Lot 6 DP 3466 should be undertaken under an archaeological discovery protocol, under which should archaeological evidence, or suspected archaeological evidence be recovered, all works will cease until the find has been verified by the project archaeologist and approval/ authority to proceed has been granted by HNZPT.

12.2 No modification of the stone railway embankment should occur if possible. However if the preservation of the surviving section of embankment cannot be practically achieved I recommend that K.D. Holdings Limited make an application for a general archaeological authority to modify, damage or destroy this embankment, and any unrecorded archaeological features contained within the entirety of the project area.

12.3 It can be expected that any archaeological authority will contain conditions requiring that works proceed under an archaeological discovery protocol and the investigation and reporting of archaeological finds to an accepted archaeological standard.

12.4 Pre application discussions should be undertaken with the regional archaeologist from HNZPT prior to submitting this application to ensure that the correct process is undertaken and the application contains all required information to process the authority.

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APPENDIX G MEMORANDUM – POTENTIAL FOR SOIL CONTAMINATION

Memorandum

To:	**BOON Limited c/o Murali Bhaskar: m.bhaskar@boon.co.nz**		
Copy:	Dave Bolger – BTW Environment Manager		
From:	Alex Connolly – BTW Environmental Scientist		
Date:	11/9/19	**BTW Job number:**	190783

Subject: Potential For Soil Contamination At 45-51 Brougham Street, New Plymouth (Record of Title TNF1/436).

Scope:

- The Site: 45-51 Brougham Street, New Plymouth (Record of Title TNF1/436)
- Review of available aerial imagery
- Taranaki Regional Council (TRC) file review
- NPDC Kete New Plymouth website review
- Brief memo to client on the likelihood of soil contamination due to Hazardous Activities and Industries List (HAIL) activities, and recommendations as to whether any further investigation is required.

Background:

- The site is currently a vacant lot and is used as a carpark. A new building is proposed to be built on the site which will include excavation of soil.
- Since the fire in 1983 the site has continued to be utilised as a metalled car parking area.

NPDC Aerial Imagery and Records

- Historical aerial imagery was obtained for 1950, 1970, 1976 and 1981 for the New Plymouth Central Business District (1950 and 1976 aerial imagery of 45-51 Brougham Street building).
- The 1950, 1970 and 1976 images show a large building on the site, the building adjacent to this still exists to the present day and it is thought to be of a similar design to the building that existed on the subject site.
- From the aerial imagery obtained (1950, 1970 and 1976) a large building existed over the site and was used for wholesale activities. The New Plymouth Information Officer provided detail around the age of the building and how it was utilised. The building that used to exist on the carpark lot was built in 1907 and used as a warehouse for a wholesaler's company (Kete New Plymouth NPDC Information Services Officer, 2019).
- In 1983 the building was destroyed in a fire and demolished on the same day. (Kete New Plymouth NPDC Information Services Officer, 2019).
- From the recent aerial imagery obtained (2001 to 2019) the subject site has been utilised as a metalled car parking area (Google Earth, Time Hop 2001-2019).

Taranaki Regional Council Records

- TRC do not hold any information concerning the subject site and therefore have no records of past or present HAIL activity being undertaken.

- The site is not recorded on the TRC Register of Selected Land Uses (RSLU) which provides a record of known contaminated sites. There are no associated consents, permitted activities, environmental incidents or RSLU entries in TRC records.

Summary

- The subject site at 45-51 Brougham Street has no known recorded HAIL activity or any reason to advise further research regarding soil contamination.

- The site had a building erected in 1907 that was used as a warehouse for wholesaler's companies until 1983 when fire burnt the building down. The site has been used as a carpark since 1983.

- There is no reason to believe there is any soil contamination on the site or cause for a Preliminary Site Investigation to be undertaken at the site based on the information we have obtained from aerial imagery and TRC records.

CC: *Darelle Martin, Intermediate Planner, BTW Company*

Attachments:

- Kete New Plymouth NPDC Information Services Officer, 2019

-NPDC 1950 aerial imagery of 45-51 Brougham Street building

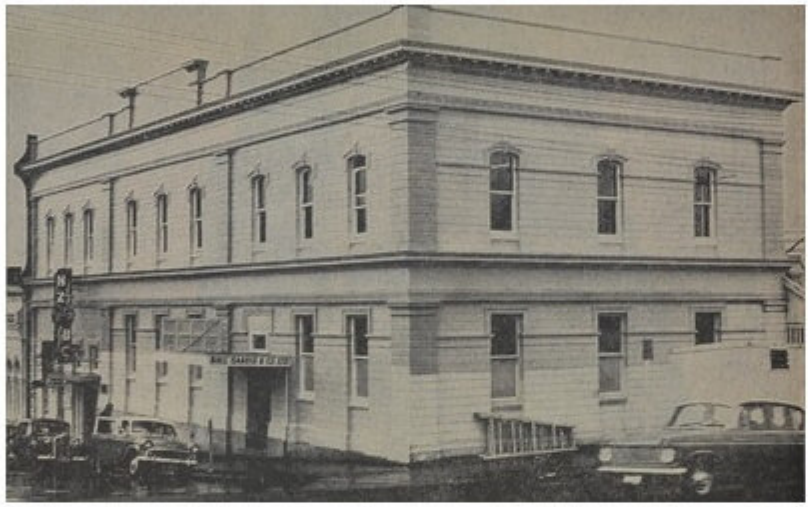
-NPDC 1976 aerial imagery of 45-51 Brougham Street building

- Google Earth, Time Hop 2001-2019

- Kete New Plymouth NPDC Information Services Officer, 2019

Macky, Logan, Caldwell & Co Building (cnr Brougham and Powderham Streets)

Topic » Place



This building was erected in 1907 as a warehouse for the wholesale company Macky, Logan, Caldwell and Co. The company was one of the largest wholesalers in the country and this New Plymouth branch was opened with the prospect of increasing business.

Located on the corner of Brougham and Powderham Streets - east side.

It was designed by Frank Messenger, and the contractors were Coleman and Son. The plumbing was done by Smart Bros, painting by Pillar and Bullot, and brickwork by Messrs Russell and Son. The cost was estimated to be £2,300. Please view the weblink, "*Town Improvements*", for more information about the building.

On the evening of 27 September 1952 a ceremony was conducted to mark the beginning of commercial radio (2XP) in Taranaki. They broadcast from the first floor of this building until new premises across the road in upper Brougham Street were built in 1966.

On the 4 March, 1983, the building was destroyed by a large fire, and demolished the same day. At the time it was the premises of Bennett and Sutton Limited.

The section has been used as a private carpark since then. In 2003 a sculpture called, *Halamoana*, by Filipe Tohi, was erected near the Powderham intersection. The sculpture was commissioned and paid for by New Plymouth architect, Terry Boon.

Tags

Tags: Macky Logan Caldwell & Co Building, fire 1980 to 1989, NPB_Powderham Street, 2XP, Brougham Street, Frank Messenger, Powderham Street, Smart Bros, Pillar and Bullot, Russell and Son, Bennett and Sutton Ltd, Filipe Tohi, Halamoana, Terry Boon, NPB_1900 to 1920, Town section 683, NPB_Brougham Street

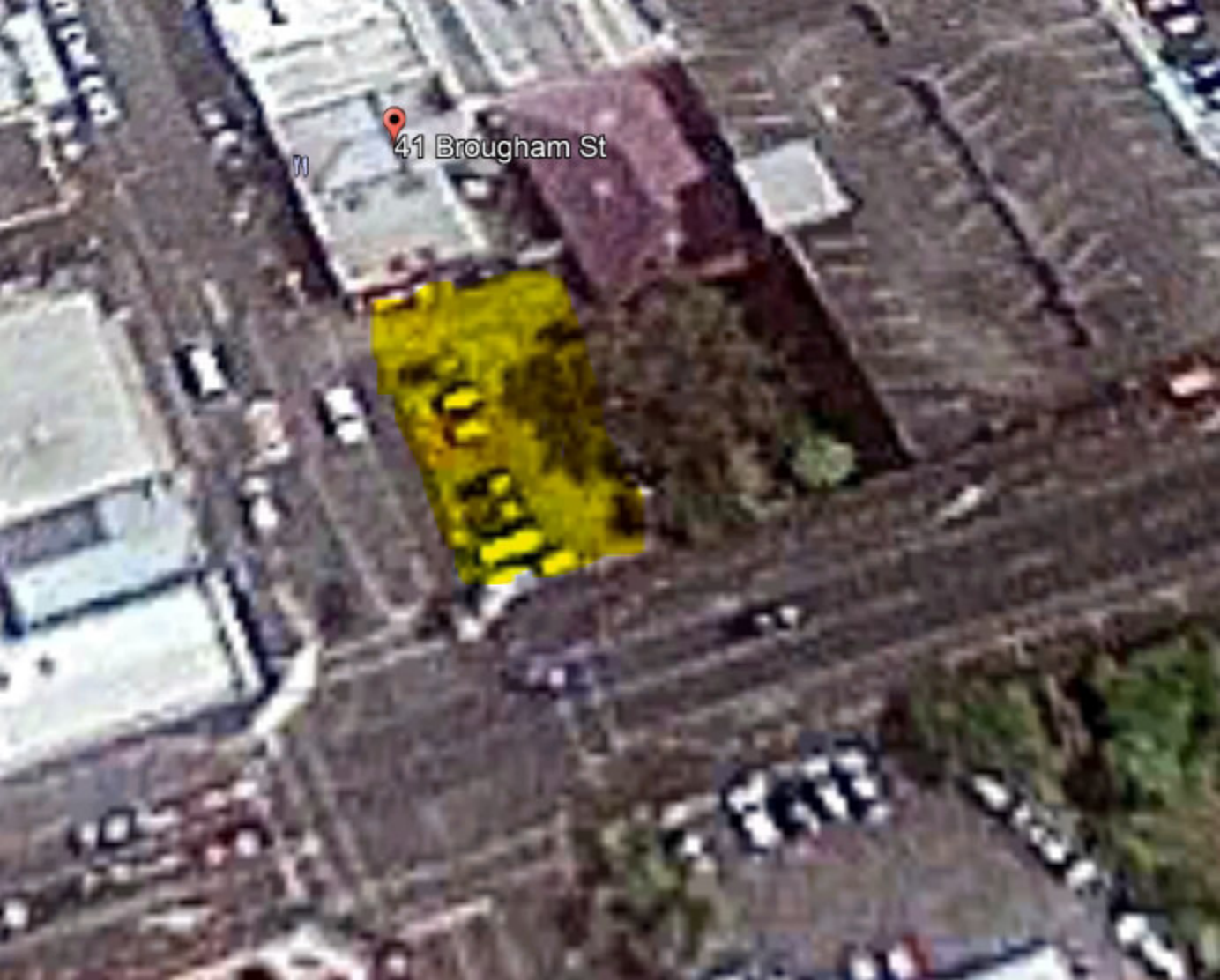
Macky, Logan, Caldwell & Co Building (cnr Brougham and Powderham Streets)

City: New Plymouth

-NPDC 1950 aerial imagery of 45-51 Brougham Street building

-NPDC 1976 aerial imagery of 45-51 Brougham Street building

- Google Earth, Time Hop 2001-2019


41 Brougham St

APPENDIX H CARPARKING STANDARD AS/NZS 2890.1:2004

TABLE 1.1

CLASSIFICATION OF OFF-STREET CAR PARKING FACILITIES

User class	Required door opening	Required aisle width	Examples of uses (Note 1)
1	Front door, first stop	Minimum for single manoeuvre entry and exit	Employee and commuter parking (generally, all-day parking)
1A	Front door, first stop	Three-point turn entry and exit into 90° parking spaces only, otherwise as for User Class 1	Residential, domestic and employee parking
2	Full opening, all doors	Minimum for single manoeuvre entry and exit	Long-term city and town centre parking, sports facilities, entertainment centres, hotels, motels, airport visitors (generally medium-term parking)
3	Full opening, all doors	Minimum for single manoeuvre entry and exit	Short-term city and town centre parking, parking stations, hospital and medical centres
3A	Full opening, all doors	Additional allowance above minimum single manoeuvre width to facilitate entry and exit	Short term, high turnover parking at shopping centres
4	Size requirements are specified in AS/NZS 2890.6 (Note 2)		Parking for people with disabilities

NOTES:

1 Except for the requirements specified in Clause 1.4 relating to User Classes 1A and 4, the examples of uses are intended to be flexible and allow for progressive improvement both in the ease of manoeuvring into and out of parking spaces, and in leaving and re-entering the vehicle as one progresses up the user class scale from 1 to 3A. The modelling of vehicle manoeuvring into Class 1A spaces shows however, that many drivers may have difficulty driving into and out of such spaces, especially those with vehicles larger than the B85 vehicle. Furthermore, they may have difficulty entering and leaving the vehicle in the narrower spaces. Safety issues associated with delays and congestion caused by manoeuvres into and out of Class 1A spaces in large parking areas should also be taken into account. See also Appendix B, Paragraph B4.8.

2 In preparation, see footnote to Clause 1.2.

2.4 DESIGN OF PARKING MODULES

2.4.1 Angle parking spaces

Dimensions of angle parking spaces shall be as shown in Figure 2.2 subject to the following exceptions:

(a) *Length* The nominal length of a parking space in a parking module shall be 5.4 m min except as follows:

(i) *End overhang* Where a vehicle may overhang the end of a space, e.g. at a kerb, provided the first 600 mm immediately behind it is unobstructed, is not another parking space and is not required as a footway or for some similar purpose, space lengths measured parallel to the parked vehicle may be reduced by 600 mm. Ends of bays shall be provided with wheel stops if the requirements specified in Clause 2.4.5.4 apply.

(ii) *In New Zealand* The space may be marked to a shorter length (nominally 5.0 m) as specified in Clause 4.4.1. There shall be no consequential reduction in the combined length of space and width of parking aisle from that given in Figure 2.2.

(iii) *Spaces for small cars* In certain circumstances it may be appropriate to provide a space smaller than specified above for small cars. It shall be designated as a space for small cars.

NOTE: The size of such spaces is based on small car vehicle dimensions recommended in Appendix A, Paragraph A6.

The minimum dimensions shall be as follows:

(A) In Australia—2.3 m wide × 5.0 m long.

(B) In New Zealand—2.3 m wide × 4.5 m long.

(b) *Width* The minimum width of parking spaces required for each user class is shown in Figure 2.2 except as follows:

(i) *Spaces for small cars* The specified minimum width is given in Item (a)(iii).

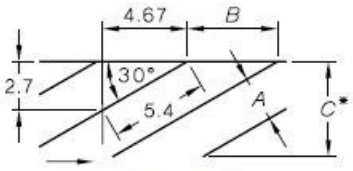
(ii) *Adjacent obstruction* If the side boundary of a space is a wall or fence, or if there are obstructions such as columns placed so as to restrict door opening, 300 mm shall be added to the width of the space.

(iii) *Parking spaces for people with disabilities* See AS/NZS 2890.6*.

Attention is also drawn to the reduced width requirement for 30 degree parking as shown in Figure 2.2.

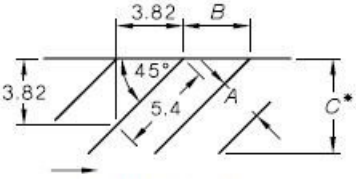
In the design of buildings or parts of buildings to be used exclusively as parking stations, the location of obstructions such as columns shall be in accordance with Clause 5.2.

* In preparation. See footnote to Clause 1.2.



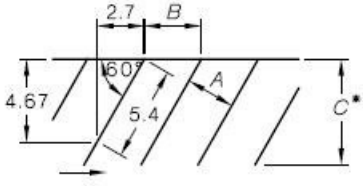
(a) Bays at 30°

User class (Note 1)	A (Notes 2 & 3)	B	C_1	C_2	C_3	Aisle width
1,1A	2.1	4.2	4.4	4.1	4.5	3.1
2	2.3	4.6	4.4	4.1	4.7	3.0
3	2.5	5.0	4.4	4.1	4.9	2.9
3A	2.5	5.0	4.4	4.1	4.9	3.45



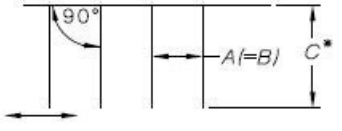
(b) Bays at 45°

User class (Note 1)	A (Note 3)	B	C_1	C_2	C_3	Aisle width
1,1A	2.4	3.4	5.2	4.8	5.5	3.9
2	2.5	3.5	5.2	4.8	5.6	3.7
3	2.6	3.7	5.2	4.8	5.7	3.5
3A	2.6	3.7	5.2	4.8	5.7	4.2
4	(See Note 5)					



(c) Bays at 60°

User class (Note 1)	A (Note 3)	B	C_1	C_2	C_3	Aisle width
1,1A	2.4	2.75	5.7	5.1	5.9	4.9
2	2.5	2.90	5.7	5.1	6.0	4.6
3	2.6	3.00	5.7	5.1	6.0	4.3
3A	2.6	3.00	5.7	5.1	6.0	5.1
4	(See Note 5)					



(d) Bays at 90°

User class (Note 1)	A (Note 3)	B	C_1	C_2	C_3	Aisle width (Note 4)
1	2.4	2.4	5.4	4.8	5.4	6.2
1A	2.4	2.4	5.4	4.8	5.4	5.8
2	2.5	2.5	5.4	4.8	5.4	5.8
3	2.6	2.6	5.4	4.8	5.4	5.8
3A	2.6	2.6	5.4	4.8	5.4	6.6
3A	2.7	2.7	5.4	4.8	5.4	6.2
4	(See Note 5)					

*Dimension C is selected as follows (see Note 6):

C1—where parking is to a wall or high kerb not allowing any overhang.

C2—where parking is to a low kerb which allows 600 mm overhang in accordance with Clause 2.4.1(a)(i).

C3—where parking is controlled by wheelstops installed at right angles to the direction of parking, or where the ends of parking spaces form a sawtooth pattern, e.g. as shown in the upper half of Figure 2.4(b).

For Notes—see over.

DIMENSIONS IN METRES

FIGURE 2.2 LAYOUTS FOR ANGLE PARKING SPACES

NOTES TO FIGURE 2.2:

1 User class is defined in Table 1.1. The two Class 3A options given for 90 degree parking are alternatives of equal standing.

2 30 degree parking spaces can be made narrower than spaces at other angles because of the reduced chance of open doors hitting adjacent vehicles.

3 The design envelope around each parking space, to be kept clear of obstructions, is shown in Figure 5.2.

4 Dimensions for 90 degree parking aisles are for two-way aisles. These dimensions are required to be observed even though one-way movement along aisles is imposed for other purposes, see Clause 2.3.2(a).

5 Space dimensions for User Class 4 spaces (for people with disabilities) are specified in AS/NZS 2890.6*. Aisle widths shall be the same as applicable to adjacent other-user spaces or in the absence of such spaces, 5.8 m minimum.

6 The values for dimension C have been calculated as follows:

$C_1 = 5.4 \sin\theta + 1.9 \cos\theta$

$C_2 = C_1 - 0.6 \sin\theta$

$C_3 = C_1 + (A - 1.9) \cos\theta$

where

θ = parking angle

A = space width, in metres

2.4.2 Angle parking aisle

The width of angle parking aisles is determined from either the width needed for circulating traffic or the width needed to manoeuvre into and out of a parking space. In the latter case, the width will vary according to the width of the parking spaces, wider spaces needing less aisle width for the parking manoeuvre. Minimum aisle widths shall be as shown in Figure 2.2. These widths will cater both for the angle parking manoeuvre or for circulating traffic, two-way in the case of 90 degree parking and one-way in the case of 30, 45 and 60 degree parking. For aisles where there is parallel parking on one or both sides, see Clause 2.4.4.

When designing for turns between an aisle and a ramp or circulation roadway, or between two aisles, adequate area shall be provided for the turning movements (see Clause 2.5.2(c)).

The following additional requirements shall apply:

(a) *Class 1A aisles* Class 1A aisles apply to 90° parking only. Minimum aisle widths are shown in Figure 2.2.

NOTE: These may be of lesser width than those for user Class 1 aisles and may not allow access into parking spaces in a single manoeuvre by some vehicles, see Appendix B, Paragraph B4.8.

(b) *Class 3A aisles* To cater for expected higher turnover than other User Class 3 parking areas, User Class 3A parking spaces or aisle widths shall be increased in size as shown in Figure 2.2.

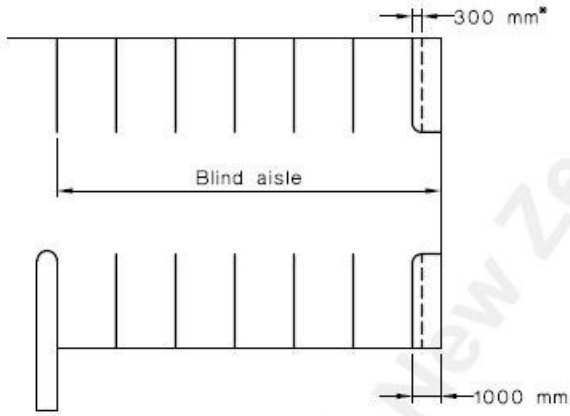
(c) *Blind aisles* At blind aisles, the aisle shall be extended a minimum of 1 m beyond the last parking space, as shown in Figure 2.3, and the last parking space widened by at least 300 mm if it is bounded by a wall or fence.

NOTE: Where practicable the space should be widened by the same amount as the aisle is lengthened.

In car parks open to the public, the maximum length of a blind aisle shall be equal to the width of six 90 degree spaces plus 1 m, unless provision is made for cars to turn around at the end and drive out forwards.

* In preparation. See footnote to Clause 1.2.

(d) *Single-sided aisles* Where there is angle parking on one side of an aisle only and the other side is confined by a wall or other high vertical obstruction closer than 300 mm to the nominal edge of the aisle, to provide manoeuvring clearance, the aisle width shall be increased by 300 mm, measured to the vertical obstruction.



*Additional widening required if there is a wall or fence at the side of the last space, see Clause 2.4.1(b)(ii).

DIMENSIONS IN MILLIMETRES

FIGURE 2.3 BLIND AISLE EXTENSION

2.4.3 Angle parking module layout

Layouts of typical angle parking modules are shown in Figure 2.4.

2.4.4 Parallel parking in parking aisles

Where parallel parking is to be provided on one or both sides of a parking aisle the following shall apply:

(a) *Parallel parking one or both sides, one-way or two-way aisle*

Layout requirements for parallel parking on one or both sides of a one-way aisle shall be as set out in Figure 2.5.

Where the aisle is two-way but parking is on one side only, its width shall be increased by 3.0 m minimum.

Where parallel parking is provided on both sides of a two-way aisle, the aisle widths shown in Figure 2.5 shall be provided on each side of the aisle centre-line.

For parallel parking on both sides of a one-way aisle the aisle width shall be at least twice that shown in Figure 2.5.

(b) *Parallel parking one side, angle parking the other, one-way or two-way aisle* Requirements shall be as follows:

(i) Angle parking space depths shall be as shown for dimension C on Figure 2.2.

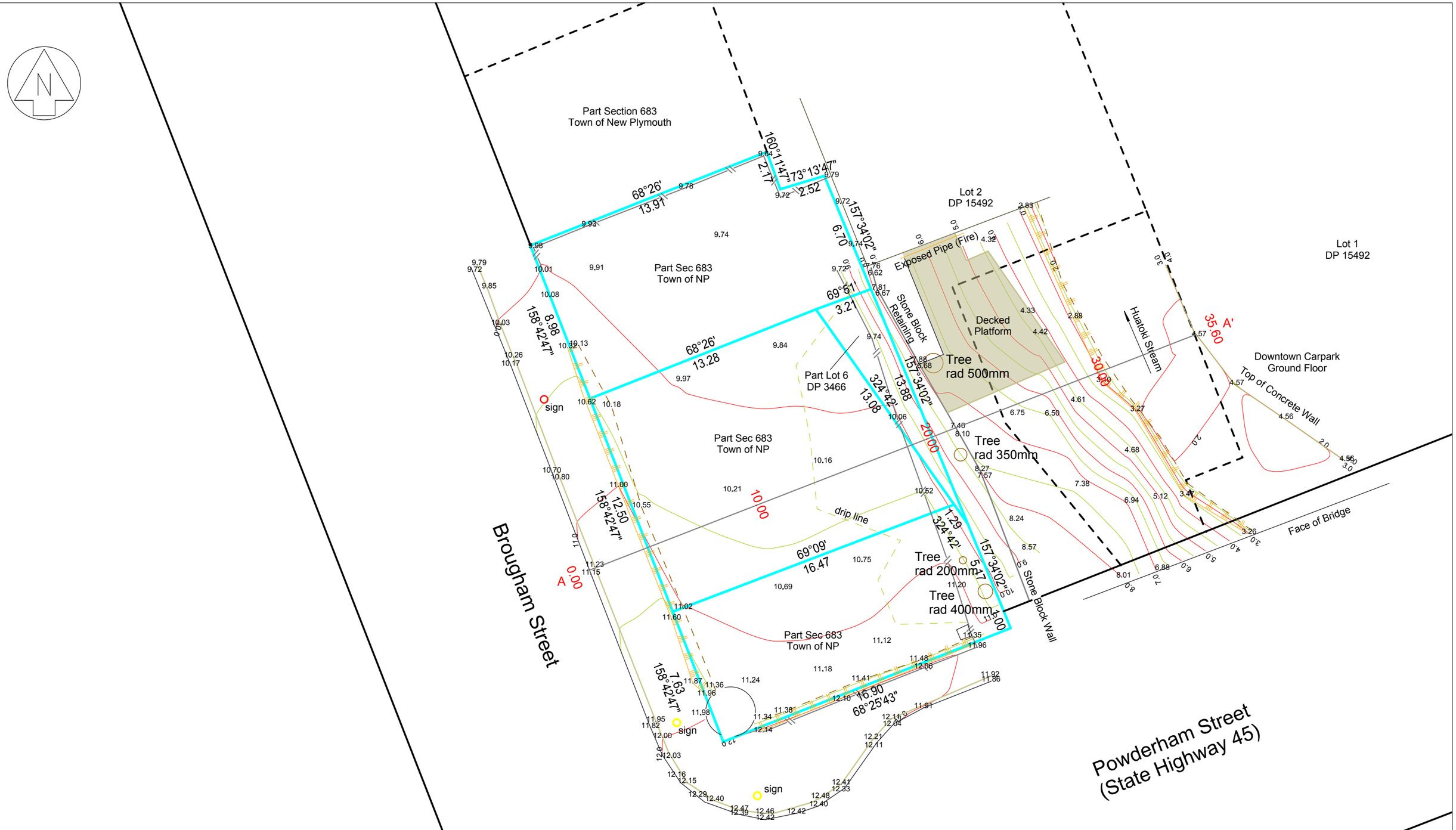
(ii) Parallel parking space dimensions shall be as shown on Figure 2.5.

(iii) Aisle width shall be that shown on Figure 2.2 plus a further 0.5 m.

(iv) Steps shall be taken to discourage reverse-in parking where the angle parking angle is other than 90 degrees.

NOTE: Suitable steps might include making the aisle one-way or signposting the angle parking spaces as front-in only.

APPENDIX I TOPOGRAPHICAL SURVEY AND NOTABLE TREE DRIPLINE INFORMATION



02	Additional Topographical Info	18.07.19	ta	cj
01	Bdy info and Trees	25.06.19	ta	cj
00	Issued	27.05.19	ta	cj
Rev.	Amendment Description	Date	Drawn	Appr.

BLAND & JACKSON SURVEYORS LTD

19 Dawson Street, New Plymouth, 4340 - www.bjsl.co.nz - (06) 758 6171 - mail@bjsl.co.nz

Coordinates are in terms of Taranaki Datum 2000
Based on RM XVI SO 13123 808683.91mN 386556.75mE
Elevations are in terms of Taranaki Vertical Datum 1970.
Origin of Elevations RM XVI SO 13123, 5.03m.

- Major Contour Interval is 1.0m
- Minor Contour Interval is 0.50m

Title

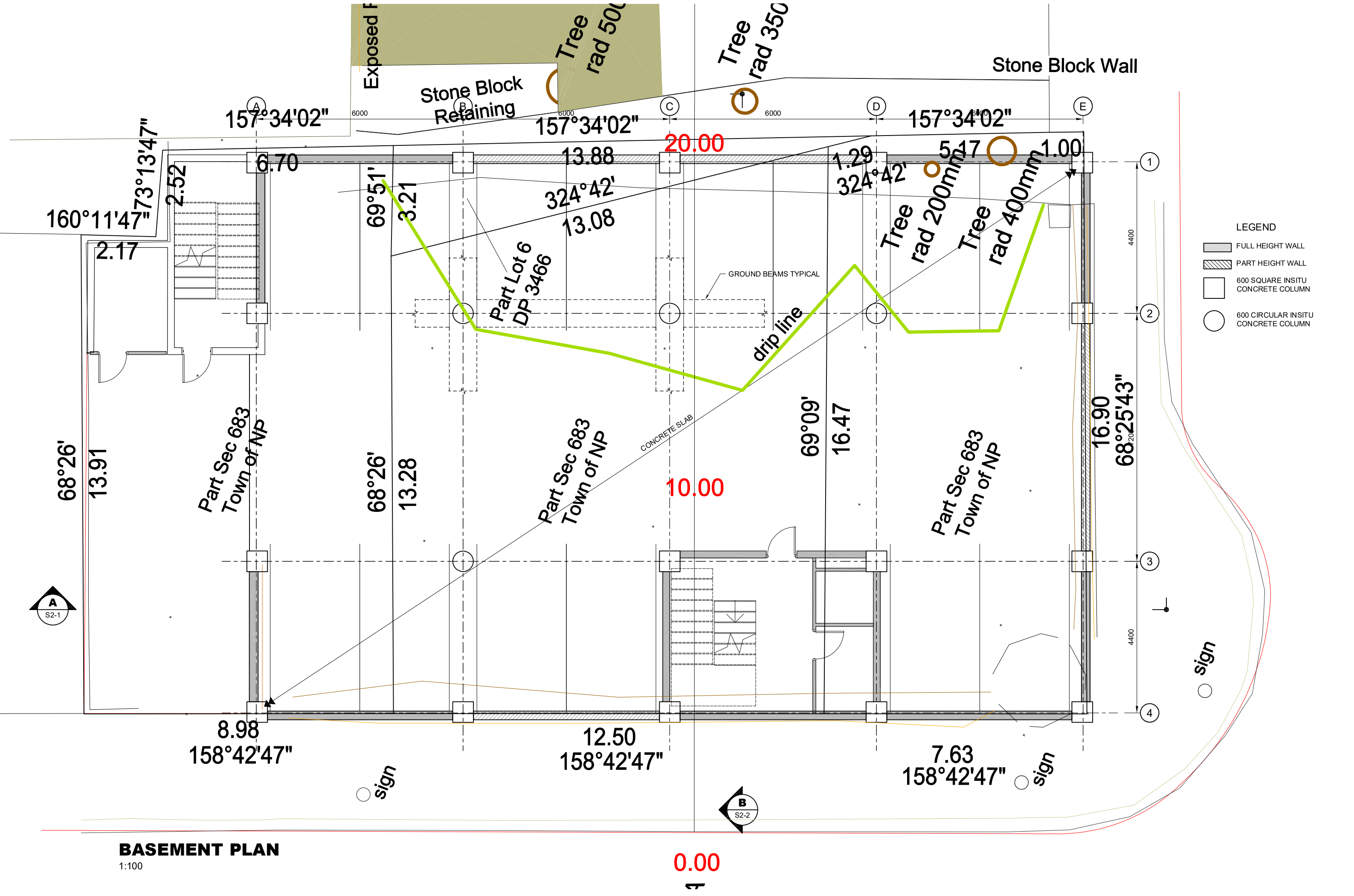
Site Topographical Survey

Part Sections 683 Town of New Plymouth
Part Lots 6 DP 3466

Location: 51 Brougham Street

Drawing Scale (Original Size - A3)	Project No.	Drawing File	Sheet no.	Revision
1:200	9299	E00	1 /2	R02

S:\Documents\9299 Red Jacket Brougham Street\12D\9299 Topo 9299 Topo



BASEMENT PLAN

1:100

APPENDIX J VIEWSHAFT PHOTOS

Figure J 1: Photo from top of Cameron Street Viewshaft (Source: BTW)

Figure J 2: Zoomed in photo from top of Cameron Street viewshaft (Source: BTW)

Figure J 3: Photo from Victoria Road viewshaft (Source BTW)

Figure J 4: Zoomed in photo from Victoria Road viewshaft, site location not clear (Source: BTW)

Figure J 5: Photo from Marsland Hill/Pukaka viewshaft (Source: BTW)

Figure J 6: Zoomed in photo from Marsland Hill/Pukaka, site indicated (Source: BTW)

Figure J 7: Panorama of the view from Marsland Hill/Pukaka viewshaft facing the site in context with other available viewpoints (Source: BTW)

APPENDIX K GEOTECHNICAL INTERPRETIVE REPORT

REPORT

Tonkin+Taylor

Geotechnical Interpretative Report

51 Brougham Street, New Plymouth

Prepared for
Red Jacket Ltd
Prepared by
Tonkin & Taylor Ltd
Date
December 2019
Job Number
1011502.v2

Exceptional thinking together
www.tonkintaylor.co.nz

Document Control

Title: 51 Brougham Street, New Plymouth Geotechnical Interpretative Report					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
September 2019	1	Draft for review	C McDiarmid / E Williams	P Tang	H Maclean
December 2019	2	First issue	E Williams	P Tang	H Maclean

Distribution:

Red Jacket Ltd	1 electronic copy
Tonkin & Taylor Ltd (FILE)	1 electronic copy

Table of contents

1 Introduction

Tonkin + Taylor Ltd (T+T) was engaged by Red Jacket Limited (Red Jacket) to supervise geotechnical field investigations on site and to provide geotechnical services for the proposed development at 51 Brougham Street, New Plymouth. The geotechnical services provided were in accordance with our proposal dated 5 July 2019[1].

This report details the results of the geotechnical investigations and assessment for the proposed development consisting of a four storey building with basement level carparking. Subject to the recommendations in this report and ongoing groundwater monitoring, we consider the site to be generally suitable for the proposed development.

1.1 Scope of work

The scope of works undertaken includes organisation and supervision of geotechnical site investigations outlined in Section 2.1.3 and a geotechnical assessment comprising:

- Interpretation of geotechnical site investigations and preparation of a geological section and site plan;
- Assessment of site subsoil class for seismic design and comment on liquefaction potential;
- Preliminary assessment of foundation options for structural design;
- Provision of design soil parameters for retaining wall design (for low retaining structures) and options for temporary retaining wall support;
- Provision of recommendations for site excavation methodology and ground preparation;
- Undertake a slope stability assessment of the eastern slope;
- Advise on floor slab design (CBR value) and external pavements;
- Provision of this combined factual and interpretive geotechnical report which summarises the assessment outlined above. This report can be used to support building and resource consent applications for the proposed building development.

This report does not cover detailed design of retaining walls.

1.2 Site description

This subject site in New Plymouth CBD is shown on site survey drawings[2] provided by Red Jacket (included in Appendix A). It is located on the corner of Powderham and Brougham Street bound to the south by Powderham Street and to the west by Brougham Street. The site is generally rectangular in shape and encompasses four property lots, legally described as Part Sections 683 Town of New Plymouth (three lots) and Part Lots 6 DP 3466.

The site slopes moderately downwards to the north from approximately 11.3 RL m at the street corner to 9.7 RL m, with a steep bank sloping towards the east along the eastern boundary, dropping down to Huatoki Stream at approximately 2 RL m. There is an archaeologically significant stone railway embankment[3] (built between 1873 - 1875 and is referred to herein as the 'non-engineered retaining wall') comprising stone block and timber sleepers up to 2-3 m high at the crest of this steep bank upslope from the stream. A timber walkway has been established mid-slope from the stream.

[1] Tonkin & Taylor Ltd, 5 July 2019, Offer of Service – 51 Brougham Street, New Plymouth – Geotechnical Consultancy Service. Job Ref: 1011502.
[2] Bland & Jackson Surveyors Ltd (18 July 2019). *Site Topographical Survey; Part Sections 683 Town of New Plymouth; Part Lots 6 DP 3466. Location: 51 Brougham Street. Project No. 9299.* Drawing File: E00; Sheet1/2; R02.
[3] K.D Holdings Ltd, November 2019 "Brougham Street Development Project Area 512 Brougham Street, New Plymouth".

The stream runs along this eastern boundary and continues toward the southeast under Powderham Street to the Huatoki Walkway.

Across the Huatoki Stream to the east is a multi-storey carparking building (Downtown) and adjacent to the northern boundary is a single storey retail building. Along the northeastern boundary is another single storey building with a raised deck platform overlooking the stream.

1.3 Proposed development

The proposed development as shown by master planning drawings provided by Red Jacket[4] (Sketches SK1.02 & SK3.01 to SK3.04 in Appendix A), is a four storey building with basement level carparking. The proposed building footprint being approximately 412m^2. We understand that up to three additional storeys could be added. Later stages of this development may include similar developments at 53 Brougham Street, which this report does not cover.

It is expected that ground retention will be required along the southern and western sides of the basement level (along the road boundaries of Powderham and Brougham Street) but that the basement will largely daylight along the downslope eastern boundary. Minor retention may be required to support the existing buildings on the northern and northeastern sides of the site. Architectural drawings have been prepared by Boon Team Architects.

2 Assessment and interpretation of site conditions

2.1 Previous geotechnical investigations

Previous geotechnical investigations and assessment have been undertaken at a nearby site by Beca Ltd in 2016, comprising two machine drilled borehole logs which were obtained from the New Zealand Geotechnical Database (NZGD) from a site approximately 200m away. The borehole logs suggest the subsurface condition is likely to comprise volcanic ash overlying sand/gravel lahar material. These borehole logs can be found in Appendix B.

2.2 Current geotechnical investigations

Geotechnical investigations were carried out at the project site on 30 July to 31 July 2019. The investigations comprised:

- 1 No. Machine drilled borehole;
- 6 No. Hand augered boreholes (undertaken by Red Jacket Ltd);
- 5 No. Cone Penetration Tests (CPTs).

The locations of the investigations were surveyed by hand held GPS and are presented on the investigation summary tables below. The investigation locations are presented on Figure 1, Appendix A. The logs are presented in Appendix C.

[4] Boon Team Architects (4 April 2019). *Brougham Street Development, 51-53 Brougham Street, New Plymouth; Master Planning. Job number 6400.* Drawing No. SK1.02 & SK3.01 to SK3.04.

Table 2-1: Summary of site investigations

Location ID	Location (NZTM)		Ground Surface Elevation RL* (m)	Termination depth (m)	Reason for termination
	Easting (m)	Northing (m)			
BH1	1692880	567616	9.68	19.95	Target Depth
HA1	1692877	5676144	11.03	5.0	Target Depth
HA2	1692870	5676154	10.13	5.0	Target Depth
HA3	1692867	5676165	9.79	5.0	Target Depth
HA4	1692884	5676145	11.01	5.0	Target Depth
HA5	1692891	5676159	6.72	4.7	Refusal on dense gravel layer
HA6	1692899	5676161	3.1	2.3	Refusal on dense gravel layer
CPT01 & 1A	1692884	5676145	11.01	5.36 & 6.11	Refusal on dense gravel layer
CPT02 &2A	1692877	5676144	11.03	5.87 & 5.2	Refusal on dense gravel layer
CPT03 &3A	1692870	5676154	10.13	5.23 & 5.19	Refusal on dense gravel layer
CPT04	1692867	5676165	9.79	7.14	Refusal on dense gravel layer
CPT05	1692880	5676161	9.68	5.3	Refusal on dense gravel layer

*Elevation is based upon contour data provided by Bland & Jackson Surveyors Ltd.

2.2.1 Machine drilled borehole

The machine drilled borehole was carried out using a rotary coring drilling rig, supplied and operated by Drillforce Ltd. The boreholes were advanced from ground level using a hydro-vacuum technique to a depth of 1.5 m for service clearance, then HQ3 triple tube coring was undertaken down to the end of hole.

In-situ Standard Penetration Testing (SPT) was carried out at regular (1.5 m) intervals through the soil horizon. All drilling works were completed under the full time supervision of an engineering geologist from T+T. The recovered drill core was photographed and logged to NZGS 'Field Description of Soil and Rock' guidelines.

2.2.2 Cone Penetration Tests (CPTs)

Five (5) Cone Penetration Tests (CPTs) were undertaken by Drillforce Ltd on 31 July 2019. None of the Cone Penetration Tests achieved the target depth of 20 m with depths to refusal ranging between 5.19 m and 7.14 m below ground level due to the cone terminating on or within a hard, impenetrable strata such as rock or a dense sand layer. A second test was performed adjacent to the original test locations where possible in an attempt to get a deeper test result. Based on the material logged from BH1, it is expected that all the CPTs refused on cobbles/boulders underlying the Taranaki Brown Ash. The CPT Logs are presented in Appendix C.

2.2.3 Hand augered boreholes

Six (6) hand augered boreholes were carried out by a Red Jacket Ltd. In situ shear strength testing was undertaken at 0.5 m intervals throughout the soil horizon. The top 1.5 to 2.0 m of the holes were hydro-vacuum excavated for service clearance. The material encountered in the hand augered boreholes was generally stiff to very stiff Taranaki Brown Ash and firm Taranaki Brown Ash closer to the stream level.

2.3 Published Geology

The published geological map of the area[5] indicates that the site is underlain by the Pouakai Group (marine terraces/ beach deposits), and bound to the coastline by the Maitahi Formation (debris avalanche) to the south. The site is overlain by a small covering of Holocene age Taranaki Brown Ash. New Plymouth is located 30km north of Mt Taranaki on the Pouakai volcanic ring plain, which consists of radiating and coalescing fans of laharic, pyroclastic and alluvial volcaniclastic detritus. The location of the site in the context of the regional geology is presented below on Figure 2.1.

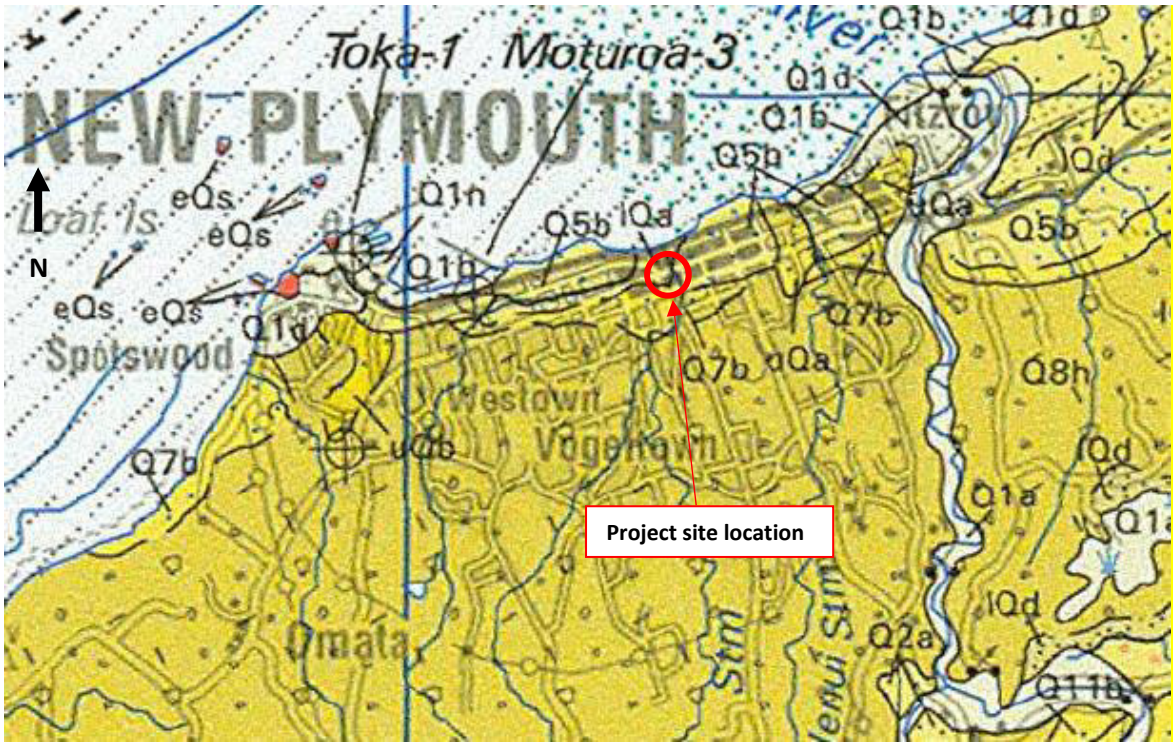


Figure 2.1 Published geological map of the Taranaki Region.

2.4 Geotechnical model

The subsurface conditions and geotechnical assessment presented in this report have been developed based on the readily available geotechnical information including the published geological map and the information held within the T+T database. The nature and continuity of the subsoil is inferred, but it must be appreciated that actual conditions could vary from the assumed model.

[5] Townsend, D.; Vonk, A.; Kamp, P.J.J. (compilers) 2008: *Geology of the Taranaki area*. Institute of Geological & Nuclear Sciences 1:250,000 geological map 7. 1 sheet + 77 p. Lower Hutt, New Zealand. GNS Science.

Based on the available geotechnical information detailed above, the site is expected to be underlain by:

- Fill
- Taranaki Brown Ash
- Pouakai Group

A description of the various geological units are presented in the sections below.

2.4.1 Fill

Fill is expected to underlie the entire site. The thickness of fill was encountered up to 1.5 m bgl. The fill is likely to comprise hardfill related to the existing pavement and a blend of reworked Taranaki Brown Ash and sandy gravels. The strength and stiffness properties of this fill appear highly variable and it is unlikely the materials have been placed to an engineering standard suitable for founding structures.

2.4.2 Taranaki Brown Ash

Taranaki Brown Ash is a term widely applied to the surface deposits of ash and lapilli found throughout the Taranaki Region, and was present across the entire site. It was found to generally comprise low to high plasticity, stiff to very stiff silty clay to clayey/sandy silt with minor gravels. Closer to the stream, the Taranaki Brown Ash was firm to stiff. The Taranaki Brown Ash is known to be allophanic and highly sensitive and can lose much of its in-situ strength when disturbed. The material was often heavily disturbed during the drilling process, resulting in the recovered material being significantly softer than its expected in situ strength. Shear vane values in the ash ranged between 40 and 200 kPa with the lower bound encountered in the hand augered borehole next to the stream.

2.4.3 Pouakai Group

The Pouakai Group includes middle to late Quaternary alluvial and marine deposits. Marine deposits of the Pouakai group underlie the Taranaki Brown Ash across the entire site. This material is predominantly sands and gravels with SPT ‘N’ Values ranged between 19 and 50+. The upper layer of Pouakai Group sands and gravels was medium dense to approximately 10.5 m below ground level. Below this level, the material becomes dense to very dense.

2.5 Groundwater

A PVC standpipe piezometer was installed within BH1 to monitor groundwater levels corresponding to the lower basement level of the proposed development. Summary details of the piezometer installation is presented in the table below. Installation records are attached on the borehole log, presented in Appendix C.

Table 2-2: Piezometer installation details

Borehole ID	Collar RL (m)	Installation depth (m)	Screened section depth (RL m)	Type	Geological Unit over screened depth
BH1	9.5	10.0	2.5 to -0.5	Standpipe	Pouakai Group (marine terraces)

The groundwater level was measured at 3.2 m below ground level (6.3 RL m) within BH1. Seasonal fluctuation is expected. For the purpose of foundation design and construction, we recommend a design groundwater level that is shown in the cross section in Appendix A. Table 2-3 show a summary of the piezometer details.

Table 2-3: Piezometer details

Location ID	Manual Dip		Ground Surface Elevation RL (m)	Groundwater Depth (m bgl)	Groundwater Depth RL (m)
	Date	Time			
BH1	26/08/2019	10:30am	9.68	3.2	6.5

3 Geotechnical considerations

3.1 General

The principal geotechnical considerations which will need to be addressed for the design and construction of the proposed development are:

- Seismic hazards;
- Foundation options;
- Slope stability;
- Subgrade strength for slabs on grade and pavements;
- Ground retention;
- Construction methodology.

Preliminary geotechnical recommendations in relation to these issues have been presented in the subsections below.

3.2 Seismic shaking hazard

3.2.1 Seismic site subsoil class

Seismic accelerations to be resisted by a structure are dependent upon the stiffness of the underlying soil/rock. If assessment of site subsoil class is undertaken with strict adherence to NZS1170.5 then the site Subsoil Class is D (deep soil site). However, T+T believes this site and others within the New Plymouth CBD may behave more like a Subsoil Class C site (shallow soil site). **Accordingly, our recommendation is that both are considered by conservatively adopting the larger ground actions of either subsoil Class C or D, which will be dependent on period.** The Designer is responsible for assessing whether Subsoil Class C or Subsoil Class D governs for the specific period being considered. Subsoil Class C is expected to govern at low periods (i.e. for geotechnical design including liquefaction analysis, in-ground structures and for low period

structures such as short buildings). Site subsoil Class D is expected to govern at higher periods (i.e. for higher period structures such as tall buildings). If more certainty on the subsoil class is required, a detailed site specific analysis could be undertaken.

Following the above recommendation, the subsoil category for this site for seismic design actions for geotechnical design may be taken as Class C: Shallow soil site. We have assumed an Importance Level 2 (IL2) structure with a design life of 50 years for liquefaction assessment.

For assessing the liquefaction hazard (refer to Section 3.3) the peak ground acceleration (PGA_H) and earthquake magnitude (M_{eff}) have been based on NZGS/MBIE Guidelines[6], Section 5, Method 1. The table below provides the return periods for design-level earthquake magnitudes and the associated unweighted peak horizontal ground acceleration (PGA_H).

Table 3-1: Ground seismic hazard for Subsoil Class C (Geotechnical design only)

NZS 1170.5 Limit State	PGA (g)	Effective magnitude M_{eff}	Return period (years)
Serviceability limit state (SLS)	0.07	6.0	25
Ultimate limit state (ULS)	0.29	6.0	500

Note:

PGA and effective magnitude has been assessed based on NZGS/MBIE Guideline Module 1 and Bridge Manual SP/M/022 Third Edition for the following:

Building design life	50 years – agreed with structural engineer
Building importance level	2 (NZS 1170.0:2004, Table 3.2) – agreed with structural engineer
Return period factor, Ru	1.0 for 500yr (NZS 1170.5:2004, Table 3.5)
Subsoil class	C (Shallow soil) – refer NZS 1170.5:2004, Table 3.2
Return period PGA coefficient, $C_{0,1000}$	0.28 (Bridge Manual Table 6A.1)
Site subsoil class factor, f	1.33 (Bridge Manual Section 6.2)
PGA	$C_{0,1000}$ x Ru/1.3 x f x g (Bridge Manual Section 6.2)
Effective Magnitude, M_{eff}	6.0 for 500yr return period (Bridge Manual Table C6.1)

3.3 Liquefaction assessment

A site specific liquefaction assessment based on CPT data was undertaken using the design action in Table 3-1. The assessment was limited to the upper layers of fill and Taranaki Brown Ash relative to the refusal depth of the CPTs. The methods used in our CPT based liquefaction analysis follow those set out by Boulanger and Idriss 2014[7]. Outputs of these analysis are included in Appendix D.

From the analyses, the liquefaction potential at the site for a ULS event is expected to be low to negligible. The CPT analysis indicate thin layers of liquefiable material could occur within the ash (<100mm thick). The cumulative liquefaction induced free field settlement was calculated to be <15mm.

The liquefaction potential of the Pouakai Group materials underlying the Taranaki Brown Ash has been assessed using SPT values. Results indicates the material is too dense to liquefy.

[6] New Zealand Geotechnical Society (NZGS) and Ministry of Business, Innovation & Employment (MBIE) guidelines for *Earthquake Geotechnical Practice in New Zealand. Module 1: Overview of the guidance*, Rev 0 issue date March 2016

[7] Boulanger, R.W and Idriss, I.M., 2014. *CPT and SPT based liquefaction triggering procedures*. Report No. UCD/CGM-14/01, Center for Geotechnical Modelling, Department of Civil and Environmental Engineering, University of California, Davis, CA, 134 pp

3.4 Foundation options

Concept plans indicate that the basement floor slab finished level is at approximately 9 m RL meaning the western side will likely be on Taranaki Brown Ash and the eastern side on the existing surficial fill.

Piled foundations are likely to be most suitable to support the four storey building given it is located directly upslope of Huatoki Stream. Any uplift capacity may be provided by tension piles.

3.4.1 Pile foundations

Pile foundations would be a feasible option for the proposed development and would need to extend to the medium dense to dense gravels and sands of the Pouakai Group which is expected to be present from an elevation of 4.5 m RL and founding near existing stream level at around 1 m RL. We understand that an archaeologically significant, non-engineered wall is present directly downslope and along the eastern boundary. Low impact and low vibration pile options may be preferred to avoid any damage to this wall, such as screw piles or bored piles. Driven piles are an acceptable option from a geotechnical perspective but associated vibration have the potential to damage the existing non-engineered retaining wall. The piles foundation options are discussed in more detail below.

Building piles on the eastern side of the building may need to be designed to resist a lateral load of 45 kN/m depending upon the approach adopted to mitigate potential instability of the eastern slope (as outlined in Section 3.5).

Screwpiles

Screw piles are solid steel helical shaped piles. The piles have a central steel pile shaft with a single helix welded to it. The pile gains capacity through end bearing as the shaft is rotated into the soil. Extension shafts with plates are added as needed. The target bearing stratum for screw piles will also be the medium dense to dense Pouakai Group formation founding at around 1 RL m. The size and capacity of the screwpile helix will need to be assessed during detailed design. Similar capacities to an H-pile can be considered for concept design.

Bored piles

Reinforced concrete bored piles extending to the medium dense to dense Pouakai Group formation founding at around 1 RL m are also considered suitable if low impact and low vibration is required. However, these are expected to require temporary support (temporary casings or bentonite slurry) through the Pouakai Group formation soils to prevent hole collapse during construction. The Bored piled capacities into the Pouakai Group formation are outlined in Table 3-2.

When calculating the maximum ultimate limit state load, a strength reduction factor (ϕ) of 0.5 should be applied to the following geotechnical ultimate capacities.

Table 3-2 – Bored pile design parameters

Geological unit	Approximate reduced level of top of unit	Geotechnical ultimate capacity (kPa)		
		Pile skin friction (Compression, kPa)	Pile end bearing (1) (Compression, kPa)	Pile skin friction (Tension, kPa)
Medium dense to dense gravels and sands Pouaki Group	4.5 RL m and below	20	1,250	To be confirmed based on pile diameter
Notes: (1) Requires an embedment of at least 3 pile diameters into geological unit to mobilise end bearing capacity				

Driven H-piles

Driven H piles could be utilised. Table 3-3 outlines preliminary estimates for driven H pile capacities. Preliminary pile capacities are calculated based on a capacity reduction factor of $\phi = 0.45$. These will need to be confirmed with detailed geotechnical investigations and analysis. The available capacities may be increased if dynamic pile testing with signal matching is undertaken on a minimum of 10% of the pile foundations. For concept design, an embedment of up to 4 m into the medium dense to dense gravels and sands of the Pouakai Group (N-value ≥ 15) should be assumed. The embedment depth of the piles may be shortened and will need to be driven with an appropriately sized hammer to achieve a pile driving set to prove the design pile capacity. The required pile driving set will need to be developed by the contractor and reviewed by T+T.

During installation of driven piles, compliance with noise and vibration restrictions would be required. If driven piles are considered, then an additional noise and vibration assessment would need to be undertaken to determine the feasibility of compliance with these regulations in close vicinity to the neighbouring buildings.

Table 3-3: Preliminary estimates for driven pile capacities

Pile Material	Pile Size	Ultimate geotechnical capacity, R_{Drive} (kN)	Preliminary ULS capacity, $\phi = 0.45$ (kN)
Steel – 300 MPa grade	150UC30	540	243
	150UC37	670	302
	200UC46	825	371
	200UC52	940	423
	200UC60	1080	486
	250UC73	1310	590
	250UC89	1600	720
	310UC97	1750	788
	310UC118	2120	954
	310UC137	2470	1112
	310UC158	2840	1278

3.4.2 Shallow foundations

Shallow pad foundations may be a suitable foundation option at basement level for small structures (for example, entranceway canopies and not supporting the full building load) provided adequate groundwater controls are implemented and an adequate factor of safety can be achieved on the adjacent slope. This should be assessed on a case by case basis and be subject to review by the Geotechnical Engineer.

Any shallow pad foundations used are expected to be founded within the Taranaki Brown Ash. The following parameters may be assumed for foundation design:

- Geotechnical Ultimate bearing capacity = 300 kPa
- Factored (ULS) bearing capacity = 150 kPa
- Allowable bearing capacity = 100 kPa

Shallow foundation loads should be applied to further slope stability assessment during detailed design if they are used.

3.5 Ground anchors for additional uplift capacity

Ground anchors can be installed where foundations are unable to fully support the tension loads of the building. Constructability of the ground anchors through the Pouakai gravels/sands will need to be considered as casing may need to be installed to avoid hole collapse. Ground anchor capacities can be provided should this be required during detailed design.

3.6 Slope stability assessment

Slope stability analysis software SLOPE/W by Geostudio was used to assess a critical section of the existing slope. A cross section (Figure 1, Appendix A) was developed using site survey, geological information and measured groundwater levels.

The following slope stability design cases were assessed:

- Design groundwater levels (static);
- Elevated groundwater levels (static);
- ULS seismic case using the seismic design criteria presented in Table 3-1.

The slope stability model showed a sensitivity to the adopted groundwater level. The design groundwater level in the slope stability model was assumed to be at 2.9 m below ground level, slightly lower than the groundwater as measured within BH1 in winter. It is assumed that the groundwater level measured in BH1 reflects the elevated groundwater levels during winter conditions. The elevated groundwater level in the slope stability model has been assumed to be 1 m higher than the design groundwater level and has been analysed using existing ground conditions. It is recommended that ongoing groundwater monitoring be undertaken to confirm the preliminary design assumptions.

The results of the slope stability analyses indicate that the eastern slope does not meet the required slope stability criteria. Normally accepted factors of safety (FoS) are achieved by introducing a 45 kN/m lateral stabilising load along the leading edge pile location. A summary of the results of these analyses is presented in Table 3-4 with SLOPE/W outputs presented in Appendix D.

Table 3-4: Summary of slope stability analyses of the proposed slope

Design case	Minimum FOS criteria	Analysed FOS	Analysed FOS with 45 kN/m lateral load
Design groundwater levels (static)	1.5	1.33	1.53 (1.60 without floor live load)
Elevated groundwater levels (static)	1.25	1.06	1.25
ULS seismic case (PGA = 0.29g)	1.0	0.91	1.0

The results presented in Table 3-4 indicate that the following approaches could be taken with respect to the portion of the building platform at the crest of the eastern slope which lies within zone of slope instability (7 m from the slope crest):

- Option 1: Fully suspend the floor slab and design the building piles to resist the 45kN/m lateral load so that any slope instability does not adversely affect the building or,
- Option 2: Construct an in-ground (palisade) retaining wall (likely comprising closely spaced piles at 3 times the pile diameter) along the crest of the eastern slope to stabilise the building platform. The building piles would therefore not be required to resist lateral loads. The floor slab may be fully suspended or constructed as a slab-on-grade.

Local instability as a result of movement of the existing non-engineered retaining wall near the crest of the eastern slope is likely over the design life of the building. However, this should have no effect on the building if one of the foundation options above is constructed.

Local (small scale) superficial scouring could occur on the steep area downslope of the building platform and non-engineered wall during rainfall. Adequate measures should be taken to ensure that stormwater is directed away from the slope (including toe of the slope) and that the finished surface of the fill batter is contoured and protected appropriately to minimise degradation of the slope.

3.7 Slab on grade and pavements

A preliminary subgrade California Bearing Ratio (CBR) of 3% may be adopted for design of pavements bearing on the existing fill and Taranaki Brown Ash. This figure should be confirmed by in-situ testing following stripping to subgrade level and confirmation of the building loads. Any soft spots encountered in the non-engineered fill will need to be sub-excavated and replaced with compacted hardfill.

A fully suspended floor slab may be required on the eastern side of the building as discussed in Section 3.5.

3.8 Ground retention

Ground retention is required along the southern and western ends of the proposed basement excavation, along the boundary to the road reserve.

The excavation required on the northern end is expected to be <1 m. Temporary and permanent ground retention may be required to support the buildings to the north and northeast. The property

files for these buildings should be reviewed during detailed design in order to assess the impact (if any) of the basement excavation on the neighbouring building foundations.

An in-ground retaining wall may also be required along the eastern side of the site to achieve slope stability design criteria depending upon the preferred foundation option as discussed fully in Section 3.5.

The following geotechnical design parameters (Table 3-5) may be adopted for retaining wall design where retained heights are no greater than 3 m with no upslope batters:

Table 3-5: Soil parameters

Soil type	Unit weight, γ (kN/m^3)	Undrained shear strength (kPa)	Effective cohesion, c' (kPa)	Drained friction angle, ϕ (°)	Modulus of elasticity, E ' (MPa)	Poisson's ratio, v'
Fill (gravels and reworked Taranaki Brown Ash	16	-	2	30	10	0.3
Taranaki Brown Ash (stiff to very stiff clay and sandy silt)	16	100	5	40	20	0.3

Soil type	Active earth pressure coefficient, k_a	Passive earth pressure coefficient, k_p	"At rest" earth pressure coefficient, k_0[2]
Fill (gravels and reworked Taranaki Brown Ash)	0.29	4.64	0.50
Taranaki Brown Ash (stiff to very stiff clay and sandy silt)	0.18	9.60	0.36

1 – Assumes normally consolidated soil

Retaining wall design should consider the maximum permissible deflections for any nearby buildings and services.

During construction, temporary retention will be required. The design for the temporary retention will need to be undertaken during detailed design. Un-propped retention may be feasible for lower retained heights, this is to be confirmed in detailed design.

3.9 Earthworks

The proposed development will require excavation to the basement ground beams and floor slabs. We anticipate the underlying fill and ash material to be suitable for re-use as engineered fill with appropriate conditioning and compaction. Alternatively, material can be disposed at a suitable landfill (subject to contamination testing).

The volcanic ash is relatively sensitive. Excessive movement of construction plant directly over the ash should be avoided.

Any earthworks undertaken in the area should be carefully managed, both in the short term and long term. It is recommended that all temporary works and construction methods be reviewed by a geotechnical engineer.

3.10 Construction considerations

The following geotechnical construction considerations are identified

1 Temporary support may be required to support heavy machinery (such as piling machines) at the site to ensure the eastern slope is stable at all times;

2 Berms and temporary props may be required to provide temporary ground retention during construction (to be confirmed during detailed design of the retaining walls);

3 Protection of the archaeologically significant stone railway embankment while using heavy machinery or installation of piles near the existing wall.

4 Construction observations should be undertaken to:

- Confirm foundation condition beneath floor slabs and any shallow foundations;
- Confirm founding conditions for pile foundations.

4 Further work

This report is intended to support design of the proposed building development of 51 Brougham Street site. It cannot be relied upon as the geotechnical assessment of the neighbouring site at 53 Brougham Street.

The following further work is recommended:

- Further monitoring of groundwater levels is recommended;
- Retaining wall design will need to be undertaken for the basement. Both permanent and temporary retaining wall design should consider the maximum permissible deflections for any nearby buildings and services;
- It is recommended that T+T be provided with a complete set of detailed design drawings for review prior to issuing for construction. This is to confirm that advice presented in this document has been appropriately interpreted. During excavation and construction, the site should be examined by an engineer competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. We would be pleased to provide this service to you and believe your project would benefit from the continuity. However, it is important that we be contacted if there is any variation in subsoil conditions from those described in the report.

5 Summary and conclusions

On the basis of the geotechnical assessment carried out, we summarise our conclusions and recommendations with respect to the proposed development as follows:

1 The proposed development includes a basement level which will require ground retention along the southern and western sides of the basement level (along the road boundaries of Powderham and Brougham Street) and minor retention may be required to support the existing northern and northeastern buildings. The basement level will daylight after excavation along the eastern boundary;

2 Geotechnical investigations indicate the site is underlain by the following materials fill, underlain by Taranaki Brown Ash, underlain by gravel and sands of the Pouakai Group;

3 The groundwater level was encountered at 3.2 m bgl from one measurement. Ongoing groundwater monitoring is recommended;

4 As discussed in Section 3.2.1, we recommend that seismic design consider both subsoil Class C or D by conservatively adopting the larger ground actions of either subsoil Class C or D, which will be dependent on period. The Designer is responsible for assessing whether Subsoil Class C or Subsoil Class D governs for the specific period being considered. The site is classified as a Subsoil Class C (shallow soil site) for geotechnical design.

5 The site is considered to have a low risk due to liquefaction;

6 The site is generally suitable for pile foundations (screw piles or bored piles for low vibration/impact options, and driven piles for high impact/vibration). Piles should be driven or drilled into the Pouakai Group sand/gravels or driven to a pile driving set determined by the contractor and reviewed by T+T;

7 FoS for slope stability on the eastern slope do not meet design criteria. Options (in-ground retaining or suspended floor slab) are provided in Section 3.5 for ensuring a stable building platform.

8 Local instability as a result of movement of the archeologically significant, existing non-engineered stone retaining wall (and stacked timber sleepers) at the crest of the eastern slope is likely over the design life of the building. However, this will not affect the building platform if the one of the recommended foundation options given to mitigate the low FoS for stability of the eastern slope is constructed.

9 Adequate measures should be taken to minimise degradation of the steep slope downslope of the building platform. All drainage should be directed away from the slope;

10 A preliminary subgrade California Bearing Ratio (CBR) of 3% may be adopted subject to in-situ testing for the basement floor slab and pavements;

11 The following considerations should be made during detailed design and construction:

- Temporary and permanent retaining wall design should consider the maximum permissible deflections for any nearby buildings and services;
- Consideration into the type of machinery or piles to be used on site if protection of the archaeologically significant stone railway embankment is required.
- Berms and temporary props may be required to provide temporary ground retention during construction;
- Un-propped retention may be feasible for lower retained heights and should be confirmed in detailed design;

6 Applicability

This report has been prepared for the exclusive use of our client Red Jacket Ltd, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on data from discrete investigation locations. The nature and continuity of subsoil away from these locations are inferred but it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd

Report prepared by:

pp.

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Report reviewed by:

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Authorised for Tonkin & Taylor Ltd by:

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Hamish Maclean
Project Director

13-Dec-19
\\ttgroup.local\files\aklprojects\1011502\workingmaterial\report\20191213_gir_51broughamst-final.docx

Appendix A : Figures

- **Figure 1 – Site plan**
- **Figure 2 – Cross section**
- **Drawings from client**
- **Topographic survey**

L:\1011502\WorkingMaterial\CAD\FIG\1011502-F1.dwg 2019-Sep-13 2:48:56 PM Plotted By: AARON CAWTHRA

LEGEND

- SITE BOUNDARY
- PROPERTY BOUNDARY
- 6.0 SURVEYED CONTOUR (1m INTERVAL)
- SURVEYED CONTOUR (0.5m INTERVAL)
- BH1 TONKIN + TAYLOR BOREHOLE LOCATION (AUG 2019)
- HA5 TONKIN + TAYLOR HAND AUGER LOCATION (AUG 2019)
- CPT5 TONKIN + TAYLOR CONE PENETRATION TEST LOCATION (AUG 2019)

A3 SCALE 1:200

0 2 4 6 8 10 (m)

ORIGINAL IN COLOUR

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NOTES:

1. ALL DIMENSION ARE IN METRES UNLESS NOTED OTHERWISE.
2. BASEPLAN AND SURVEY SUPPLIED BY BLAND & JACKSON SURVEYORS LTD, REF "9299 E00 R02 Site Topographical Survey.dwg" DATED 25/07/2019.
3. AERIAL PHOTOGRAPHY SOURCED FROM LINZ DATA SERVICE <https://data.linz.govt.nz/layer/95525-new-plymouth-010m-urban-aerial-photos-2017/> , LICENSED BY LINZ FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 NEW ZEALAND LICENCE (CC BY 4.0). ACCESSED 12/08/2019.

PROJECT No.	1011502	
DESIGNED	CMCD	Aug.19
DRAWN	JC	Aug.19
CHECKED	EMAD	Sep.19
APPROVED	H. MACLEAN	DATE SEP.19

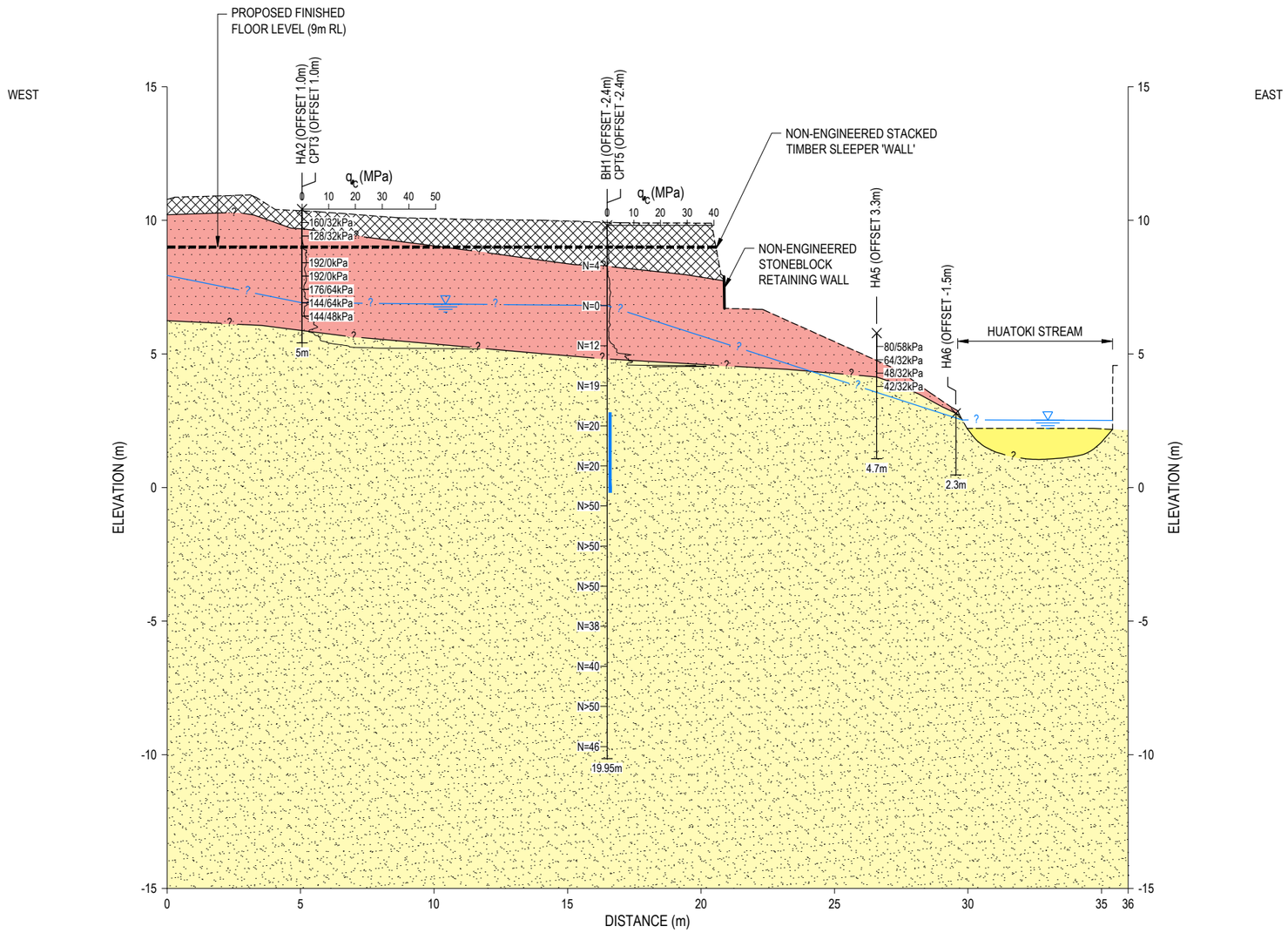
CLIENT **RED JACKET LIMITED**

PROJECT **51 BROUGHAM STREET, NEW PLYMOUTH**

TITLE GEOTECHNICAL INVESTIGATION
SITE PLAN

SCALE (A3) 1:200 FIG No. FIGURE 1 REV 1

L:\1011502\WorkingMaterial\CAD\FIG\1011502-F2.dwg 2019-Sep-13 3:16:07 PM Plotted By: AARON CAWTHRA



SECTION 1 / F1
SCALE 1: 200

LEGEND

- FINISHED FLOOR LEVEL
- EXISTING GROUND PROFILE
- INFERRED GEOLOGICAL BOUNDAY
- INFERRED WATER LEVEL
- FILL
- TARANAKI ASH
- POUAKAI GROUP (MARINE TERRACES)
- ALLUVIUM
- PIEZOMETER WITH SCREEN DEPTH

A3 SCALE 1:200

ORIGINAL IN COLOUR

NOTES:

1. ALL DIMENSION ARE IN METRES UNLESS NOTED OTHERWISE.
2. GROUND PROFILE BASED ON SURVEY SUPPLIED BY BLAND & JACKSON SURVEYORS LTD, REF "9299 E00 R02 Site Topographical Survey.dwg" DATED 25/07/2019.

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PROJECT No.	1011502	
DESIGNED	CMCD	Aug.19
DRAWN	JC	Aug.19
CHECKED	EMAD	Sep.19
APPROVED	H. MACLEAN	DATE SEP.19

CLIENT **RED JACKET LIMITED**

PROJECT **51 BROUGHAM STREET, NEW PLYMOUTH**

TITLE GEOTECHNICAL INVESTIGATION
GEOLOGICAL CROSS SECTION 1

SCALE (A3) 1:200 FIG No. FIGURE 2 REV 1

Site Plan

Scale 1 : 500 (A3)

Proposed Floor Areas - 51 Brougham

NOTE. All areas are approximate. Areas include entire building footprint, ie. no allowance for circulation, WCs etc.

L0 - 412m² (covered)
L1 - 412m²
L2 - 412m²
L3 - 412m²
L4 - 205m²

Total - 1853m²

Proposed Floor Areas - 53 Brougham

NOTE. All areas are approximate. Areas include entire building footprint, ie. no allowance for circulation, WCs etc.

L0 - 752m² (covered)
L1 - 752m²
L2 - 752m²
L3 - 752m²

Total - 3008m²

BROUGHAM STREET DEVELOPMENT

51 & 53 Brougham Street, New Plymouth

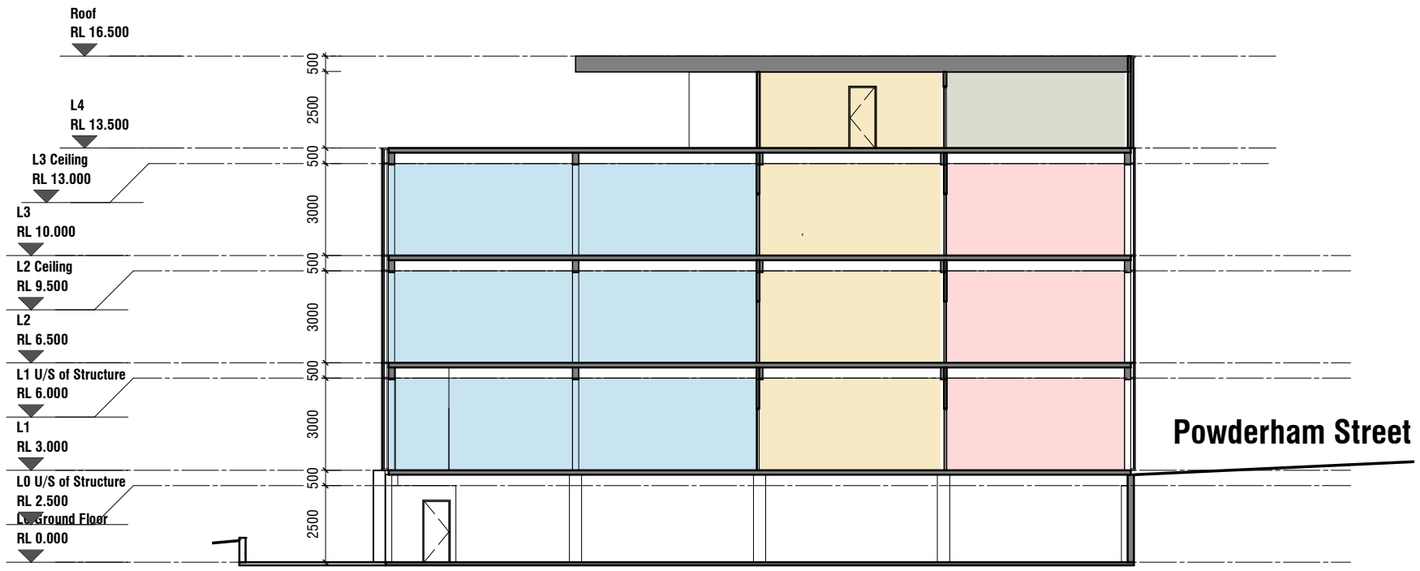
MASTERPLANNING

MAR | 2019

job no.	a3 scale	drawing no	rev	drawing title	print date
6400	As indicated	SK1.02		Proposed Site Plan	15-Mar-19 8:35:46 AM

BOON teamarchitects

A/131 Courtenay St, New Plymouth 4310, New Zealand
P/06 757 3200 E/office@boon.co.nz W/boon.co.nz



A SK1.01 **Section A**

Scale 1 : 200 (A3)

BROUGHAM STREET DEVELOPMENT

51-53 Brougham Street, New Plymouth

MASTERPLANNING

APRIL | 2019

job no.	a3 scale	drawing no	rev	drawing title	print date
6400	1 : 200	SK3.03		Cross Sections - 51 Brougham Street	04-Apr-19 8:25:55 AM

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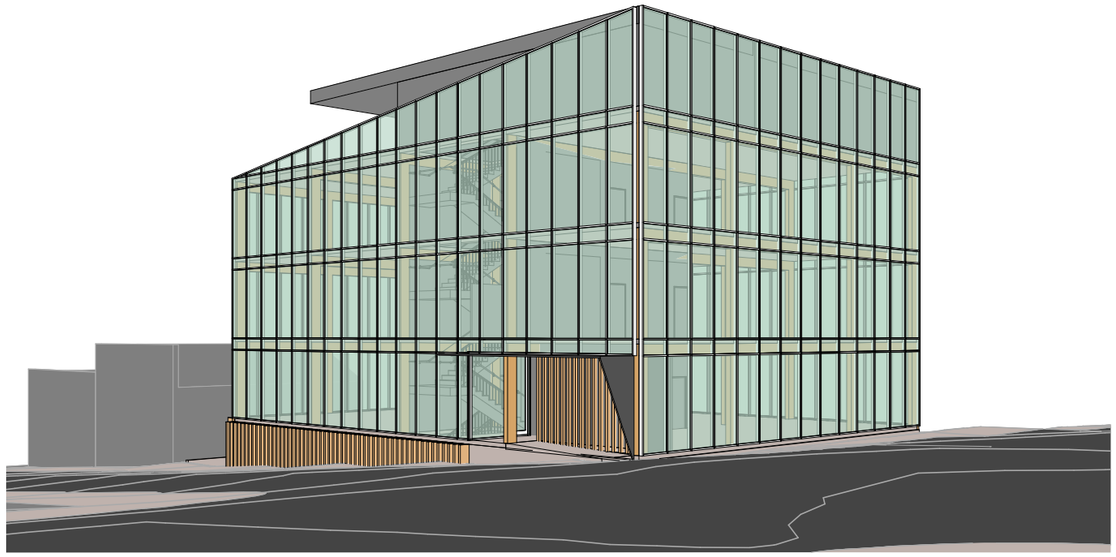

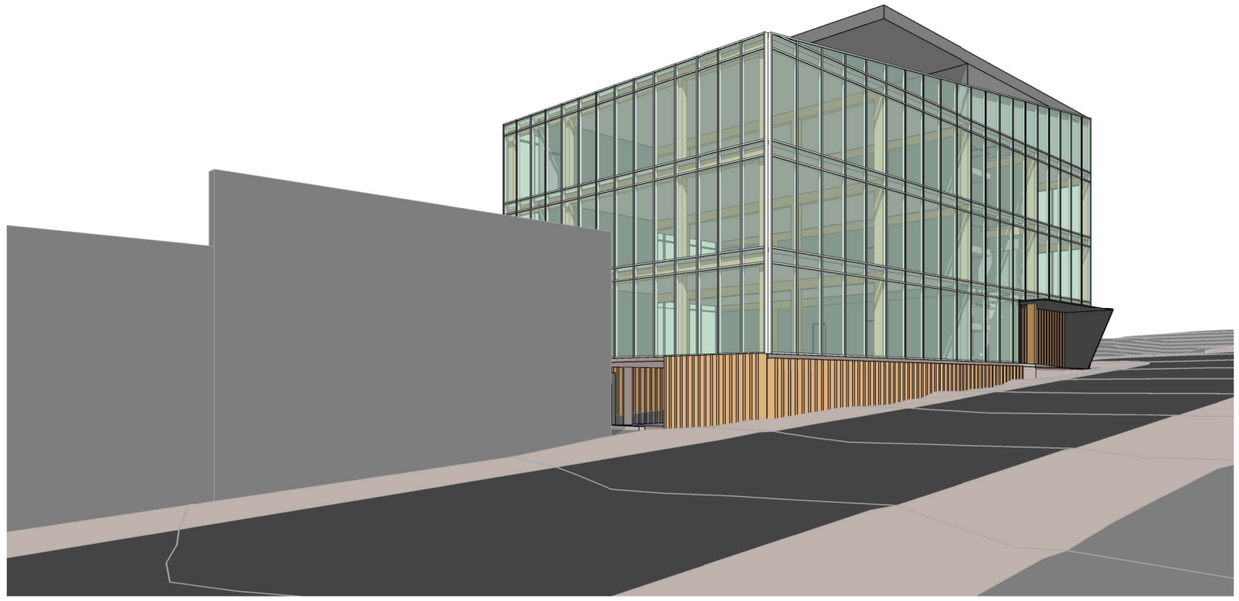

BROUGHAM STREET DEVELOPMENT

51-53 Brougham Street, New Plymouth

MASTERPLANNING

APRIL | 2019

job no.	a3 scale	drawing no	rev	drawing title	print date
6400		SK3.04		3D Views - 51 Brougham Street	04-Apr-19 8:26:06 AM

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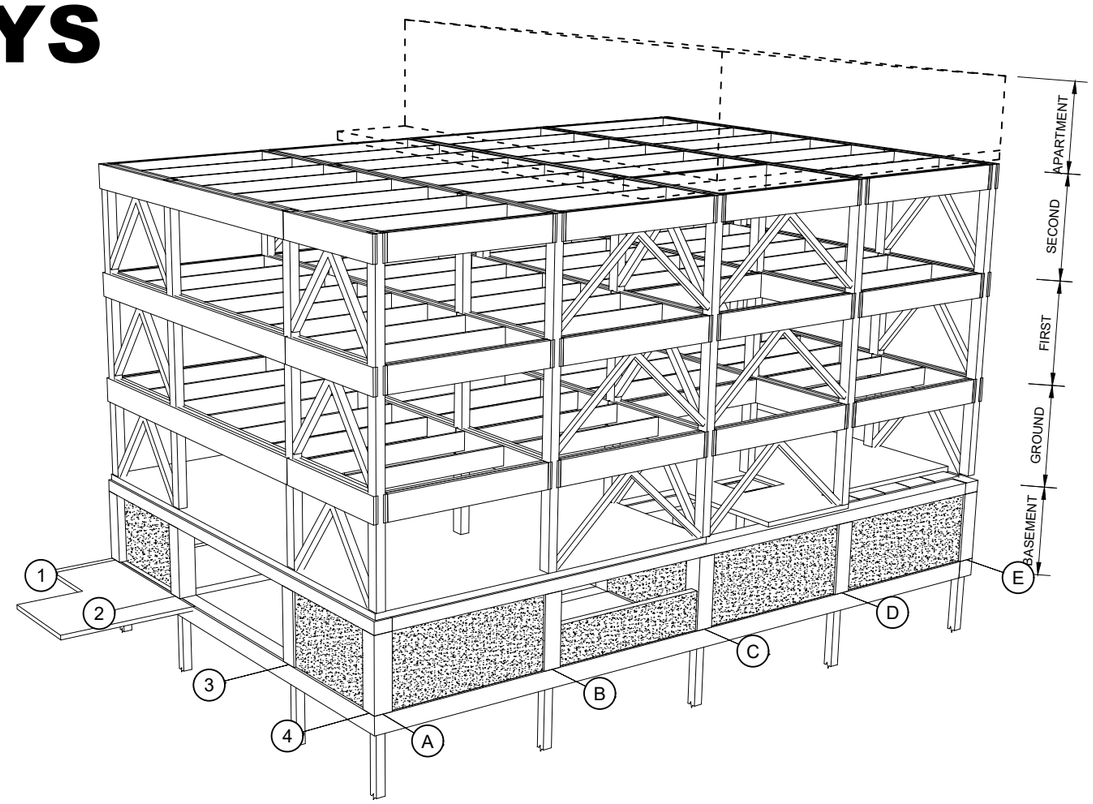
NEW COMMERCIAL BUILDING
CONCRETE FLOOR OVERLAYS
51 BROUGHAM STREET
NEW PLYMOUTH

SHEET No.	DESCRIPTION	29/05/19								
S0-1	COVER SHEET	A								
S1-2	BASEMENT PLAN	A								
S1-3	GROUND FLOOR PLAN	A								
S1-4	FIRST FLOOR PLAN	A								
S1-5	SECOND FLOOR PLAN	A								
S1-6	SECOND FLOOR PLAN	A								
S2-1	LONG SECTION	A								
S2-2	CROSS SECTION	A								



CONCEPT

REDJACKET
3 DAVIDSON STREET
NEW PLYMOUTH 4310
Ph. 06 759 0999

DATE	REV	REV RECORD	BY	CHD	VER	APP
29/05/19	A	CONCEPT STRUCTURAL DESIGN	PT	MP	AF	-

Client: KD HOLDINGS LTD

Project: NEW COMMERCIAL BUILDING
CONCRETE FLOOR OVERLAYS
51 BROUGHAM STREET
NEW PLYMOUTH

Sheet Title: COVER SHEET

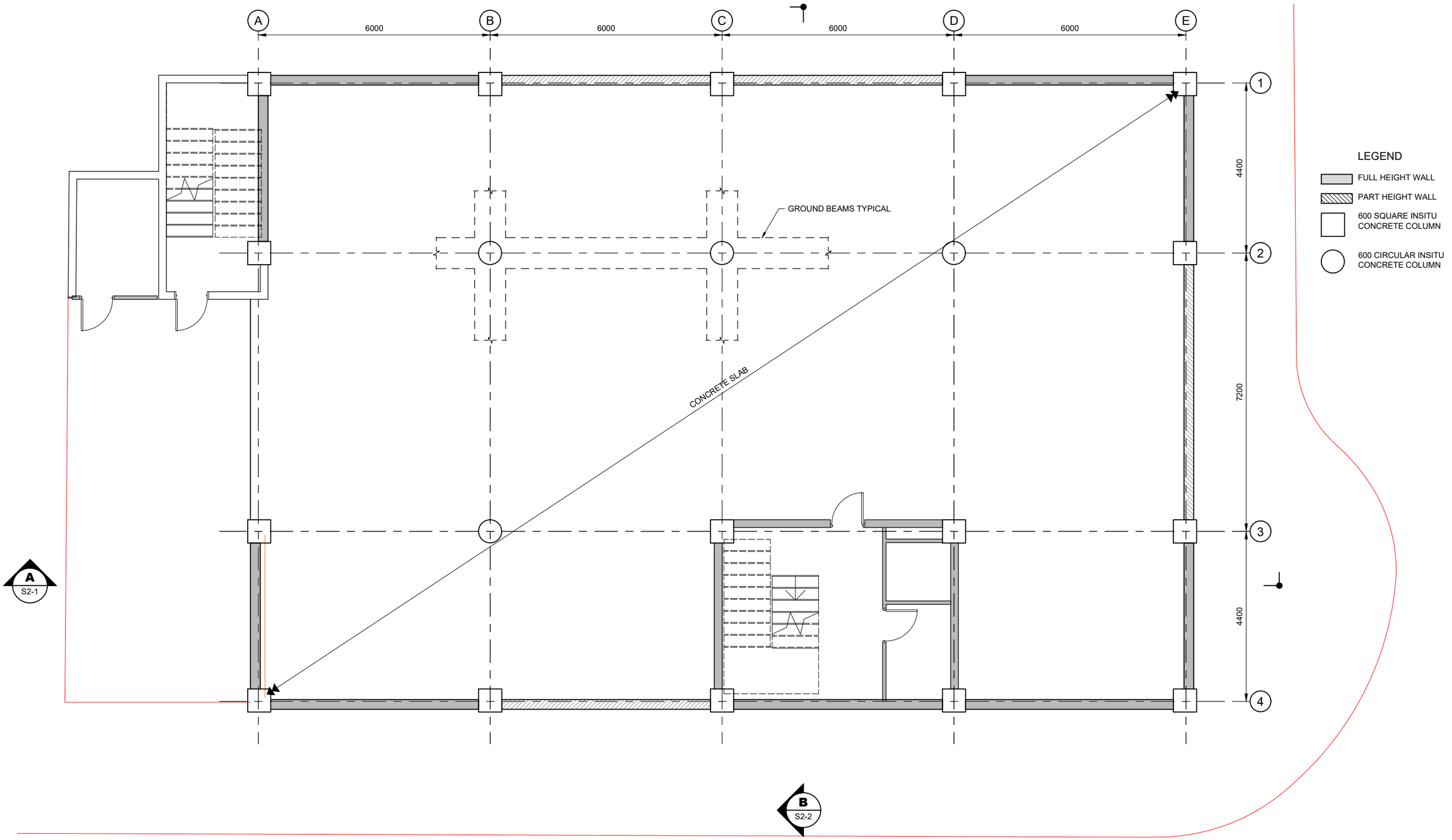
Drawing No.: 400-401

A3

REV. A

Job No.: 3297

Sheet No.: S0-1



BASEMENT PLAN

1:100

CONCEPT

REDJACKET
3 DAVIDSON STREET
NEW PLYMOUTH 4310
Ph. 06 759 0999

DATE	REV	REV RECORD	BY	CHD	VER	APP
29/05/19	A	CONCEPT STRUCTURAL DESIGN	PT	MP	AF	-

Client: KD HOLDINGS LTD

Project: NEW COMMERCIAL BUILDING
CONCRETE FLOOR OVERLAYS
51 BROUGHAM STREET
NEW PLYMOUTH

Sheet Title: BASEMENT PLAN

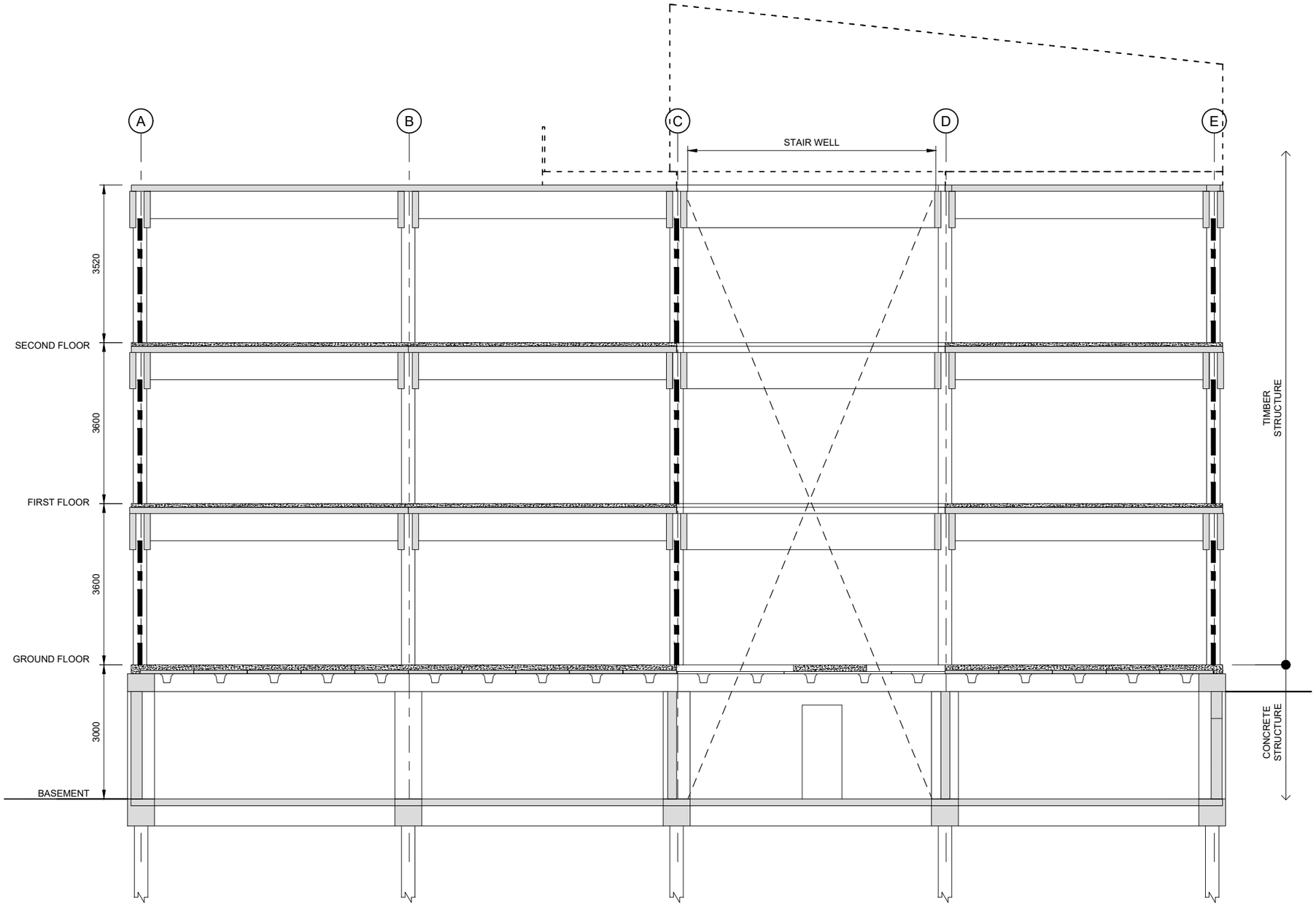
Drawing No.: 400-401

A3

REV. A

Job No.: 3297

Sheet No.: S1-2



A
-
LONG SECTION
1:100

CONCEPT

REDJACKET
3 DAVIDSON STREET
NEW PLYMOUTH 4310
Ph. 06 759 0999

DATE	REV	REV RECORD	BY	CHD	VER	APP
29/05/19	A	CONCEPT STRUCTURAL DESIGN	PT	MP	AF	-

Client
KD HOLDINGS LTD

Project
NEW COMMERCIAL BUILDING
CONCRETE FLOOR OVERLAYS
51 BROUGHAM STREET
NEW PLYMOUTH

Sheet Title
LONG SECTION

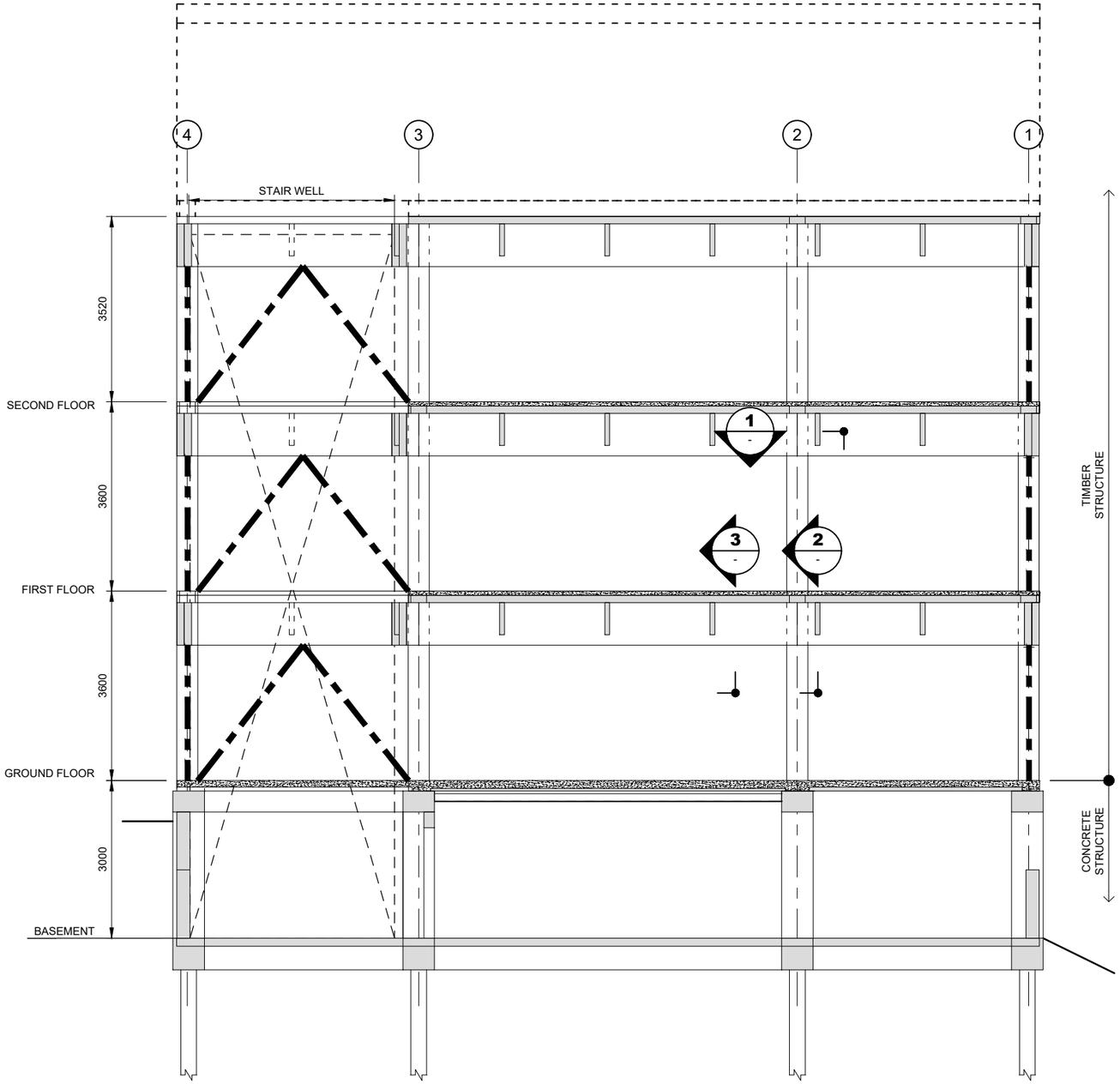
Drawing No.
400-401

A3

REV.
A

Job No.
3297

Sheet No.
S2-1



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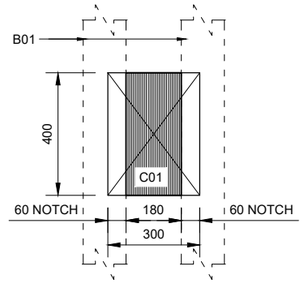

1 - DETAIL
1:20

LEGEND

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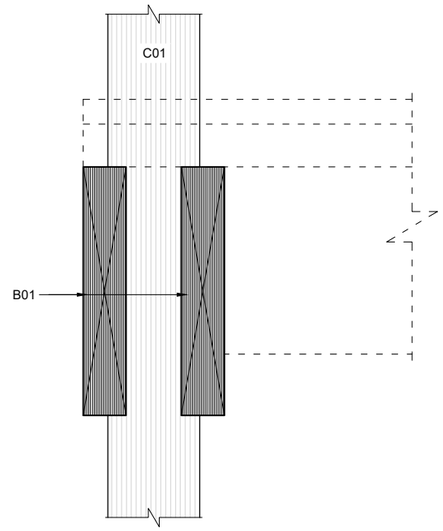
B02 610x90 LVL 11

C01 400x300 LVL 11



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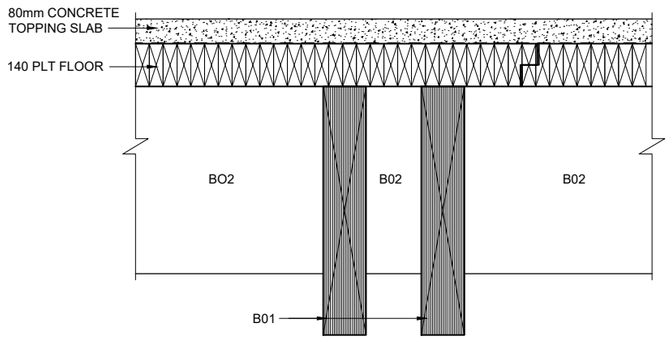


3 - DETAIL
1:20

CONCEPT

29/05/19	A	CONCEPT STRUCTURAL DESIGN	PT	MP	AF	-
DATE	REV	REV RECORD	BY	CHD	VER	APP

REDJACKET
3 DAVIDSON STREET
NEW PLYMOUTH 4310
Ph. 06 759 0999

Client: KD HOLDINGS LTD

Project: NEW COMMERCIAL BUILDING
CONCRETE FLOOR OVERLAYS
51 BROUGHAM STREET
NEW PLYMOUTH

Sheet Title: CROSS SECTION

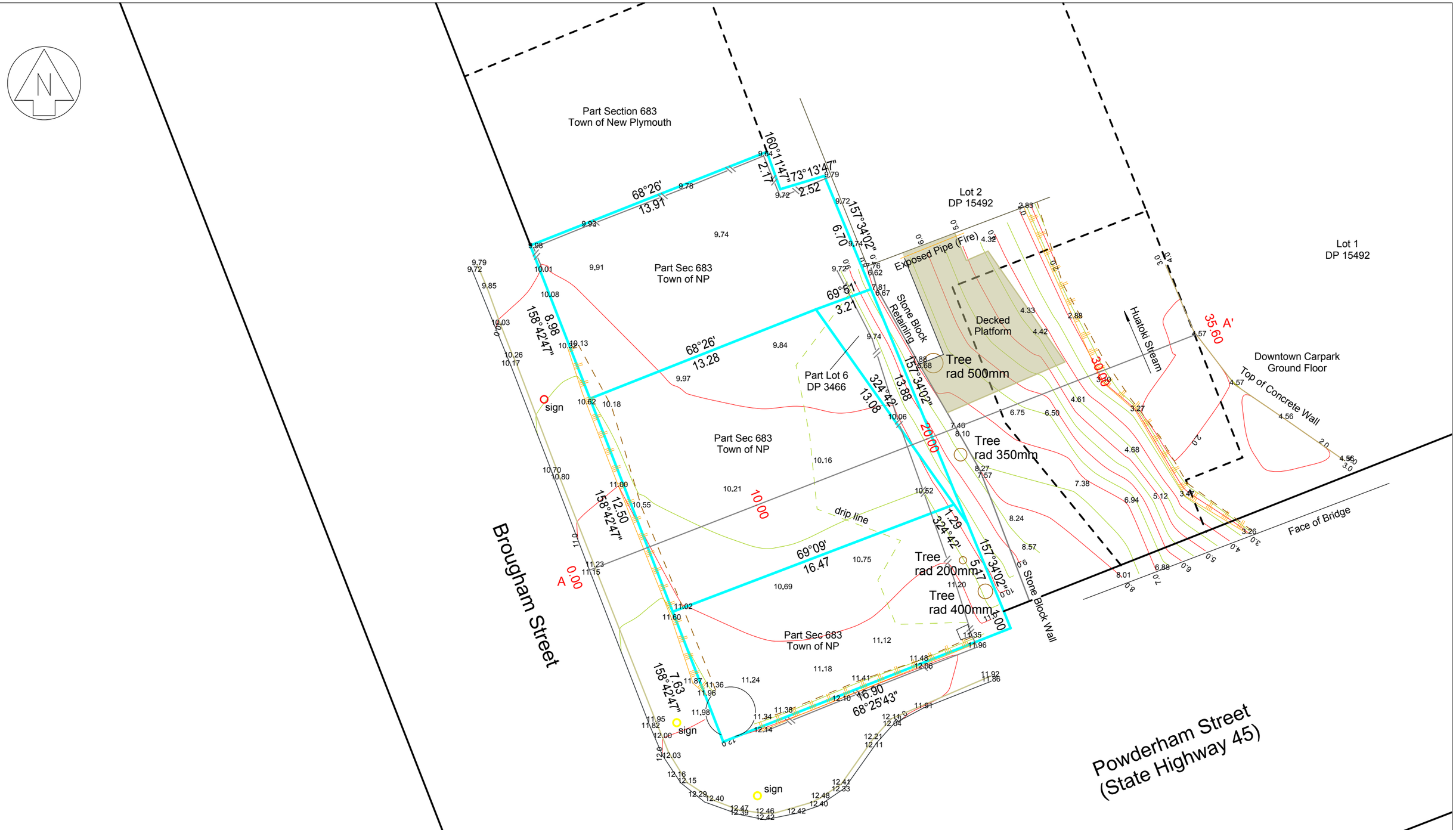
Drawing No.: 400-401

A3

REV. A

Job No.: 3297

Sheet No.: S2-2



02	Additional Topographical Info	18.07.19	ta	cj
01	Bdy info and Trees	25.06.19	ta	cj
00	Issued	27.05.19	ta	cj
Rev.	Amendment Description	Date	Drawn	Appr.

BLAND & JACKSON SURVEYORS LTD

19 Dawson Street, New Plymouth, 4340 - www.bjsl.co.nz - (06) 758 6171 - mail@bjsl.co.nz

Coordinates are in terms of Taranaki Datum 2000
Based on RM XVI SO 13123 808683.91mN 386556.75mE
Elevations are in terms of Taranaki Vertical Datum 1970.
Origin of Elevations RM XVI SO 13123, 5.03m.

- Major Contour Interval is 1.0m
- Minor Contour Interval is 0.50m

Title

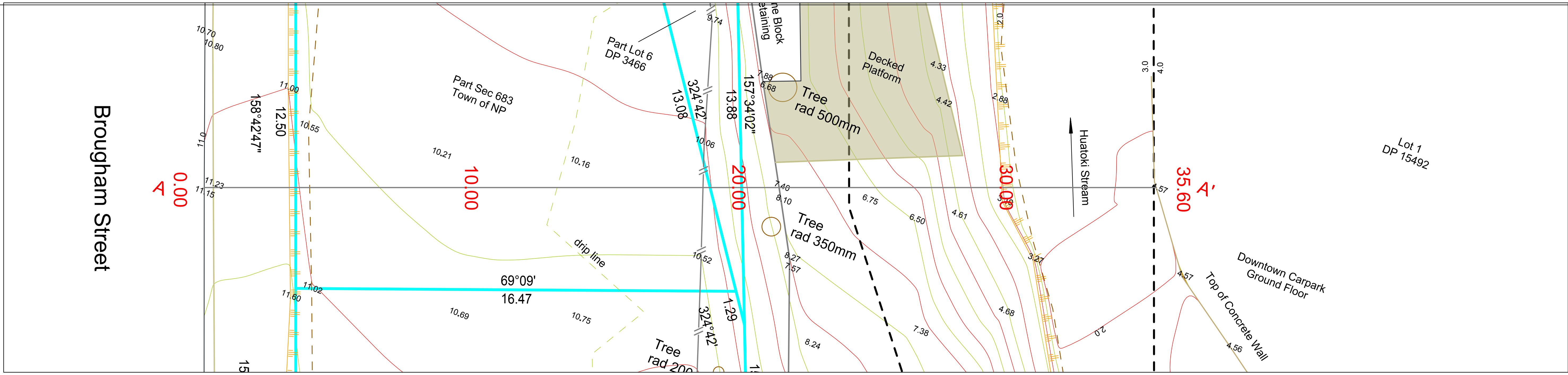
Site Topographical Survey

Part Sections 683 Town of New Plymouth
Part Lots 6 DP 3466

Location: 51 Brougham Street

Drawing Scale (Original Size - A3)	Project No.	Drawing File	Sheet no.	Revision
1:200	9299	E00	1 /2	R02

S:\Documents\9299 Red Jacket Brougham Street\12D\9299 Topo 9299 Topo



Profile A - A'	11.14	11.22	11.29	10.92	10.72	10.40	10.31	10.29	10.24	10.25	10.25	10.23	9.23
Ground Level	11.14	11.22	11.29	10.92	10.72	10.40	10.31	10.29	10.24	10.25	10.25	10.23	9.23
Chainage	0.00	0.34	3.18	3.66	3.94	7.70	8.98	10.00	13.33	14.03	15.13	18.65	20.00

Profile A - A'	8.57	8.07	7.31	6.74	6.43	5.91	4.56	3.29	3.07	2.80	2.14	1.96	1.95
Ground Level	8.57	8.07	7.31	6.74	6.43	5.91	4.56	3.29	3.07	2.80	2.14	1.96	1.95
Chainage	20.88	21.49	21.66	24.52	25.18	26.84	28.00	29.52	29.82	30.00	30.54	35.06	35.59

BLAND&JACKSON SURVEYORS LTD

19 Dawson Street, New Plymouth, 4340 - www.bjsl.co.nz - (06) 758 6171 - mail@bjsl.co.nz

Rev.	Amendment Description	Date	Drawn	Appr.
00	Issued	23.07.19	ta	cj

Coordinates are in terms of Taranaki Datum 2000
Based on RM XVI SO 13123 808683.91mN 386556.75mE
Elevations are in terms of Taranaki Vertical Datum 1970.
Origin of Elevations RM XVI SO 13123, 5.03m.

Title
Site Topographical Survey
Long Section Profile

Location: 51 Brougham Street

Drawing Scale (Original Size - A3)	Project No.	Drawing File	Sheet no.	Revision
1:150 Hz; 1:150 Vert	9299	E00	2 / 2	R00

S:\Documents\9299 Red Jacket Brougham Street\12D\9299 Topo 9299 Topo

Appendix B: Previous ground investigation results

- **Beca Borehole logs**

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 1 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS								
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3									'Loose', silty, fine to coarse SAND, some rootlets, trace clay; dark reddish brown; moist, low plasticity (matrix). [Topsoil]	Fill	
		50 %	HQ3									'Loose', medium to coarse GRAVEL; grey; moist, non plastic. Gravel: SW, angular to subrounded greywacke, clast supported. [Ballast]		
		50 %	HQ3							1		'Loose', fine to coarse sandy, medium to coarse GRAVEL, minor silt, dark reddish brown; moist, non plastic. Gravel: SW, rounded to subangular greywacke. 0.5 m, matrix lost on drilling (?).		5
		90 %	HQ3						Box 1			'Loose', fine to coarse sandy, medium to coarse GRAVEL, some silt, trace clay; dark brown; low plasticity (matrix). Gravel: MW-SW, subangular greywacke/ andesite.		
		80 %	HQ3							2		Very soft, fine to coarse gravelly SILT, some fine to coarse sand, trace clay; orange; wet, low plasticity. Loses volume on reworking. Gravel: SW, rounded to angular andesite.		4
		88 %	HQ3									Core loss (1.4 - 1.8 m).		
		85 %	HQ3									Very soft, fine to coarse gravelly SILT, some fine to coarse sand, trace clay; orange; wet, low plasticity. Loses volume on reworking. Gravel: SW, rounded to angular andesite.	Fill/ Quatenrary Andesitic Ash	
		80 %	HQ3							3		Soft, SILT, minor medium to coarse sand, minor clay; orange-brown; wet, high plasticity, moderately sensitive, pumiceous. Structure: open, loses volume on reworking. Moderately thinly interbedded with thin beds of fine to medium uncemented SAND. 2.8 m, stiff.		3
		67 %	HQ3									3.5 m, soft.		
		0 %	HQ3						Box 2	4		4.0 m, moderately thin (100 mm) bed of uncemented SAND.		2
		100 %	HQ3									'Medium dense', medium to coarse GRAVEL and BOULDERS; grey/ orange; wet. Gravel/ boulders: SW, subrounded andesite, clast supported, maximum 330 mm diameter.		
		89 %	HQ3							5		Core loss (5.0 - 5.5 m).		1
		100 %	HQ3									'Loose', fine to medium SAND, minor fine to medium gravel; dark grey; wet, non plastic. Gravel: SW, rounded andesite.		
		73 %	HQ3							6		'Loose', fine to coarse SAND, some silt; laminated light grey, speckled black; wet, non plastic, pumiceous, weakly cemented, loses volume on reworking. Moderately thinly interbedded with fine to medium SAND, trace silt; dark grey, laminated white; wet, non plastic.		0
		100 %	HQ3									'Loose', fine to coarse SAND, minor silt; dark grey; saturated, non plastic, pumiceous.	Undifferentiated Quaternary Lahars	
		100 %	HQ3							7		7.05 m, some silt; brownish grey; saturated. Uncemented. 7.18 m, thin (20 mm) bed of very soft, clayey SILT; grey; wet, high plasticity.		-1
		60 %	HQ3						Box 3			'Loose', coarse GRAVEL; brownish grey: wet, non plastic. Gravel: SW, subrounded to subangular andesite. 7.6 m, moderately thin (100 mm) bed of hard, SILT, minor clay; dark greenish brown; moist, low plasticity, sensitive/ loses volume on reworking. [Cemented ash?]		
		30 %	HQ3							8		'Loose', sandy fine to coarse GRAVEL; brownish grey: wet, non plastic. Gravel: SW, subrounded to subangular andesite.		-2
												'Medium dense', medium to coarse gravelly, fine to coarse SAND, some silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite, greywacke. 1 x cobble: extremely weak, SW, grey mudstone (breaks down to SILT; low plasticity).		
										9		'Loose', uncemented fine to medium SAND; grey; wet, non plastic. Core loss (8.6 - 9.7 m).		-3
												'Loose', medium to coarse SAND; dark brownish grey; moist, non plastic.		

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 2 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 3	11		'Medium dense', medium to coarse gravelly, fine to coarse SAND, some silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite and greywacke.	Undifferentiated Quaternary Lahars	-5
		100 %	HQ3									11.0 - 11.6 m, weakly cemented.		
		100 %	HQ3									11.6 m, cemented.		
		40 %	HQ3						Box 4	12		Core loss (12.1 - 12.9 m).		-6
		0 %	HQ3											
		90 %	HQ3							13		'Medium dense', medium to coarse gravelly, fine to coarse SAND, some silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite and greywacke.		-7
		100 %	HQ3											
		100 %	HQ3							14				-8
		100 %	HQ3											
		60 %	HQ3							15		Core loss (15.0 - 15.3 m).		-9
		100 %	HQ3									'Medium dense', medium to coarse gravelly, fine to coarse SAND, minor silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite and greywacke.		
		93 %	HQ3						Box 5	16				-10
		100 %	HQ3									Very stiff, fine sandy SILT, trace clay; bluish grey (oxidised greenish brown); moist, low plasticity.		
										17		'Medium dense', medium to coarse GRAVEL; grey; dry, clast supported (matrix lost?). Gravel: SW, rounded to subangular andesite.		-11
												Core loss (16. 7 - 17.6 m).		
		90 %	HQ3							18		'Medium dense', medium to coarse gravelly, fine to coarse SAND, minor silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite and greywacke. 17.9 - 18.3 m, weakly cemented, some matrix loss.		-12
		100 %	HQ3											
		53 %	HQ3						Box 6	19		Core loss (18.9 - 19.4 m).		-13
												'Medium dense', medium to coarse gravelly, fine to coarse SAND, minor silt; greyish brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite and greywacke.		

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd COMMENTS:

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 3 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS								
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		0 %	HQ3							21		Core loss (20.0 - 21.1 m).		-15
		0 %	HQ3											
		100 %	HQ3						Box 6			'Dense', fine to coarse gravelly, fine to coarse SAND, minor silt; greyish brown; moist, non plastic, weakly cemented. Gravel: MW-SW, subangular to rounded, andesite, greywacke and quartz.		
		100 %	HQ3							22		21.9 - 22.16 m, 'loose', medium to coarse SAND; dark brownish grey (possibly uphole material).		-16
		78 %	HQ3							23		'Dense', fine to coarse SAND, some medium to coarse gravel; greyish and pinkish brown; wet, non plastic, pumiceous, cemented. Gravel: SW, subangular, andesite.		-17
		32 %	HQ3							24		23.9 m, 'loose', matrix lost.		-18
												Core loss (24.23 - 24.9 m).		
		35 %	HQ3						Box 7	25		'Dense', medium to coarse GRAVEL; grey; wet, non plastic, clast supported. Gravel: SW, subangular andesite.		-19
												'Medium dense', fine to medium SAND; brownish grey; wet, non plastic, uncemented.		
												Core loss (25.25 - 25.9 m).		
		100 %	HQ3							26		'Medium dense', fine to medium SAND; brownish grey; wet, non plastic, uncemented.		-20
		96 %	HQ3											
		100 %	HQ3									26.8 m, 1 x cobble: strong, SW, greyish green andesite.		
		50 %	HQ3							27		Core loss (27.0 - 27.25 m).		-21
		80 %	HQ3									'Medium dense', fine to medium SAND; brownish grey; wet, non plastic, uncemented. 27.4 m, 1 x cobble: strong, SW, greyish green andesite.		
												27.75 m, 'dense'; brown; weakly cemented.		
										28		'Dense', fine gravelly, fine to coarse SAND, trace coarse gravel; dark brownish grey; moist, non plastic. Gravel: SW, subrounded andesite and greywacke.		-22
		12 %	HQ3						Box 8			28.23 - 30.6 m, core loss.		
										29				-23

Undifferentiated Quaternary Lahars

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS | DAILY WATER LEVEL | CORE RECOVERY | METHOD | CASING | RQD

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

SAMPLES | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK DESCRIPTION | GEOLOGICAL UNIT | R L (m)

Torqueless + Sand Drill

Core recovery	Method	Samples	Depth (m)	R L (m)	Soil / rock description	Geological unit
12 %	HQ3				28.23 - 30.6 m, core loss.	
100 %	HQ3				'Dense', fine gravelly, fine to coarse SAND, trace coarse gravel; dark brownish grey; moist, non plastic. Gravel: SW, subrounded andesite and greywacke.	Undifferentiated Quaternary Lahars
80 %	HQ3		31	-25	'Dense', fine to medium SAND, trace coarse gravel; brownish grey; moist, non plastic. Gravel: MW-SW, siltstone.	
91 %	HQ3	Box 8			'Dense', fine to coarse SAND, minor fine to medium gravel; brownish grey; moist, non plastic. Gravel: SW, subrounded andesite.	
83 %	HQ3		32	-26		
75 %	HQ3					
67 %	HQ3		33	-27	32.9 m, brown.	
					33.3 m, trace wood fragments (bark).	
95 %	HQ3				'Very dense', fine to medium SAND, trace fine gravel, trace silt; greyish brown; moist, non plastic, weakly cemented. Gravel: SW, subrounded greywacke.	
53 %	HQ3		34	-28	Core loss (33.4 - 33.6 m).	
		Box 9			'Very dense', fine to medium SAND, trace fine gravel, trace silt; greyish brown; moist, non plastic, weakly cemented. Gravel: SW, subrounded greywacke.	
			35	-29	'Very dense', fine to coarse SAND, some shell fragments, some fine to coarse gravel; orange-brown; moist, non plastic. Gravel:	
					35.0 m, fine to coarse sandy, medium to coarse GRAVEL; brownish grey; wet, non plastic. Gravel:	Matemateaonga Formation
60 %	HQ3				Very weak, MW-SW, grey MUDSTONE	
					35.3 m, moderately thin (100 mm) bed of extremely weak fine silty SANDSTONE.	
					35.4 m, extremely weak. Defects: subhorizontal, planar/ stepped, smooth.	
			36	-30	35.8 m, moderately thin (100 mm) uncemented SANDSTONE.	
100 %	HQ3				35.9 m, very weak.	
					35.95 m, defect: very steeply inclined, planar/stepped smooth.	
					36.7 m, extremely weak, fine sandy MUDSTONE, thinly interbedded with silty SANDSTONE.	
			37	-31	36.8 m, very weak MUDSTONE; subvertical brown veined. Defects: very closely spaced, subvertical (to depth 37.5 m), planar, smooth.	
					37.4 - 37.8 m, silty SANDSTONE, moderately thickly interbedded with thin MUDSTONE beds.	
100 %	HQ3	Box 10			Extremely weak, MW-SW, grey SANDSTONE. Defect: very steeply inclined, closed.	
			38	-32	38.1 - 38.25 m, subhorizontal brown laminations (organic flecked).	
					Very weak, MW-SW, brownish grey fine sandy MUDSTONE. Defects: subhorizontal/ gently inclined, undulating, rough.	
			39	-33	38.8 m, defect: very steeply inclined, planar/stepped, smooth.	
100 %	HQ3				39.6 m, moderately thin (100 mm) bed of silty SANDSTONE.	
					39.83 m, SW. Defect: steeply inclined, closed.	

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 5 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS; DAILY WATER LEVEL; CORE RECOVERY; METHOD; CASING; RQD

IN-SITU TESTS: SV; τ (kPa); SPT 'N'

SAMPLES

DEPTH (m)

GRAPHIC LOG

SOIL / ROCK DESCRIPTION

GEOLOGICAL UNIT

R L (m)

Torqueless + Sand Drill

CORE RECOVERY	METHOD
93 %	HQ3
100 %	HQ3
98 %	HQ3
100 %	HQ3
100 %	HQ3
100 %	HQ3

Box 11 | Box 12 | Box 13 | Box 14

41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49

-35 | -36 | -37 | -38 | -39 | -40 | -41 | -42 | -43

40.0 m, moderately thin (100 mm) bed of very weak, SW, grey silty fine SANDSTONE, some organic laminations.
40.2 m, defects: closely spaced, steeply inclined, planar, rough, and moderately widely spaced, stepped, smooth.

40.6 m, organic laminations.

40.9 m, moderately thin (150 mm) bed of extremely weak, SW, grey, uncemented fine to medium SANDSTONE. Defect: very steeply inclined, stepped, rough.

41.2 m, moderately thick (300 mm) bed of extremely weak, SW, grey, uncemented fine to medium SANDSTONE.

41.4 - 41.5 m, core loss.

Very weak, SW, grey MUDSTONE. Moderately thickly interbedded with organic laminations. Defects: closely to moderately widely spaced, subhorizontal, stepped, smooth.

41.9 m, moderately thin (100 mm) bed of extremely weak silty fine SANDSTONE.

42.3 - 42.6 m, moderately thinly interbedded with very weak silty SANDSTONE.

42.85 m, moderately thin (200 mm) bed of extremely weak silty fine SANDSTONE.
42.9 m, defect: steeply inclined, planar, smooth.
43.05 m, extremely weak (very stiff, SILT, minor clay; grey; moist, low plasticity). Defect: very steeply inclined moderately narrow (15 mm) greenish brown vein (undulating/ planar, smooth).
43.2 m, moderately thin (100 mm) bed of very weak, silty fine SANDSTONE, moderately thinly interbedded with lenses of uncemented sand.
43.4 m, very weak; moderately thinly interbedded with silty fine SANDSTONE and organic laminations. Bedding: gently inclined. Defects: subhorizontal to gently inclined, stepped, rough (breaking on sandstone beds).

45.1 m, defects: moderately widely spaced, steeply inclined, undulating, smooth.

45.45 m, defect: steeply inclined, undulating, smooth.

45.9 m, moderately thin (100 mm) bed of very weak, fine to medium SANDSTONE.

Extremely weak, SW, grey, fine to medium SANDSTONE; micaceous. Uncemented. ('Very dense', SAND, trace silt; grey; non plastic).

Very weak to weak, SW, dark grey, medium to coarse volcaniclastic SANDSTONE. Massive.

47.05 m, moderately thin (150 mm) bed of very weak, SW, grey MUDSTONE.

47.7 m, weak.

48.0 m, strong, SW, grey volcaniclastic SANDSTONE (400 mm diameter, boulder?). Defect: very steeply inclined, undulating, rough, quartz lined.

48.4 m, weak to moderately strong. Defects: widely spaced, steeply inclined, undulating rough.

49.16 m, cobble (100 mm), subrounded, weak SANDSTONE.
49.26 m, very weak, greenish grey, trace mica.
49.4 m, extremely weak, weakly cemented. Trace fine mudstone clasts (within sandstone matrix). Becoming more fine grained with depth.

Matemateaonga Formation

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 6 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 — JOB NUMBER: 3853039

SITE LOCATION: New Plymouth — CLIENT: New Plymouth District Council

CIRCUIT: NZTM — BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m — R L: 6.02 m — COORDINATE ORIGIN: dGPS

E 1,692,611.55 m — DATUM: MSL — ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 14			Very weak, SW, grey MUDSTONE, thinly interbedded with extremely weak, SW, grey, weakly cemented fine to medium SANDSTONE.		
												Very weak, SW, grey MUDSTONE. Defects: gently inclined, stepped, smooth (bedding parallel).		
		96 %	HQ3						Box 15	51		Extremely weak, SW, grey SANDSTONE. 51.0 m, moderately thin (100 mm) bed of fine sandy MUDSTONE. 51.2 m, very weak, silty fine SANDSTONE. Defects: moderately widely spaced, subhorizontal (possibly drilling induced). 51.3 m, moderately thin bed of very weak, fine sandy MUDSTONE. Defects: subhorizontal to gently inclined, undulating/ stepped, smooth.		-45
										52		51.8 m, moderately thin bed of very weak MUDSTONE. Bedding: gently inclined, laminated. 52.1 m, moderately thin (50 mm) bed of extremely weak, fine to medium SANDSTONE. Trace shells.		-46
										53		52.5 m, moderately thin (50 mm) bed of extremely weak, fine to medium SANDSTONE. Trace shells.		-47
		97 %	HQ3						Box 16	54		54.0 m, very weak, silty fine SANDSTONE. Trace shell fragments, trace mica flakes. Moderately thinly interbedded with very weak MUDSTONE. Defects: widely spaced, gently inclined, undulating, smooth.	Matemateaonga Formation	-48
										55		55.3 m, defect: steeply inclined, undulating, rough.		-49
										56				-50
		90 %	HQ3						Box 17	57		Very weak, SW, grey, fine sandy MUDSTONE, moderately thinly interbedded with extremely weak to very weak, silty fine SANDSTONE. Trace shells.		-51
										58				-52
										59				-53
		99 %	HQ3						Box 18					

DATE STARTED: 16/2/16 — DRILLED BY: Drill Force NZ Ltd — COMMENTS:

DATE FINISHED: 26/2/16 — EQUIPMENT: YDX3L

LOGGED BY: JUB — DRILL METHOD: HQ3

SHEAR VANE No: NA — DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 14:51 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 7 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		99 %	HQ3						Box 18	61		Very weak, SW, grey MUDSTONE. Trace shell fragments. Massive. Defects: moderately widely spaced, undulating, rough. 60.2 m, grades to fine sandy MUDSTONE. 60.5 m, 200 mm strong SANDSTONE (concretion?). 60.7 m, MUDSTONE. 61.5 m, defect: gently inclined, stepped, smooth, sand coated. 61.7 m, thin (20 mm) bed of extremely weak SANDSTONE.		-55
										62				-56
		73 %	HQ3						Box 19	63		62.4 m, defects: closely to moderately widely spaced, subhorizontal (appear drilling induced).		-57
										64		64.22 - 64.5 m, extremely weak, thinly interbedded with weakly cemented silty SANDSTONE (very dense, silty SAND, trace shell fragments; moist, non plastic).		-58
										65		Core loss (64.6 - 65.4 m).		-59
		99 %	HQ3						Box 20	66		Extremely weak to very weak, SW, grey silty SANDSTONE. Trace mica flakes. Very weak, SW, grey MUDSTONE. Bedding: gently inclined, very thin. Defects: moderately widely spaced, gently inclined, undulating, smooth. 66.0 m, extremely weak. Defects: closely to moderately widely spaced, bedding parallel. 66.27 m, 150 mm strong SANDSTONE (concretion?).	Matemateaonga Formation	-60
										67		67.0 m, very weak. Defects: widely spaced.		-61
										68		68.4 m, extremely weak to very weak. 68.7 m, extremely weak.		-62
		88 %	HQ3						Box 21	69		Extremely weak, SW, grey, fine silty SANDSTONE, thinly interbedded with MUDSTONE. ('very dense', silty fine SAND; moist, non plastic). Bedding: subhorizontal. Defects: closely spaced, subhorizontal to gently inclined, stepped, smooth. 69.5 m, weakly cemented, trace mica flakes. Extremely weak to very weak, SW, grey MUDSTONE. Bedding: gently inclined. Defects: closely to very closely spaced, stepped, smooth, sand coated.		-63

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS: Torqueless + Sand Drill; DAILY WATER LEVEL; CORE RECOVERY: 88 %, 62 %, 33 %, 40 %, 0 %, 85 %; METHOD: HQ3; CASING; RQD

IN-SITU TESTS: SV; τ (kPa); SPT 'N'

SAMPLES: Box 21, Box 22, Box 23

DEPTH (m)	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
71	70.1 m, bedding: gently inclined, laminated (5-10 mm) sand lenses. Defects: closely spaced, very steeply inclined, undulating, smooth. 70.2 m, moderately thick (300 mm) bed of very weak MUDSTONE. Bedding: Defects: subhorizontal, planar/ stepped, smooth and subvertical, undulating, smooth, stained brown. 70.5 m, extremely weak. Defects: very closely spaced. Core loss (71.0 - 71.4 m).	Matemateaonga Formation	-65
72	Very weak, SW, grey MUDSTONE, interbedded with laminations of fine silty SANDSTONE. Bedding: subhorizontal. Defects: closely spaced, stepped, smooth, sand coated. 72.2 m, very weak, SW, grey sandy MUDSTONE.		-66
73	72.6 m, extremely weak. 72.7 m, moderately thin (150 mm) bed of extremely weak, silty SANDSTONE ('very dense', silty SAND; moist, non plastic). Bedding: gently inclined. 72.85 m, very weak. Defects: subhorizontal and subvertical, stepped, smooth. 72.95 m, extremely weak. 73.15 m, very weak. Core loss (73.25 - 74.4 m).		-67
74			-68
75	Extremely weak, SW, grey, silty fine SANDSTONE ('dense', silty fine sand; moist, non plastic). Bedding: subhorizontal. Extremely weak, SW, grey, fine sandy MUDSTONE, laminated with subhorizontal beds of silty SANDSTONE. 74.7 m, very weak. Defects: very closely spaced, subhorizontal, stepped, smooth. 74.85 m, extremely weak. 74.92 m, very weak, MUDSTONE, laminated with silty SANDSTONE. Bedding: gently inclined. Defects: closely to very closely spaced, gently inclined, planar/stepped, smooth. 75.2 m, extremely weak silty SANDSTONE. 75.33 m, extremely weak, SW, grey MUDSTONE (very stiff, SILT, minor clay; moist, low plasticity).		-69
76	Core loss (75.4 - 77.40 m).		-70
77			-71
78	Very weak, SW, grey MUDSTONE. Trace mica. Bedding: laminated, subhorizontal. Defects: very closely spaced, subhorizontal, sand coated. 77.53 m, 180 mm strong SANDSTONE (concretion). Core loss (77.8 - 79.4 m).		-72
79			-73
	Extremely weak, silty fine to medium SANDSTONE. Micaceous, cemented. ('Very dense', silty SAND; moist, non plastic). 79.5 m, grading to fine sandy MUDSTONE. Extremely weak, SW, grey SANDSTONE. Trace shell fragments. Uncemented.		

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Wind Wand

COORDINATES: N 5,676,436.04 m R L: 6.02 m COORDINATE ORIGIN: dGPS

E 1,692,611.55 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS | DAILY WATER LEVEL | CORE RECOVERY | METHOD | CASING | RQD

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
			Torqueless + Sand Drill		
			85 % HQ3		
			Bedding: very thin, lenses of extremely to very weak mudstone. ('Very dense', fine to medium SAND, some silt; saturated, non plastic).		
			80.15 m, extremely weak silty SANDSTONE. Bedding: genty inclined, laminated.		
			Defects: very closely spaced, gently inclined, planar, smooth.		
			Core loss (80.25 - 80.4 m).		
			96 % HQ3		
	81		Extremely weak, SW, grey, fine to medium SANDSTONE. Massive, micaceous, trace shell fragments, weakly cemented.		-75
Box 23					
	82		82.14 m, moderately thin (60 mm) bed of sandy MUDSTONE. Defect: subvertical, undulating, smooth.		-76
			69 % HQ3		
			82.62 m, extremely to very weak, SW, grey MUDSTONE.		
	83		Core loss (82.77 - 83.4 m).		-77
			Extremely weak, silty, fine to medium SANDSTONE. Trace mica. Weakly cemented to uncemented. Bedding: laminated.		
	84		Core loss (83.9 - 85.2 m).		-78
			33 % HQ3		
Box 24					
	85		40 % HQ3		-79
			Extremely weak, silty, fine to medium SANDSTONE. Weakly cemented to uncemented.		
			72 % HQ3		
			Extremely weak to very weak, SW, grey MUDSTONE (hard, SILT, minor fine sand, trace clay; moist, low plasticity).		
	86		85.6 m, thin (50 mm) bed of uncemented silty fine SANDSTONE.		-80
			85.7 m, defect: steeply inclined, stepped, rough.		
			52 % HQ3		
			Core loss (85.76 - 85.9 m).		
			Extremely weak to very weak, SW, grey MUDSTONE (hard, SILT, minor fine sand, trace clay; moist, low plasticity).		
			94 % HQ3		
			Core loss (86.26 - 86.4 m).		
			Extremely weak, SW, grey, fine sandy MUDSTONE. Trace shells, trace mica flakes.		
	87		86.6 m, thin (50 mm) bed of uncemented silty SANDSTONE.		-81
			100 % HQ3		
			Extremely weak, SW, grey, silty, shelly, fine to medium SANDSTONE. Uncemented.		
			Extremely to very weak, SW, grey, MUDSTONE.		
			Extremely weak, SW, grey, fine silty SANDSTONE. Some coarse gravel: UW, strong, subrounded greywacke, and weak mudstone and sandstone. Some shells.		
	88		87.3 m, moderately thin (100 mm) bed of fine sandy MUDSTONE. Trace shells.		-82
			87.4 m, uncemented fine to medium SANDSTONE, with 2 x coarse, subangular gravels. Gravel: moderately strong to strong SILTSTONE and strong fossiliferous SANDSTONE.		
			15 % HQ3		
			Core loss (87.6 - 88.5 m).		
Box 25					
	89		Extremely weak, SW, grey, fine to medium SANDSTONE. Trace shells. Uncemented.		-83
			89.1 m, cobble (100 mm), subrounded, SW, moderately strong greywacke.		
			90 % HQ3		
			100 % HQ3		

Matemateaonga Formation

DATE STARTED: 16/2/16 DRILLED BY: Drill Force NZ Ltd COMMENTS:

DATE FINISHED: 26/2/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH02

MACHINE BOREHOLE LOG

SHEET 10 of 10

PROJECT: NP CBD Borehole Drilling 15/BSG05 — JOB NUMBER: 3853039

SITE LOCATION: New Plymouth — CLIENT: New Plymouth District Council

CIRCUIT: NZTM
COORDINATES: N 5,676,436.04 m
E 1,692,611.55 m

BOREHOLE LOCATION: Wind Wand
R L: 6.02 m
DATUM: MSL

COORDINATE ORIGIN: dGPS
ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 25	91		Extremely weak, SW, grey, fine to medium SANDSTONE. Trace shells. Uncemented.	Matemateaonga Formation	-85
		63 %	HQ3						Box 26			91.6 m, 160 mm strong SANDSTONE (concretion) (broken in two).		
										92		Core loss (91.7 - 92.0 m).		-86
												END OF LOG @ 92 m		
										93				-87
										94				-88
										95				-89
										96				-90
										97				-91
										98				-92
										99				-93

DATE STARTED: 16/2/16
DATE FINISHED: 26/2/16
LOGGED BY: JUB
SHEAR VANE No: NA

DRILLED BY: Drill Force NZ Ltd
EQUIPMENT: YDX3L
DRILL METHOD: HQ3
DRILL FLUID: Lubricant
DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 14:51 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 1 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS | DAILY WATER LEVEL | CORE RECOVERY | METHOD | CASING | RQD

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

SAMPLES

DEPTH (m)

GRAPHIC LOG

SOIL / ROCK DESCRIPTION

GEOLOGICAL UNIT

R L (m)

Torqueless + Sand Drill

Core Recovery	Method	Samples	Depth (m)	R L (m)	Soil / Rock Description	Geological Unit
100 %	HQ3		0	6	'Loosely packed', coarse GRAVEL; grey; dry. Gravel: SW, subangular andesite, clast supported.	Fill
5 %	HQ3		1		Core loss (0.5 - 1.5 m).	
100 %	HQ3	Box 1	1.5	5	Very soft, SILT, some fine to coarse sand, trace fine gravel, trace clay, trace organics; brown; saturated, low plasticity. Organics: decomposing fine fibrous. [Topsoil]	Quaternary Andesitic Ash
100 %	HQ3		2		Soft, fine to medium sandy SILT, trace clay; light brown speckled black; wet, low plasticity. 1.8 m, minor fibrous organics (rootlets). 2.0 m, firm.	
				4	2.6 m, some decomposing fibrous organics.	
100 %	HQ3		3		Firm, clayey SILT, some fine to medium sand, minor organics; light brownish grey speckled black; wet, high plasticity, sensitive. Organics: rootlets.	
100 %	HQ3				Firm, fine to medium sandy SILT, minor clay; light greyish brown and orange-brown; wet, low plasticity, sensitive.	
88 %	HQ3		4	3	3.8 m, trace fine fibrous organics; brown. Sand: fine to coarse.	
100 %	HQ3				'Loose', silty fine to coarse SAND, trace clay; brown; wet, non plastic.	
56 %	HQ3	Box 2		2	Core loss (4.3 - 4.7 m).	
			5		'Loose', coarse gravelly COBBLES; grey; dry. Gravel/ cobbles: SW, subrounded andesite, clast supported (matrix lost on drilling?).	
65 %	HQ3				Core loss (5.2 - 5.55 m).	
				1	'Loose', coarse GRAVEL; grey and brownish grey; moist. Gravel: SW, subrounded andesite, clast supported (matrix lost on drilling?).	
90 %	HQ3		6		'Loose', fine to coarse SAND, trace silt; dark brownish grey; saturated, non plastic. 6.05 - 6.2 m, some cobbles: SW, subangular to subrounded andesite, clast supported.	Undifferentiated Quaternary Lahars
				0	'Loose', coarse gravelly, fine to coarse SAND; dark brownish grey; wet, non plastic. Gravel: SW, subangular andesite. 6.95 m, clast supported, matrix lost on drilling (?).	
92 %	HQ3		7		'Loose', fine to coarse SAND, some medium to coarse gravel, minor cobbles; dark brownish grey; wet, non plastic. Gravel: MW-SW, subangular to subrounded andesite. 7.5 m, cobble (180 mm) broken into coarse gravel-cobbles.	
90 %	HQ3	Box 3		-1		
			8			
70 %	HQ3				8.7 m, hydrocarbon odour.	
				-2		
94 %	HQ3		9		'Medium dense', medium to coarse gravelly, coarse SAND, minor fine to medium sand; dark brownish grey; wet, non plastic. Gravel: SW, subrounded andesite, matrix supported. 9.6 m, trace cobbles: subrounded, pink andesite.	
93	HQ3			-3		

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 15:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		93 %	HQ3						Box 4	11		'Medium dense', medium to coarse gravelly, coarse SAND, minor fine to medium sand; dark brownish grey; wet, non plastic. Gravel: SW, subrounded andesite, matrix supported.	Undifferentiated Quaternary Lahars	-4
		90 %	HQ3									10.2 m, clast supported.		
		100 %	HQ3									10.8 m, some fine to medium sand.		
		76 %	HQ3									11.2 m, sand: fine to coarse.		-5
		90 %	HQ3							12				
		78 %	HQ3									12.6 m, trace cobbles.		-6
		92 %	HQ3							13				
		100 %	HQ3						Box 5			'Medium dense', fine to coarse SAND, some coarse gravel, minor cobbles; dark brownish grey; wet, non plastic. Gravel/ cobbles: SW, subangular pink and grey andesite, matrix supported.		-7
		91 %	HQ3							14				
		86 %	HQ3											-8
		83 %	HQ3							15		15.06 m, boulder (240 mm), SW, grey, andesite.		
		80 %	HQ3											-9
		92 %	HQ3							16		16.0 m, trace silt.		
		88 %	HQ3						Box 6					-10
		90 %	HQ3							17				
		100 %	HQ3											-11
		80 %	HQ3							18				
		90 %	HQ3									18.6 - 18.7 m, coarse gravel, clast supported (matrix lost on drilling ?).		-12
		88 %	HQ3							19				
		100 %	HQ3						Box 7					-13

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		86 %	HQ3						Box 8	21		'Dense', fine to coarse gravelly, fine to coarse SAND, minor silt; dark greenish grey (oxidised brown); moist, non plastic, matrix supported, weakly cemented. Gravel: MW-SW, subangular andesite.	Undifferentiated Quaternary Lahars	-14
		24 %	HQ3									20.3 m, very thin (10 mm) clayey SAND lenses, yellowish brown.		
												20.32 m, clast supported, cemented cobble (of fine to coarse gravelly SAND).		
		85 %	HQ3									Core loss (20.51 - 20.7 m).		
		60 %	HQ3									'Dense', medium to coarse gravelly BOULDERS AND COBBLES; grey; dry. Boulders/ cobbles/ gravel: SW, subangular andesite (matrix lost on drilling ?).		-15
		100 %	HQ3							22		'Dense', fine to coarse gravelly, fine to coarse SAND, some silt; greenish grey oxidised brown; moist, non plastic, cemented. Gravel: MW-SW, subangular andesite, matrix supported.		-16
		89 %	HQ3						Box 9	23		'Dense', fine to coarse sandy, fine to coarse GRAVEL and COBBLES, minor silt; brownish grey; moist, non plastic, weakly cemented. Gravel: MW-SW, subangular andesite, matrix supported.		-17
		87 %	HQ3									23.45 - 23.85 m, greenish brown/ grey; cemented.		
		100 %	HQ3							24		'Medium dense' fine SAND, some silt; grey; saturated, non plastic.		-18
		50 %	HQ3							25		24.5 m, trace mica, trace silt. Sand: fine to medium, dilatant.		-19
		100 %	HQ3									'Medium dense', silty fine to medium SAND; grey; saturated, non plastic, weakly cemented.	Marine Sands	
												Core loss (25.58 - 26.0 m).		
		100 %	HQ3						Box 10	26		'Dense', fine to medium SAND, trace mica flakes; grey; wet, non plastic.		-20
		100 %	HQ3							27		26.3 m, trace fine gravel; saturated. Gravel: subangular, weakly cemented siltstone.		-21
		100 %	HQ3							28				-22
		100 %	HQ3						Box 11	29				-23

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS | DAILY WATER LEVEL | CORE RECOVERY | METHOD | CASING | RQD

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

SAMPLES | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK DESCRIPTION | GEOLOGICAL UNIT | R L (m)

Torqueless + Sand Drill

Core recovery	Method	Sample	Depth (m)	Soil / rock description	Geological unit	R L (m)
100 %	HQ3			'Dense', fine to medium SAND, trace mica flakes; grey; saturated, non plastic.	Marine Sands	
				Core loss (30.63 - 31.0 m).		-24
100 %	HQ3	Box 11	31	'Dense', fine to coarse SAND, trace fine to medium gravel, trace silt; dark grey; wet, non plastic.		-25
			32	Core loss (32.15 - 32.5 m).		-26
60 %	HQ3			'Dense', fine to coarse SAND, minor fine to medium gravel, minor shells, minor silt; dark grey; wet, non plastic. Gravel: MW-SW, subrounded andesite, and subangular shelly conglomerate.		
100 %	HQ3		33	Extremely weak, SW, grey MUDSTONE.		-27
100 %	HQ3	Box 12		33.66, sandy concretion (100 mm). 33.76 m, defect: subvertical, undulating, smooth.		-28
			34			
100 %	HQ3		35	34.75 m, thin (30 mm) uncemented bed.		-29
94 %	HQ3			Extremely weak, SW, grey SANDSTONE. Uncemented ('Very dense', fine to medium SAND, minor silt; moist, non plastic).	Matemateaonga Formation	
100 %	HQ3		36	Extremely weak, SW, grey MUDSTONE.		-30
90 %	HQ3	Box 13		36.2 m, moderately thin (80 mm) bed of extremely weak, SW, grey, uncemented SANDSTONE. 36.4 - 36.5 m, disturbed by drilling.		-31
			37			
100 %	HQ3		38	38.05 m, moderately thin (150 mm) bed of extremely weak, SW, grey, uncemented SANDSTONE.		-32
100 %	HQ3	Box 14	39	Extremely weak, SW, grey, silty fine SANDSTONE. 39.3 m, grading to sandy MUDSTONE.		-33
99 %	HQ3			Extremely weak, SW, grey, SANDSTONE. Uncemented to weakly cemented. Moderately thinly interbedded with extremely weak, SW, grey, MUDSTONE.		

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 5 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		99 %	HQ3						Box 14	41		Extremely weak, SW, grey, SANDSTONE. Uncemented to weakly cemented ('Very dense', fine to medium SAND, minor silt; moist, non plastic). Moderately thinly interbedded with moderately thin beds of extremely weak, SW, grey, MUDSTONE.	Matemateaonga Formation	-34
		100 %	HQ3						Box 15	42		41.13 m, organic lamination.		-35
		100 %	HQ3							43		42.5 m, trace mica flakes, trace shells.		-36
		100 %	HQ3							44		42.95 m, 50mm strong shelly SANDSTONE (concretion). 43.15 m, weakly cemented. 43.4 m, thin (40 mm) zone of organic laminations.		-37
		90 %	HQ3						Box 16	45		44.85 m, 50 mm strong SANDSTONE (concretion).		-38
		100 %	HQ3							46		45.7 m, uncemented.		-39
		100 %	HQ3						Box 17	47				-40
		100 %	HQ3							48		Extremely weak, SW, grey, silty, fine to medium SANDSTONE to sandy SILTSTONE. Weakly cemented. 47.85 m, 4x organic laminations.		-41
		100 %	HQ3							49		Extremely weak, SW, grey, SANDSTONE, trace shells. Uncemented. Bedding: laminated. ('Very dense', fine to medium SAND, minor silt; moist, non plastic).		-42
		33 %	HQ3						Box 18			49.4 m, 50 mm strong sandstone (concretion). Core loss (49.46 - 50.0 m).		-43

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS | DAILY WATER LEVEL | CORE RECOVERY | METHOD | CASING | RQD

IN-SITU TESTS: SV | τ (kPa) | SPT 'N'

SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
			Torqueless + Sand Drill		
Box 18	51		Extremely weak, SW, grey, SANDSTONE. Uncemented to weakly cemented ('Very dense', fine to medium SAND, minor silt; moist, non plastic). Moderately thinly interbedded with moderately thin beds of extremely weak, SW, grey, MUDSTONE.	Matemateaonga Formation	-44
			50.78 m, organic lamination; subhorizontal bedding.		
	52				-45
					-46
Box 19	53		Extremely weak, SW, grey, silty fine SANDSTONE. Uncemented. Thinly interbedded with extremely weak, SW, grey, sandy MUDSTONE, trace shells.		-47
	54		53.93 m, 110 mm strong SANDSTONE (concretion). 54.04 m, sandy MUDSTONE moderately thinly interbedded.		-48
			Extremely weak, MW-SW, grey, speckled black and white volcaniclastic SANDSTONE. 54.35 m, 50 mm moderately strong volcaniclastic SANDSTONE (concretion).		
			Extremely weak, SW, grey, silty fine SANDSTONE. Uncemented. Thinly interbedded with extremely weak, SW, grey, sandy MUDSTONE, trace shells.		
	55		Extremely weak, SW, grey MUDSTONE.		-49
Box 20	56		Extremely weak, SW, grey, silty SANDSTONE. Uncemented.		-50
			Extremely weak, SW, grey MUDSTONE.		
	57		Extremely weak, SW, grey, silty SANDSTONE. Uncemented.		-51
			Extremely weak, SW, grey MUDSTONE.		
			Extremely weak, SW, grey, SANDSTONE, trace shells. Uncemented.		
	58		57.85 m, 50 mm strong SANDSTONE (concretion).		-52
			Extremely weak, SW, grey MUDSTONE.		
Box 21	59		Extremely weak, SW, grey SANDSTONE. Uncemented ('Very dense', fine to medium SAND, minor silt; moist, non plastic).		-53
			59.22 m, 20 mm strong SANDSTONE (concretion).		

CORE RECOVERY	METHOD
100 %	HQ3
100 %	HQ3
90 %	HQ3
100 %	HQ3
93 %	HQ3
96 %	HQ3
100 %	HQ3
100 %	HQ3

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 15:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 21	61		Extremely weak, SW, grey SANDSTONE. Uncemented ('Very dense', fine to medium SAND, minor silt; moist, non plastic).	Matemateaonga Formation	-54
		100 %	HQ3									60.75 m, 130 mm strong SANDSTONE (concretion).		
		100 %	HQ3						Box 22	62				-55
		100 %	HQ3							63		62.35 m, 60 mm strong SANDSTONE (concretion).		-56
		100 %	HQ3							64				-57
		100 %	HQ3						Box 23	65		64.43 m, 90 mm strong coarse SANDSTONE (concretion).		-58
		100 %	HQ3							66		65.03 m, 70 mm strong to weak SANDSTONE (concretion).		-59
		97 %	HQ3							67		66.25 m, thin (30 mm) weak bed.		-60
		98 %	HQ3						Box 24	68		66.8 m, 50 mm strong SANDSTONE (concretion).		-61
										69		69.4 m, 120 mm strong SANDSTONE (concretion).		-62
														-63

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 25	71		Extremely weak, SW, grey, SANDSTONE. Uncemented to weakly cemented ('very dense', fine to medium SAND, some silt; moist, non plastic).		-64
		92 %	HQ3											
		100 %	HQ3							72				-65
														-66
		100 %	HQ3							73		73.0 m, weakly cemented. Defects: drilling induced.		-67
		100 %	HQ3						Box 26	74		74.0 m, 170 mm strong SANDSTONE (concretion, with possible shell casts).		-68
		100 %	HQ3									Extremely weak, fine sandy MUDSTONE.	Matemateaonga Formation	
										75		74.5 m, very weak.		-69
		98 %	HQ3							76		75.9 m, defect: steeply inclined, undulating, rough.		-70
									Box 27	77		Very weak, SW, grey MUDSTONE.		-71
		98 %	HQ3									77.25 m, 120 mm strong fine sandy MUDSTONE (concretion).		
										78				-72
		100 %	HQ3						Box 28	79		78.95 m, extremely weak. Defect: steeply inclined, undulating, smooth.		-73
												79.25 m, trace shells.		

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING						IN-SITU TESTS							
FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		96 %	HQ3						Box 28	81		Extremely weak, SW, grey MUDSTONE.	Matemateaonga Formation	-74
		100 %	HQ3						Box 29	82		Extremely weak, SW, grey, silty SANDSTONE, trace shells. Weakly cemented. 82.24 m, 20 mm strong SANDSTONE (concretion).		-75
		90 %	HQ3							83				-76
		58 %	HQ3							84		83.7 m, moderately thin (100 mm) very weak bed.		-77
		100 %	HQ3						Box 30	85				-78
		95 %	HQ3							86				-79
		100 %	HQ3						Box 31	87		87.5 m, very weak, grading to fine sandy MUDSTONE.		-80
		80 %	HQ3							88		Strong, SW, grey SANDSTONE (concretion). 88.26 m, defect: steeply inclined, undulating, rough. 88.35 m, defect: gently inclined, undulating, rough.		-81
										89		Extremely weak, SW, grey, silty fine SANDSTONE. Weakly cemented. 88.7 m, very weak/ extremely weak, moderately thinly interbedded. 88.8 - 88.9 m, extremely weak, drilling disturbed. 1x 50 mm strong SANDSTONE (concretion). 89.15 m, defect: steeply inclined, undulating, rough. 89.26 m, defect: steeply inclined, stepped, smooth. 89.6 m, defect: subvertical, planar, rough.		-82 -83

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING

FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		65 %	HQ3						Box 32	91		Extremely weak, SW, grey, silty fine SANDSTONE. Weakly cemented.	Matemateaonga Formation	-84
												Very weak, SW, grey, fine sandy MUDSTONE. 90.45 m, defect: steeply inclined, undulating, smooth.		
												Extremely weak to very weak, SW, grey, silty fine SANDSTONE. 90.8 m, extremely weak, weakly cemented. 90.9 m, defect: steeply inclined, stepped, rough.		
												Core loss (91.3 - 92.9 m).		-85
		64 %	HQ3							92				-86
										93		Extremely weak, SW, grey, silty fine SANDSTONE. Weakly cemented. Defects: closely spaced, drilling induced.		
												93.4 m, 30 mm strong SANDSTONE (concretion).		-87
												93.75 m, defect: steeply inclined, stepped, rough.		
										94				-88
		94 %	HQ3									94.5 m, extremely weak to very weak.		
												94.75 - 95.0 m disturbed by drilling.		
		96 %	HQ3						Box 33	95		Very weak, SW, grey, fine sandy MUDSTONE.		-89
												95.37 m, extremely weak.		
										96				-90
		96 %	HQ3									96.65 m, very weak, trace shells.		
										97				-91
		100 %	HQ3											
										98				-92
		99 %	HQ3						Box 34			98.6 m, extremely weak.		
										99		Extremely weak, SW, grey, silty fine SANDSTONE, trace shells. Cemented.		-93

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 11 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DAILY WATER LEVEL	CORE RECOVERY	METHOD	CASING	RQD	IN-SITU TESTS: SV	τ (kPa)	SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		99 %	HQ3									Extremely weak, SW, grey, silty fine SANDSTONE, trace shells. Cemented,		
		100 %	HQ3									100.3 m, very weak.		-94
												100.7 - 100.8 m, disturbed by drilling.		
		100 %	HQ3						Box 35	101				-95
										102		102.1 - 102.2 m, disturbed by drilling.		
		94 %	HQ3											-96
										103				
		100 %	HQ3									103.4 m, 50 mm bed with some shells.		-97
												Extremely weak to very weak, SW, grey, fine sandy MUDSTONE.		
									Box 36	104				-98
		100 %	HQ3									Extremely weak, SW, grey, silty fine SANDSTONE. Cemented.	Matemateaonga Formation	
										105		Very weak, SW, grey, fine sandy MUDSTONE, trace shells.		-99
		100 %	HQ3							106		Extremely weak to very weak, SW, grey, silty fine SANDSTONE.		-100
												106.65 m, extremely weak, weakly cemented.		
												106.8 m, 60 mm strong SANDSTONE (concretion) trace black speckled.		
		90 %	HQ3						Box 37	107		107.14 m, extremely weak, weakly cemented. Trace shells.		-101
										108				-102
										109				
		82 %	HQ3						Box 38			109.2 m, thin (30 mm) bed of extremely weak MUDSTONE.		
												109.3 m, thin (30 mm) bed of extremely weak MUDSTONE.		-103
												109.8 - 111.7 m, drilling disturbed.		

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 15:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 12 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 — JOB NUMBER: 3853039

SITE LOCATION: New Plymouth — CLIENT: New Plymouth District Council

CIRCUIT: NZTM — BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m — R L: 6.47 m — COORDINATE ORIGIN: dGPS

E 1,693,062.11 m — DATUM: MSL — ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		100 %	HQ3						Box 38	111		Extremely weak, SW, grey, silty fine SANDSTONE, trace shells. Weakly cemented. Defect: very steeply inclined to subvertical, undulating, smooth. 110.2 m, defect: very steeply inclined to subvertical, undulating, smooth. 110.75 m, defect: very steeply inclined, undulating, smooth, coarsely striated in dip direction. 111.15 m, defect: very steeply inclined, undulating, smooth, coarsely striated in dip direction.	Matemateaonga Formation	-104 -105
		81 %	HQ3							112		Very weak, SW, grey, MUDSTONE, trace shells.		-106
		99 %	HQ3						Box 39	113		Extremely weak, SW, grey, silty fine SANDSTONE. Weakly cemented. 113.0 m, trace shells.		-107
		100 %	HQ3							114				-108
										115				-109
		49 %	HQ3						Box 40	116		115.95 m, disturbed by drilling. 116.6 m, very thin (5 mm) very steeply inclined brown band.		-110
										117		Extremely weak, SW, grey SANDSTONE. Uncemented. Extremely weak, SW, grey, silty fine SANDSTONE. Weakly cemented.		-111
										118		Core loss (117.48 - 119.0 m).		-112
		80 %	HQ3							119		Extremely weak, SW, grey, silty fine SANDSTONE, trace shells. Weakly cemented.		-113
		100 %	HQ3						Box 41			119.5 - 120.4 m, extremely weak to very weak.		
		40	HQ3											

DATE STARTED: 7/3/16 — DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 — EQUIPMENT: YDX3L

LOGGED BY: JUB — DRILL METHOD: HQ3

SHEAR VANE No: NA — DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 15:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 13 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
Torqueless + Sand Drill		43 %	HQ3						Box 41	121		Extremely weak to very weak, SW, grey, silty fine SANDSTONE, trace shells. Weakly cemented.	Matemateaonga Formation	-114
												120.62 m, 50 mm very weak to weak SANDSTONE (concretion?).		
												Core loss (120.7 - 122.0 m).		-115
		52 %	HQ3							122		Extremely weak, SW, grey, silty fine SANDSTONE. Cemented. Defects: closely spaced (drilling induced?).		
												122.3 m, defect: subvertical (~200 mm persistence), undulating, rough.		-116
										123				-117
												Core loss (123.5 - 124.9 m).		
										124				-118
		77 %	HQ3						Box 42	125		Extremely weak, SW, grey, silty fine to medium SANDSTONE. Cemented.		-119
												125.6 - 125.72 m, uncemented zone (silty fine to medium SAND).		
										126		125.6 - 125.9 m, defect: subvertical, undulating, smooth.		-120
												Core loss (126.52 - 127.0 m).		
		100 %	HQ3							127		Extremely weak, SW, grey, silty fine to medium SANDSTONE, trace shells. Cemented.		-121
												127.7 - 127.82 m, very weak.		
										128		128.0 m, moderately widely spaced thin (50 mm) weakly cemented to uncemented beds.		-122
		100 %	HQ3						Box 43	129				
														-123

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

BECA LIB 1.07.4.GLB Log BECA MACHINE BOREHOLE NP CBD BH DRILLING 15_BSG05.GPJ <<DrawingFile>> 28/07/2016 15:38 8.30.004 Datgel Lab and In Situ Tool - DGD | Lib: Beca 1.07.4 2016-01-15 Prj: Beca 1.07 2014-12-16

Beca

BOREHOLE No: BH03/03a

MACHINE BOREHOLE LOG

SHEET 14 of 14

PROJECT: NP CBD Borehole Drilling 15/BSG05 JOB NUMBER: 3853039

SITE LOCATION: New Plymouth CLIENT: New Plymouth District Council

CIRCUIT: NZTM BOREHOLE LOCATION: Vivian St Carpark

COORDINATES: N 5,676,133.05 m R L: 6.47 m COORDINATE ORIGIN: dGPS

E 1,693,062.11 m DATUM: MSL ACCURACY: ±0.01m

DRILLING: FLUID LOSS	DRILLING: DAILY WATER LEVEL	DRILLING: CORE RECOVERY	DRILLING: METHOD	DRILLING: CASING	DRILLING: RQD	IN-SITU TESTS: SV	IN-SITU TESTS: τ (kPa)	IN-SITU TESTS: SPT 'N'	SAMPLES	DEPTH (m)	GRAPHIC LOG	SOIL / ROCK DESCRIPTION	GEOLOGICAL UNIT	R L (m)
		100 %	HQ3						Box 43	131		Extremely weak to very weak, SW, grey, silty fine to medium SANDSTONE, trace shells. Cemented. 130.8 m, extremely weak to very weak. END OF LOG @ 131 m		-124 -125 -126 -127 -128 -129 -130 -131 -132 -133

132 133 134 135 136 137 138 139

DATE STARTED: 7/3/16 DRILLED BY: Drill Force NZ Ltd

DATE FINISHED: 7/4/16 EQUIPMENT: YDX3L

LOGGED BY: JUB DRILL METHOD: HQ3

SHEAR VANE No: NA DRILL FLUID: Lubricant

DIAMETER/INCLINATION: 100 mm/ 90°

COMMENTS:
This borehole log combines the upper 20.1 m of BH03 (which was drilled to 23.2 m, and terminated due to artesian conditions), and the replacement borehole nearby, BH03a which was wash drilled to 20.1 m and cored thereafter.

FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS SEE KEY SHEET

A4 Scale 1:50

Appendix C: Current ground investigation results

- **Borehole Logs**
- **Hand Auger Logs**
- **Cone Penetration Test Logs**

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH1

SHEET: 1 OF 2

PROJECT: 51 Brougham St, New Plymouth
JOB No.: 1011502.0000
LOCATION: 51 Brougham St, New Plymouth

CO-ORDINATES: (NZTM2000) 5676161.00 mN 1692880.00 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.73m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Ollie & Kerwyn
LOGGED BY: CMCD
CHECKED: KJH
START DATE: 30/07/2019
FINISH DATE: 31/07/2019
CONTRACTOR: Drillforce Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE (SOIL: Classification, colour, consistency / density, moisture, plasticity; ROCK: Weathering, colour, fabric, name, strength, cementation)	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)
Fill	ASPHALT;	HVAC	0			
	Silty GRAVEL with some sand and organics (rootlets); Dark grey. Tightly packed, moist, well graded; Gravel, medium to coarse, angular, highly weathered andesite; Sand, fine to medium [HARDFILL]					
	Sandy GRAVEL with some organics (rootlets); Greyey-brown. Tightly packed, wet, poorly graded; Gravel, fine-medium, sub-angular, highly weathered andesite; Sand, medium to coarse.					
Taranaki Ash	Gravelly SAND with some organics (wood fragments); dark brown-grey. Loosely packed, poorly graded; Sand, medium to coarse; Gravel, fine to medium, sub-angular, highly weathered andesite.	SPT	0	1/1 1/1 1/1 N=4		
	Clayey SILT with some sand with trace organics (rootlets); brown. Stiff, wet, low plasticity; sand, fine to medium.	HQTT	100			
	2.40m: with trace fine, sub-angular gravel.					
	2.80m: becoming very stiff.					
	Sandy SILT with some clay; orange-brown. Firm, wet-saturated, non plastic; sand, fine-medium.	SPT	88	0/0 0/0 0/0 N=0		
	3.6-3.75m: CORELOSS;	HQTT	71			
	Silty CLAY with some sand; orange-brown. Stiff, wet, medium plasticity.					
	3.95m: becoming mottled orange & grey, very stiff.					
	4.30m: with trace organics (rootlets).					
	4.35-4.5m: CORELOSS;	SPT	0	2/1 3/3 2/4 N=12		
	Silty CLAY with some sand; orange-brown. Stiff, wet, medium plasticity.					
Pouakai Group	Sandy GRAVEL; mottled brown and grey. Medium dense, wet, well graded; gravel, fine to coarse, sub-rounded, slightly to unweathered andesite; sand, medium to coarse.	HQTT	80			
	Slightly weathered, light brown SILTSTONE; Extremely weak, moderately cemented, shallow dipping bedding planes.					
	SAND with some gravel; brown, mottled black and orange. Medium dense, wet, poorly graded; sand, fine to coarse; gravel, fine, sub-rounded, slightly to unweathered andesite.	SPT	100	3/3 3/5 5/6 N=19		
	Slightly weathered, light brown SILTSTONE; Extremely weak, moderately cemented, shallow dipping bedding planes.	HQTT	52			
	5.8-6.0m: CORELOSS;					
	Silty CLAY; light brown. Very stiff, moist to wet, high plasticity.					
	Silty SAND with some gravel; dark brown. Medium dense, wet, poorly graded; sand, fine to medium; gravel, medium to coarse, sub-angular, slightly to unweathered andesite.	SPT	66	2/4 3/5 6/6 N=20		
	7.0-7.5m: CORELOSS;	HQTT	33			
	Silty SAND with some gravel; dark brown. Medium dense, wet, poorly graded; sand, fine to medium; gravel, medium to coarse, sub-angular, slightly to unweathered andesite.					
	8.05m: grading into coarse, sub-rounded gravel.					
	Silty gravelly SAND; light brown with grey mottles. Medium dense, poorly graded; sand, fine to medium; gravel, fine, sub-rounded, slightly to unweathered andesite.	SPT	100	3/5 4/4 6/6 N=20		
	8.3-9.0m: CORELOSS;					

ROCK DEFECTS: Defect Log; Fracture Spacing (mm); RQD (%); Description & Additional Observations

0.00 - 1.50m: Hydro Excavation. Point samples taken from borehole walls.

Fluid Loss (%); Water Level (31/07/2019, 30/07/2019); Casing (100mm PQ Casing); Installation; Core Box No (Box 1, 0.0-5.1m)

COMMENTS: 10.0m PVC Standpipe Piezometer installed with a screened zone from 7.0-10.0m bgl.

Hole Depth 19.95m

Scale 1:50

Rev.: A

BOREHOLE LOG

Tonkin+Taylor

BOREHOLE No.: BH1

SHEET: 2 OF 2

PROJECT: 51 Brougham St, New Plymouth
JOB No.: 1011502.0000
LOCATION: 51 Brougham St, New Plymouth

CO-ORDINATES: (NZTM2000) 5676161.00 mN 1692880.00 mE
DIRECTION:
ANGLE FROM HORIZ.: -90°

R.L. GROUND: 9.73m
R.L. COLLAR:
DATUM: NZVD2016
SURVEY: Total Station\Surveyed

DRILLED BY: Ollie & Kerwyn
LOGGED BY: CMCD
CHECKED: KJH
START DATE: 30/07/2019
FINISH DATE: 31/07/2019
CONTRACTOR: Drillforce Ltd

GEOLOGICAL UNIT	DESCRIPTION OF CORE SOIL: Classification, colour, consistency / density, moisture, plasticity ROCK: Weathering, colour, fabric, name, strength, cementation	Rock Weathering	Rock Strength	Sampling Method	Core Recovery (%)	Testing	RL (m)	Depth (m)	Graphic Log	ROCK DEFECTS: Defect Log	ROCK DEFECTS: Fracture Spacing (mm)	ROCK DEFECTS: RQD (%)	ROCK DEFECTS: Description & Additional Observations	Fluid Loss (%)	Water Level	Casing	Installation	Core Box No
Pouakai Group	Sandy silty GRAVEL; brown-grey. Medium dense, wet, well graded; gravel, fine, sub-rounded, slightly to unweathered andesite; sand, medium to coarse. 9.65m: grading to coarse gravel 9.8-10.0m: CORELOSS;			HQTT SPT	80 100	8/18 10 for 25mm **N>=50** Bouncing	-1	11										
	Silty SAND with some gravel; brown-grey. Medium dense, wet, poorly graded; sand, medium to coarse; gravel, sub-angular, medium to coarse, slightly to unweathered andesite. 10.5m: becoming very dense.			HQTT	69		-2	12										
	SAND; grey. Very dense, wet, poorly graded; sand, fine to medium. 11.4-11.6m: 5mm thick interbedded black and orange bands of tightly packed, fine SAND 11.6-12.0m: CORELOSS;			SPT	55	4/7 10/11 14/16 **N>=50**												
	SAND; grey. Very dense, wet, poorly graded; sand, fine to medium.			HQTT	100		-3	13					*12.45m:* End of day 30/07/19. Standing ground water at 2.26m.					Box 3, 10.3-13.5m
				SPT	100	4/7 10/13 17/10 for 45mm **N>=50**	-4	14										
	silty CLAY; grey. Very stiff, moist to wet, high plasticity. SAND; grey. Very dense, wet, poorly graded; sand, fine to medium. 14.5-15.0m: CORELOSS; SAND; grey. Very dense, wet, poorly graded; sand, fine to medium. *15.50m:* with some fine, sub-angular gravel.			HQTT	53		-5	15										
				SPT	100	4/6 6/9 11/12 **N=38**												
	16.0-16.5m: CORELOSS;			HQTT	52		-6	16										
	Silty gravelly SAND; dark grey. Dense, wet, poorly graded; sand, medium to coarse; gravel, sub-angular, fine, slightly to unweathered andesite.			SPT	100	5/6 11/10 9/10 **N=40**	-7	17										
				HQTT	100		-8	18										Box 4, 13.5-18.0m
	18.00m: becoming very dense			SPT	57	6/8 17/17 16 for 50mm **N>=50** Bouncing												
	18.80m: traces of wood fragments.			HQTT	100		-9	19										
	19.95m: Target depth			SPT	100	5/7 7/12 14/13 **N=46**	-10											Box 5, 18.0-20.0m

COMMENTS: 10.0m PVC Standpipe Piezometer installed with a screened zone from 7.0-10.0m bgl.

Hole Depth 19.95m

Scale 1:50

Rev.: A

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH1**

PROJECT: 51 Brougham St, New Plymouth	LOCATION: 51 Brougham St, New Plymouth	JOB No.: 1011502.0000
CO-ORDINATES: 5676161.00 mN (NZTM2000) 1692880.00 mE R.L.: 9.73m DATUM: NZVD2016	DRILL TYPE: Drill Rig DRILL METHOD: RC	HOLE STARTED: 30/07/2019 HOLE FINISHED: 31/07/2019 DRILLED BY: Drillforce Ltd LOGGED BY: CMCD CHECKED: KJH

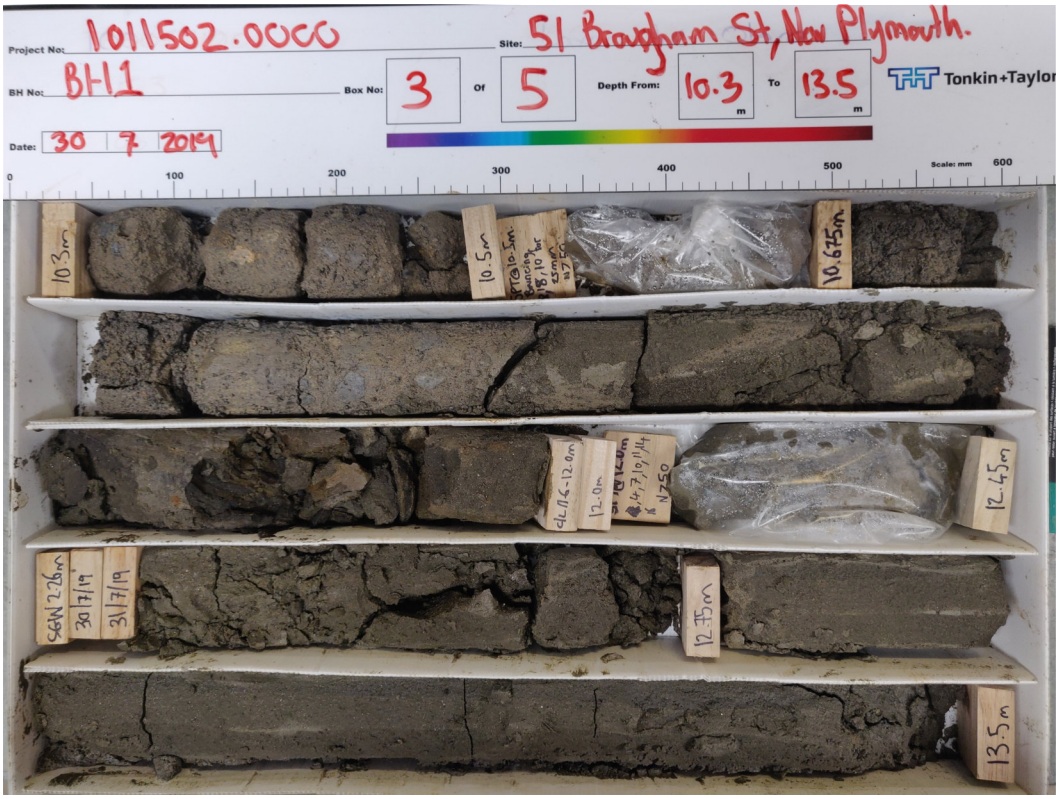
0.00-5.05m

5.05-10.30m

CORE PHOTOS

BOREHOLE No.: **BH1**

PROJECT: 51 Brougham St, New Plymouth	LOCATION: 51 Brougham St, New Plymouth	JOB No.: 1011502.0000
CO-ORDINATES: (NZTM2000) 5676161.00 mN 1692880.00 mE R.L.: 9.73m DATUM: NZVD2016	DRILL TYPE: Drill Rig DRILL METHOD: RC	HOLE STARTED: 30/07/2019 HOLE FINISHED: 31/07/2019 DRILLED BY: Drillforce Ltd LOGGED BY: CMCD CHECKED: KJH



10.30-13.50m

13.50-18.00m

Tonkin+Taylor

CORE PHOTOS

BOREHOLE No.: **BH1**

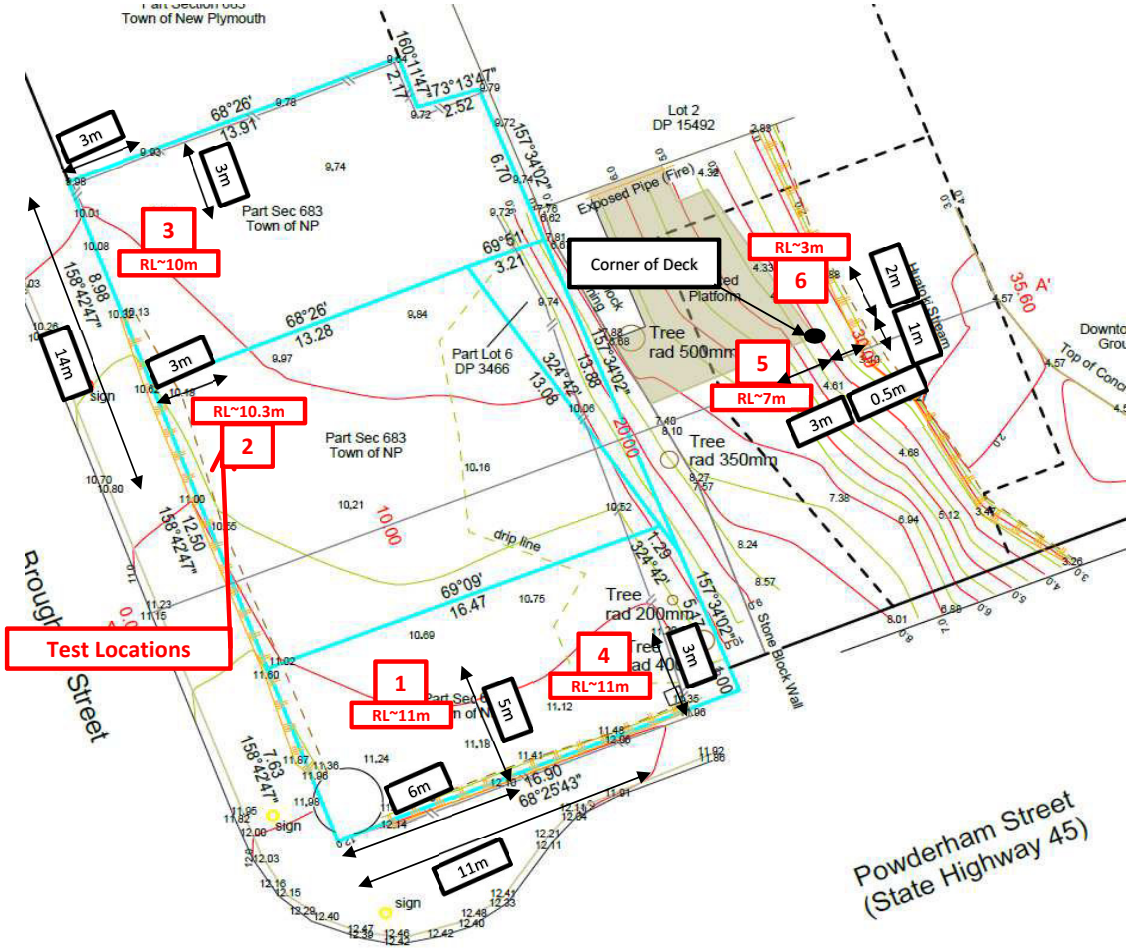
PROJECT: 51 Brougham St, New Plymouth	LOCATION: 51 Brougham St, New Plymouth	JOB No.: 1011502.0000
CO-ORDINATES: (NZTM2000) 5676161.00 mN 1692880.00 mE R.L.: 9.73m DATUM: NZVD2016	DRILL TYPE: Drill Rig DRILL METHOD: RC	HOLE STARTED: 30/07/2019 HOLE FINISHED: 31/07/2019 DRILLED BY: Drillforce Ltd LOGGED BY: CMCD CHECKED: KJH

18.00-19.95m

Date	31/07/2019	Job No.	3297
By	MP	Page No.	1 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS

51 Brougham Street, New Plymouth



Location Plan
(N.T.S)

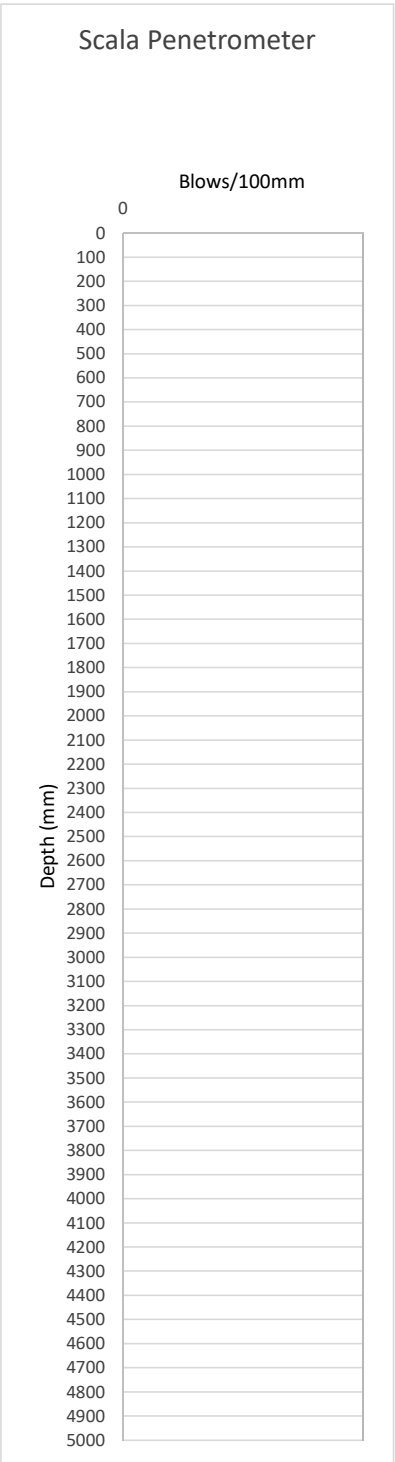
Disclaimer:
These Soil Testing Results are prepared for the client of Red Jacket for the stated purpose, and cannot be used for any other purpose or by others unless authority is given by Red Jacket Consulting Engineers Ltd.

Red Jacket Limited - 3 Davidson Street, New Plymouth 4312, NZ
P.06 759 0999 - info@redjacket.nz - www.redjacket.co.nz

Date	31/07/2019	Job No.	3297
By	MP	Page No.	2 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.1

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.
b) The clay content of the volcanic ash increased in each soil layer

Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.	Soil Type
	G	HARDFILL
96 / 48	C	Hydrovac to 1.5 m depth. Soil VOLCANIC ASH by visual inspection of hole.
112 / 64		
192 /	CL	Moist low plasticity brown sandy VOLCANIC ASH with traces of gravels
192 /	C	Moist stiff brown sandy VOLCANIC ASH with traces of gravels
192 /		
192 /	CL	Moist slightly plastic brown sandy VOLCANIC ASH with traces of gravels and pumice
144 / 64	CH	Moist high plasticity orangey brown sandy VOLCANIC ASH
192 /		
192 /		
	S	Moist grey Silty SAND

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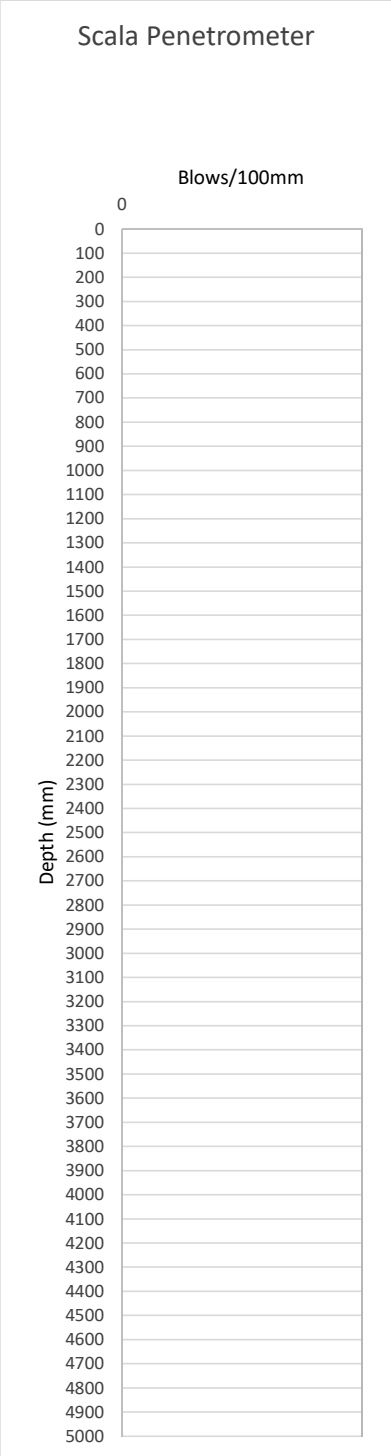
Date	31/07/2019	Job No.	3297
By	MP	Page No.	3 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.2

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.
b) The clay content of the volcanic ash increased in each soil layer

Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.	Soil Type
	G	HARDFILL
160 / 32	C	Hydrovac to 1.7 m depth. Soil VOLCANIC ASH by visual inspection of hole.
128 / 32		
192 /	C	Moist stiff brown sandy VOLCANIC ASH with traces of gravels
192 /		
176 / 64	CL	Moist low plasticity orangey brown sandy VOLCANIC ASH
144 / 64	CH	- high plasticity at 3.5 m
144 / 48		
	S	Moist grey Silty SAND

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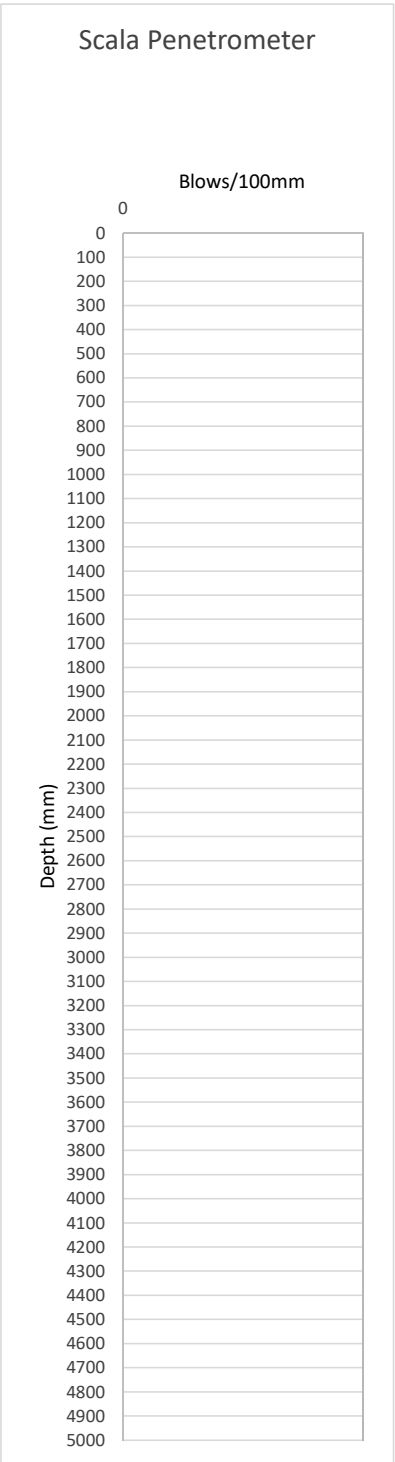
Date	31/07/2019	Job No.	3297
By	MP	Page No.	4 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.3

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.
b) The clay content of the volcanic ash increased in each soil layer

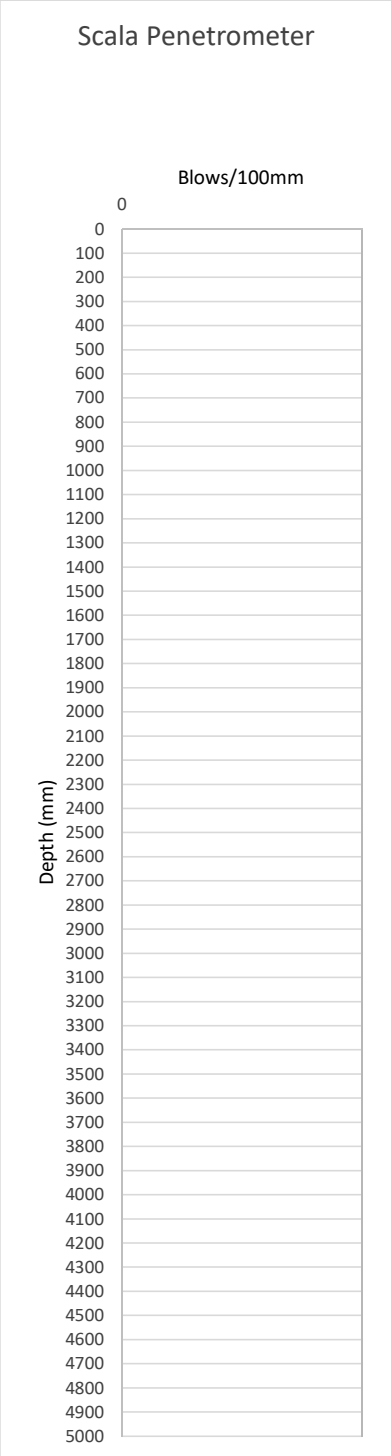
Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.	Soil Type
	G	Hydrovac to 2.0 m depth. Soil HARDFILL between 0-1.5 m depth by visual inspection of hole.
	C	Hydrovac to 2.0 m depth. Soil VOLCANIC ASH between 1.5-2.0 m depth by visual inspection of hole.
192 /	C	Moist stiff brown sandy VOLCANIC ASH with traces of gravels
144 / 80	CH	- High plasticity at 3.0 m
160 / 112	CL	Moist low plasticity orangey brown sandy VOLCANIC ASH
192 /		
192 /		- Veins of white silt at 4.6 m
192 /		

Date	31/07/2019	Job No.	3297
By	MP	Page No.	5 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.4

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.
b) The clay content of the volcanic ash increased in each soil layer

Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.	Soil Type
	G	HARDFILL
	C	Hydrovac to 2.0 m depth. Soil VOLCANIC ASH by visual inspection of hole.
144 / 64 96 / 48	CL	Moist low plasticity brown sandy VOLCANIC ASH with traces of gravels
192 /	C	Moist slightly plastic brown sandy VOLCANIC ASH with traces of gravels and pumice
192 / 128 / 64	CH	Moist high plasticity brown sandy VOLCANIC ASH with traces of gravels
144 / 96 192 /	CH	Moist high plasticity orangey brown sandy VOLCANIC ASH

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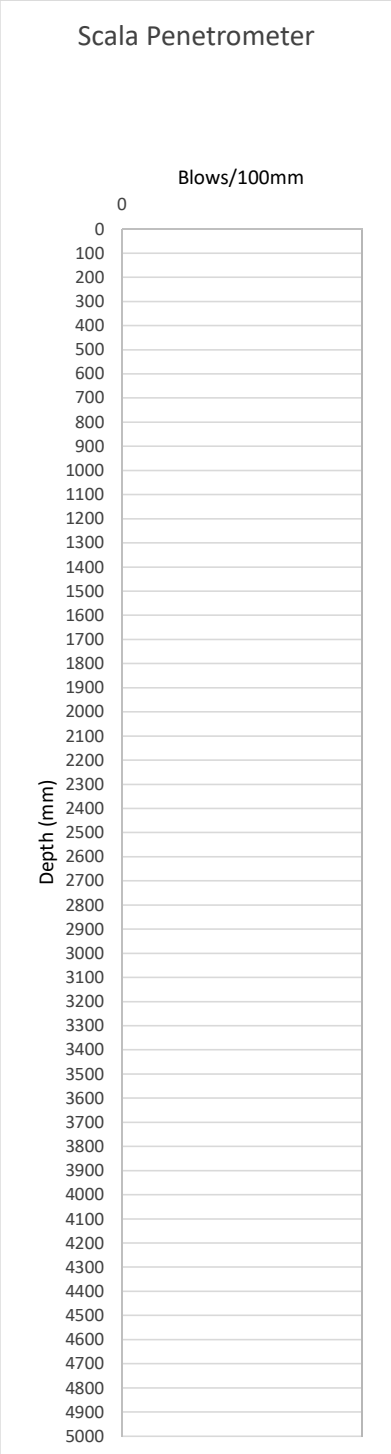
Date	31/07/2019	Job No.	3297
By	MP	Page No.	6 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.5

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.
b) Depth of auger approximately to stream level

Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.	Soil Type
80 / 58	O	Dark brown TOPSOIL with roots and rubbish
64 / 32	C	Moist friable mottled - brown and dark brown - sandy VOLCANIC ASH
48 / 32		
42 / 32	S	Moist black silty SAND -wet at 2.6 m -water likely purching on below soil layer
	S	Pale brown very stiff clayey SILT
	S	Wet grey coarse sandy SILT - gravel content increases with depth
		REFUSAL at 4.7 m. Auger head catching on gravels

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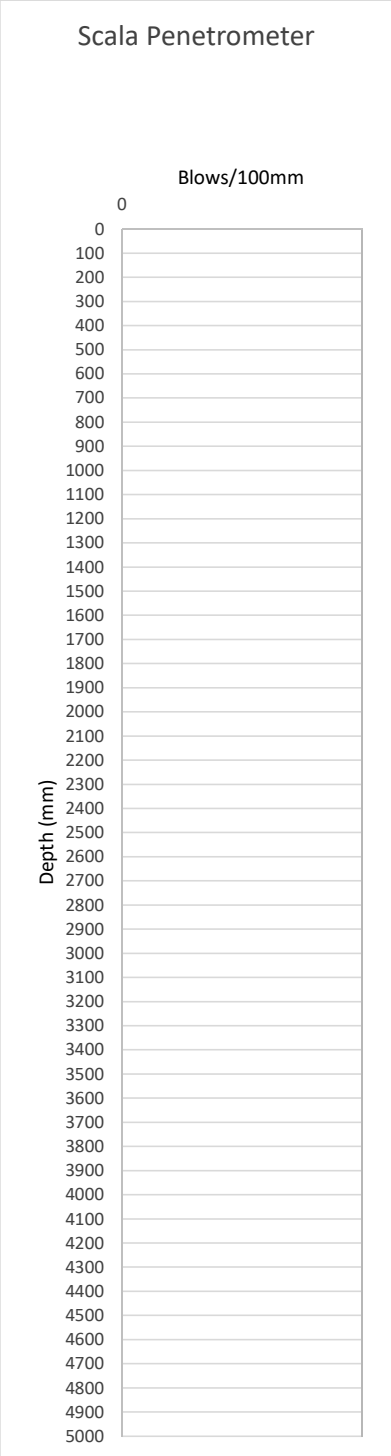
Date	31/07/2019	Job No.	3297
By	MP	Page No.	7 of 7
Doc No.	TST-3297-01		

SOIL TESTING RESULTS - Location No.6

51 Brougham Street, New Plymouth



NOTES:
a) No Scala Penetrometer Test.

Shear Vane Used: Serial Number 1564

Shear Strength (kPa)	Soil Class.		Soil Type
		O	TOPSOIL
		C	VOLCANIC ASH
		S	Moist black soft sandy SILT
		S	Moisture grey sandy SILT with traces of gravel - moist and gravel content increases with depth - water table at 1.8 m ▽
			REFUSAL at 2.3 m. Auger head catching on gravels

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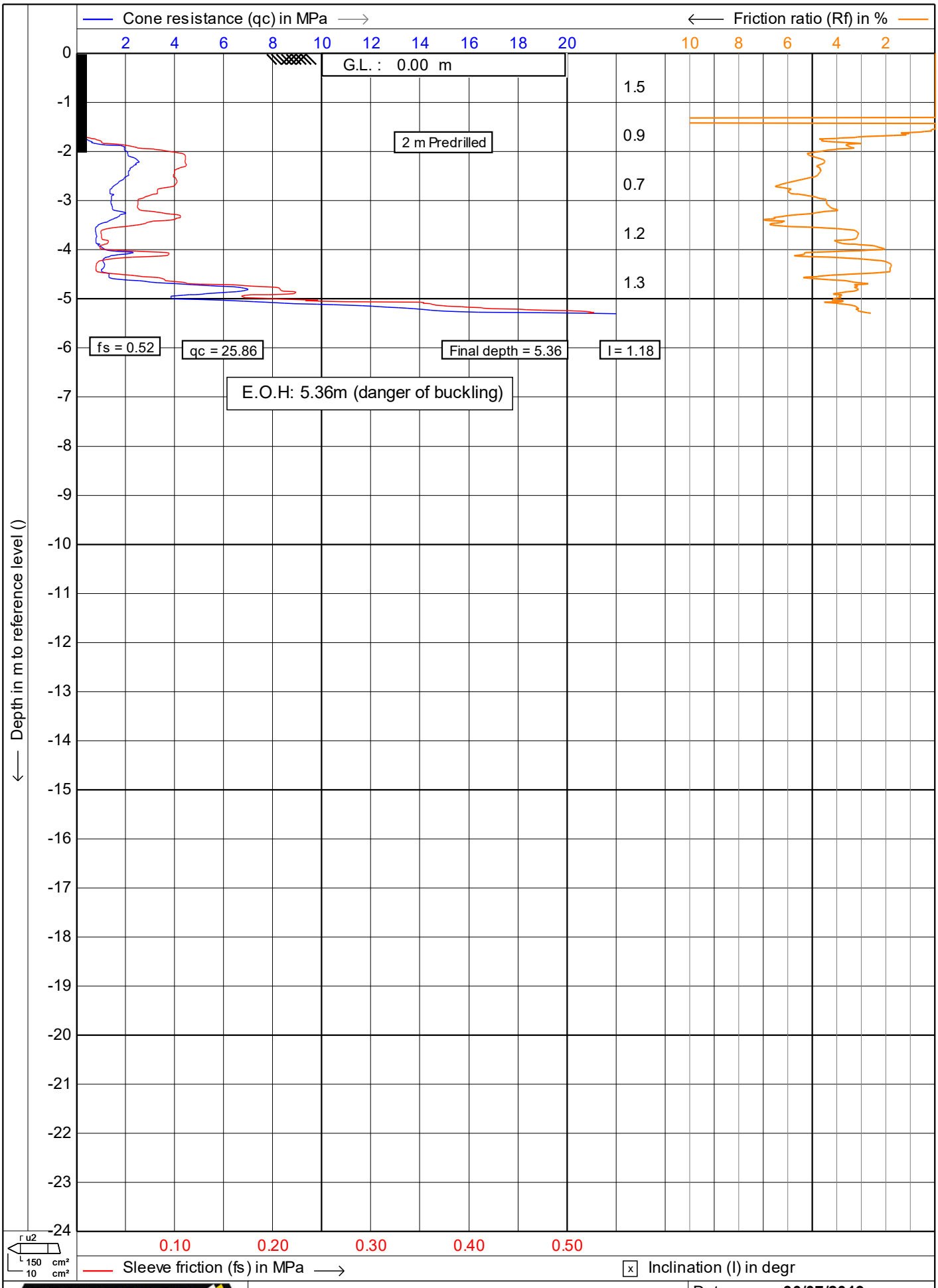


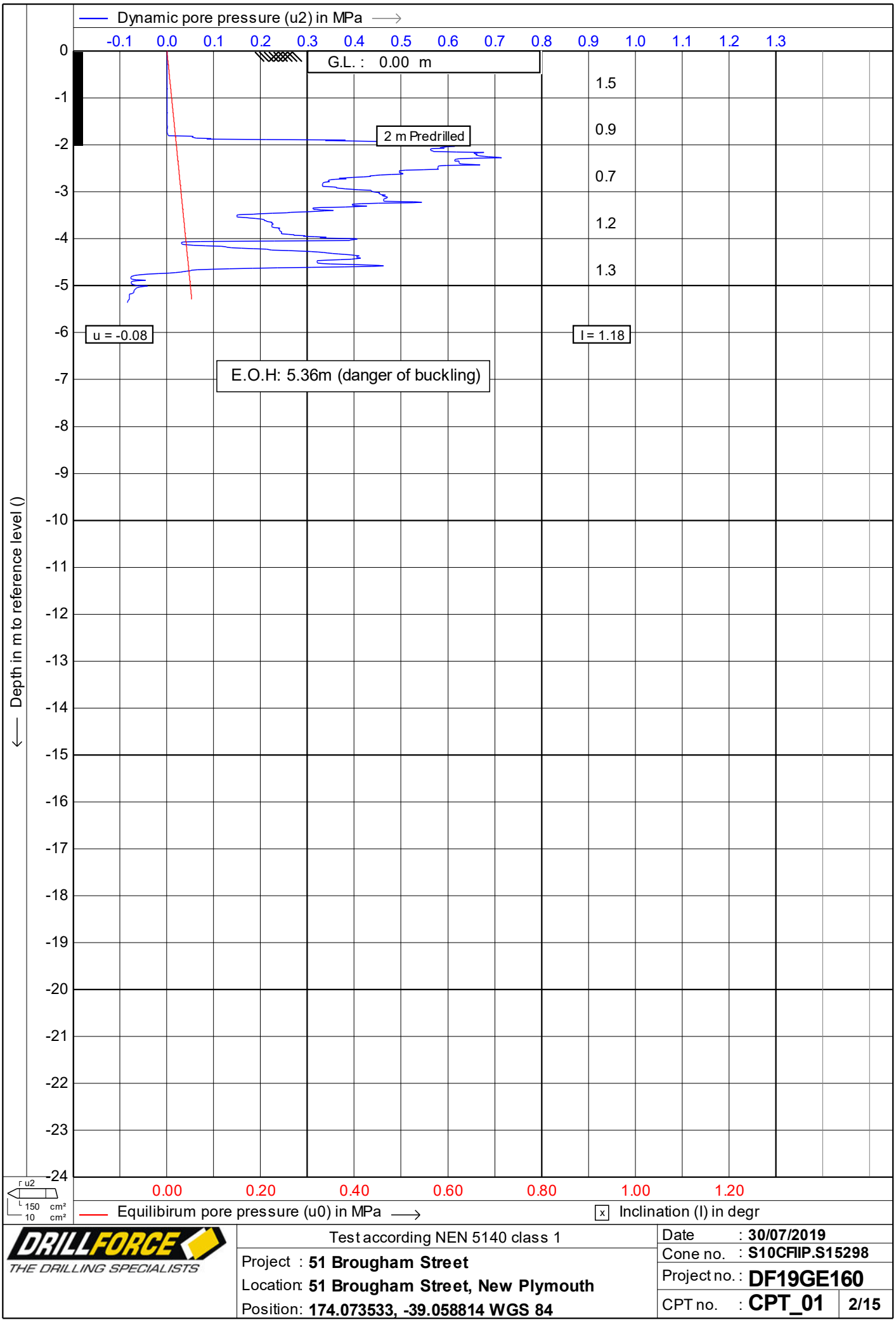
DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**
Location: **51 Brougham Street, New Plymouth**
Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** 1/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

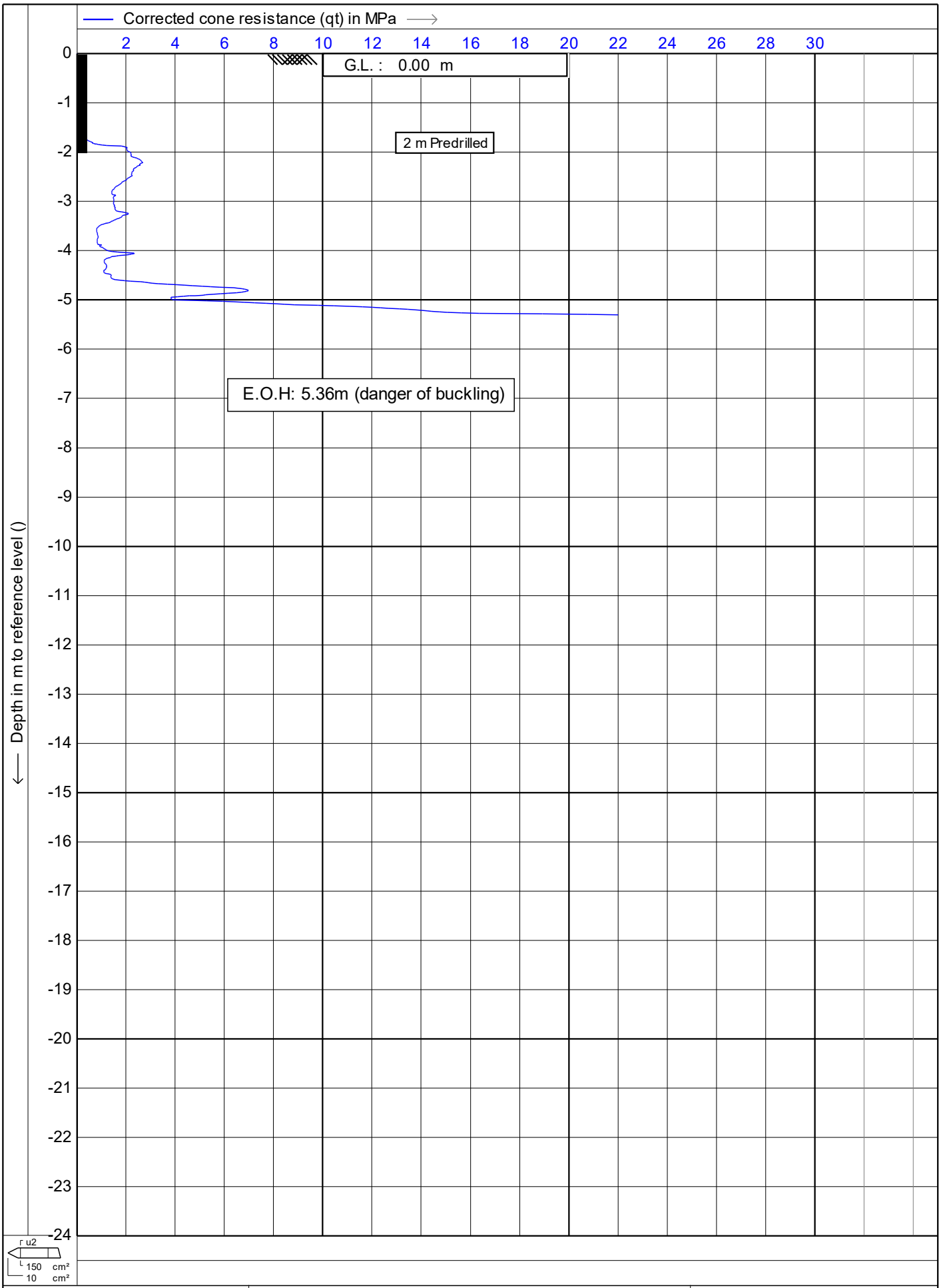
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **2/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

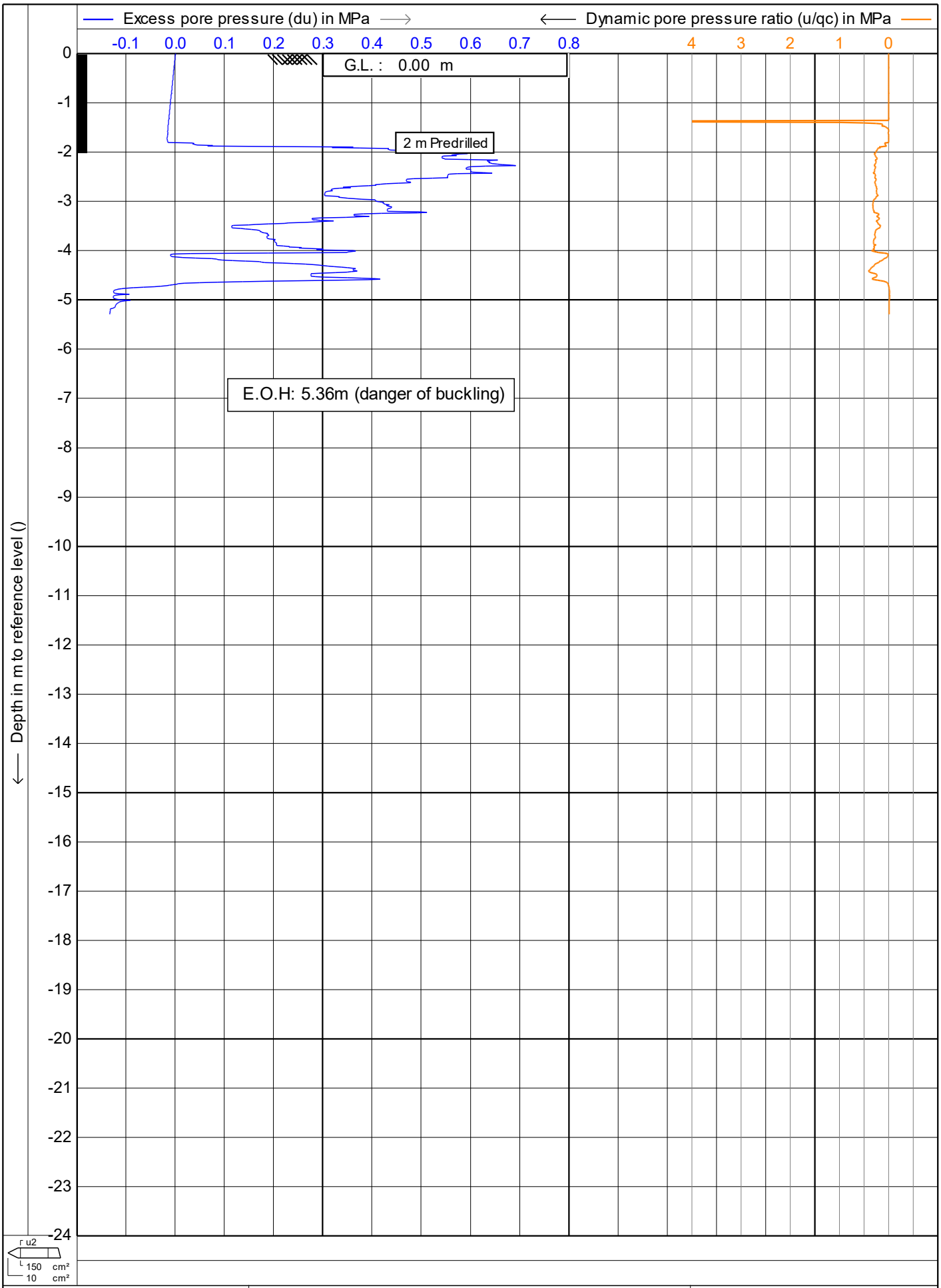
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** 3/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

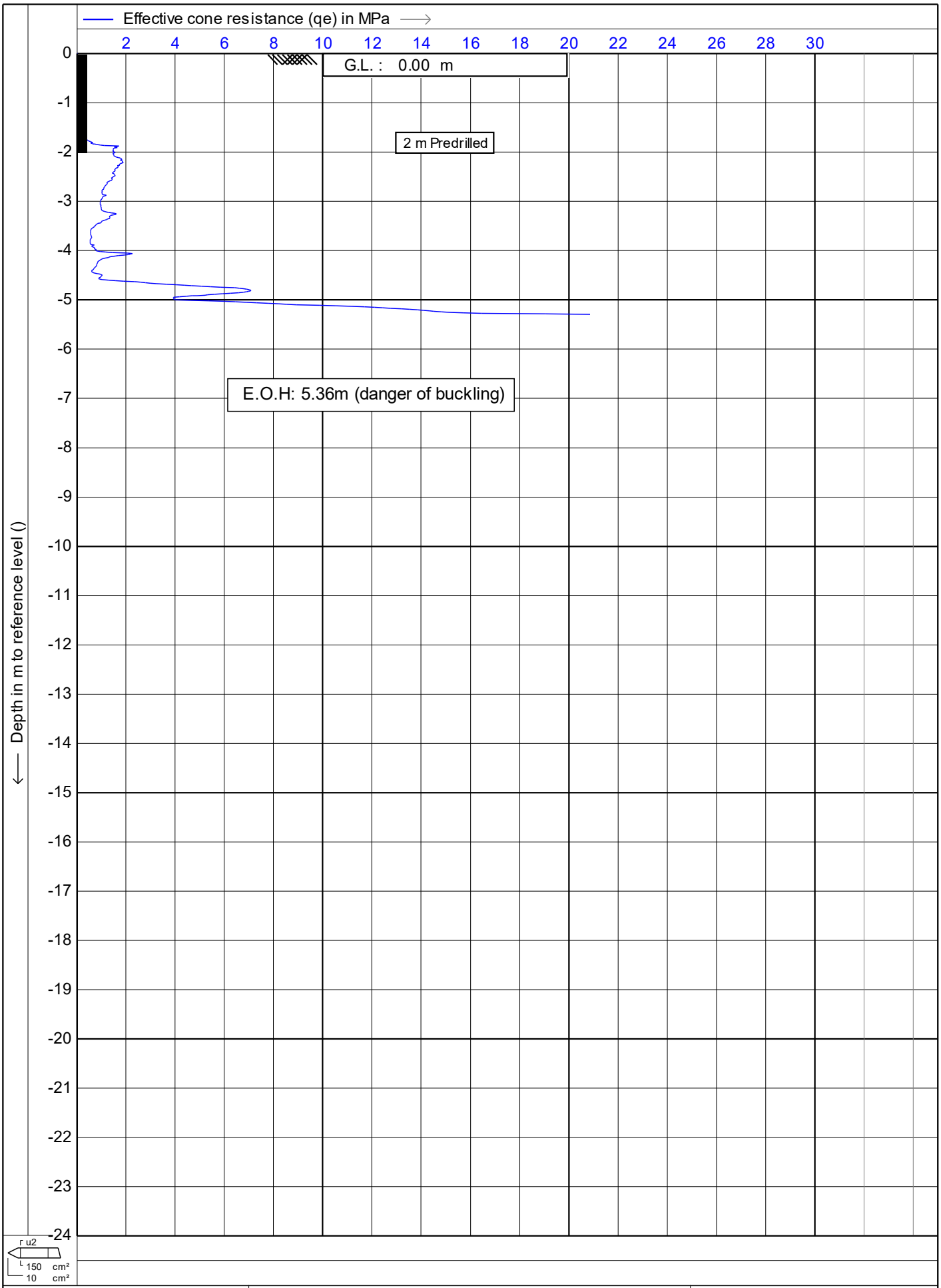
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **5/15**

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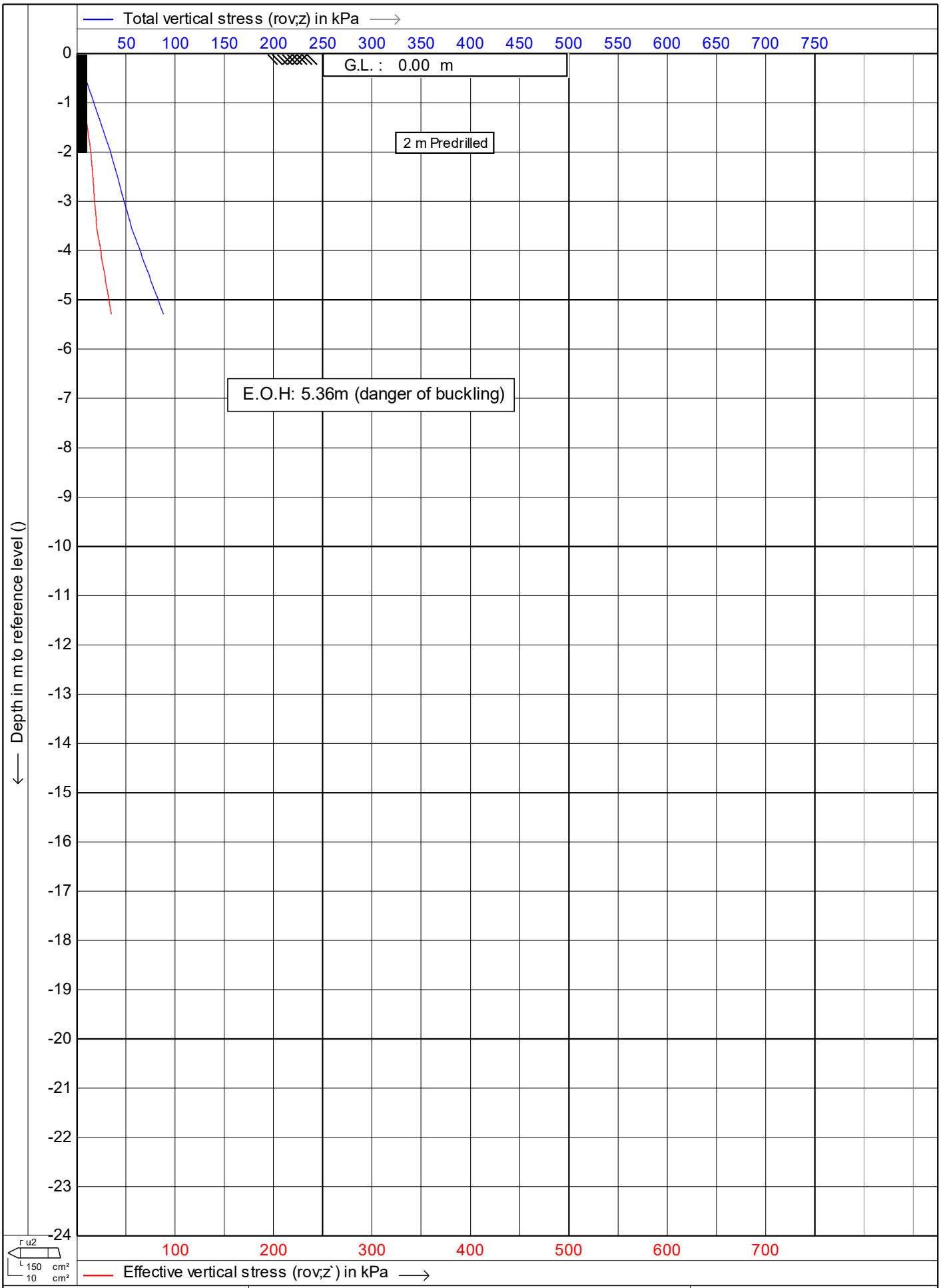

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **6/15**

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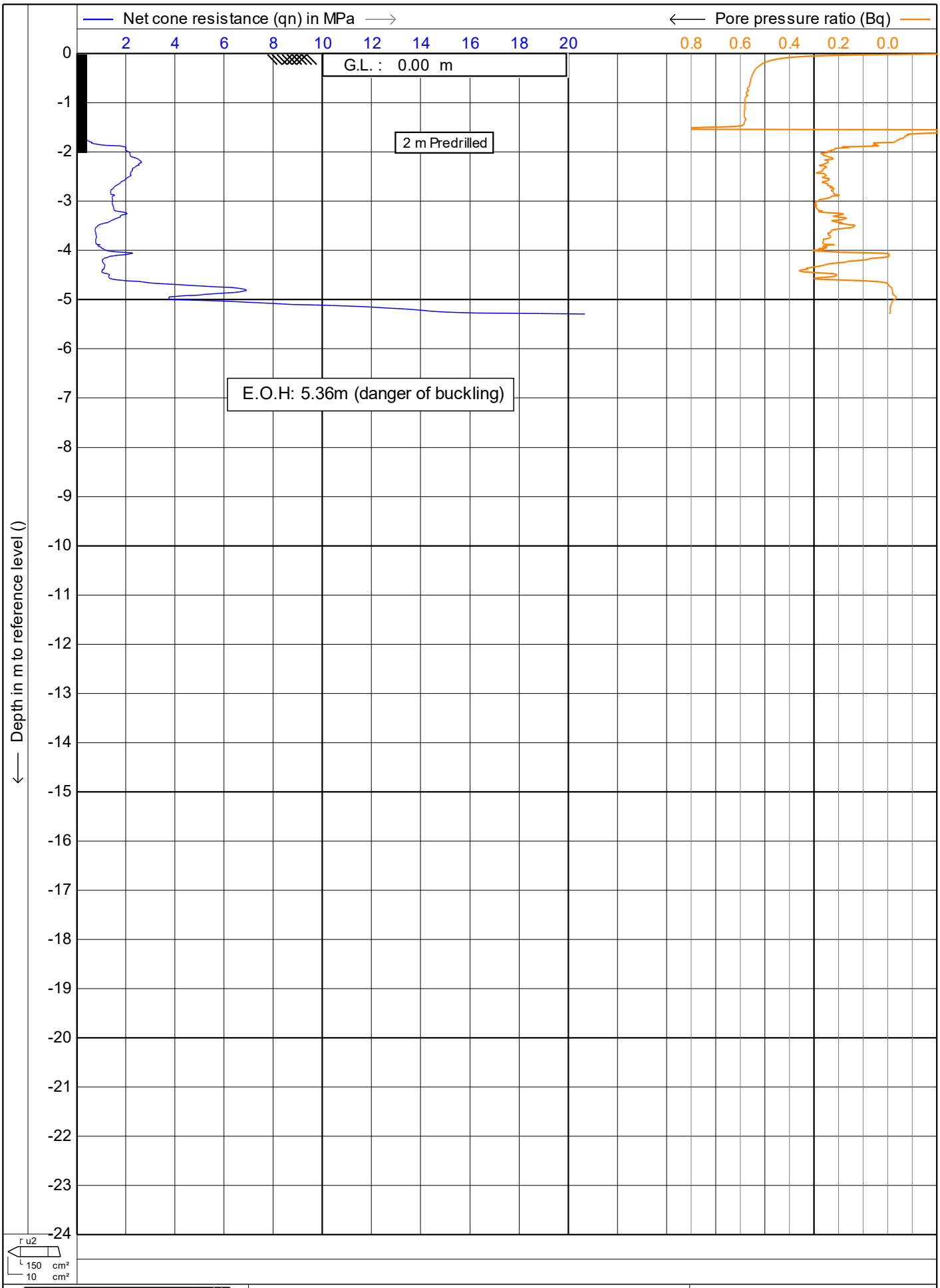


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

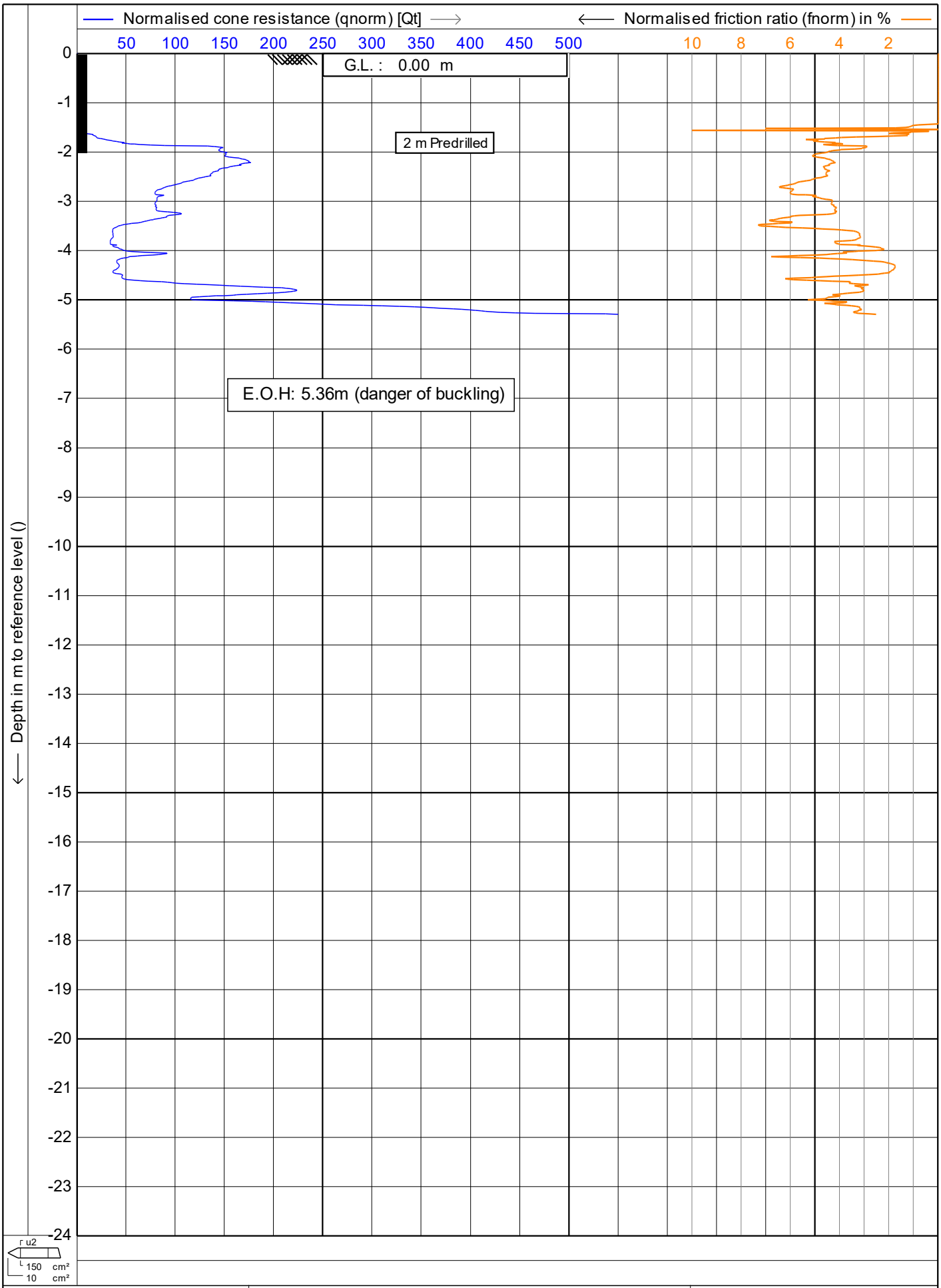
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **7/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

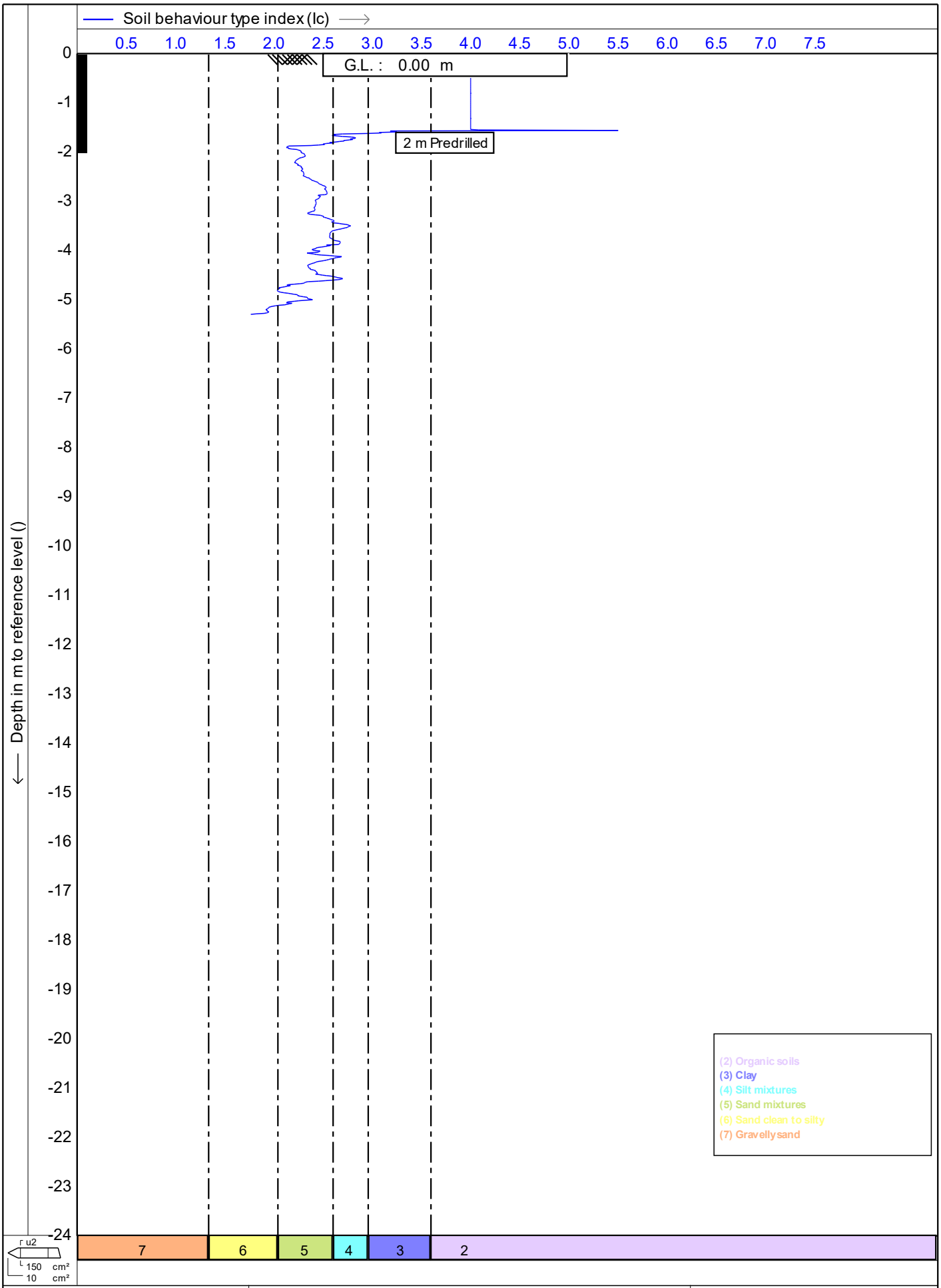
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** 8/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **9/15**

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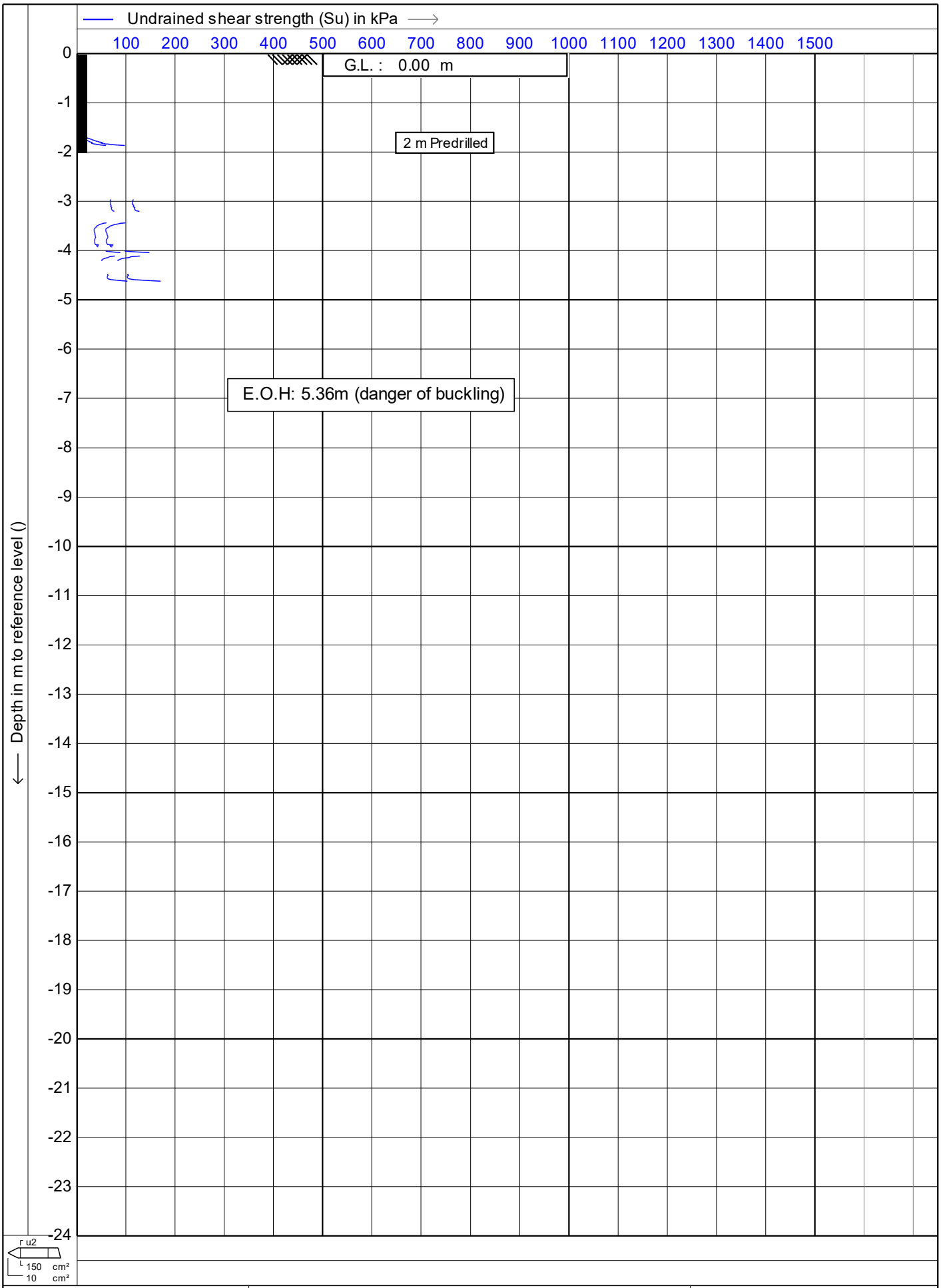


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

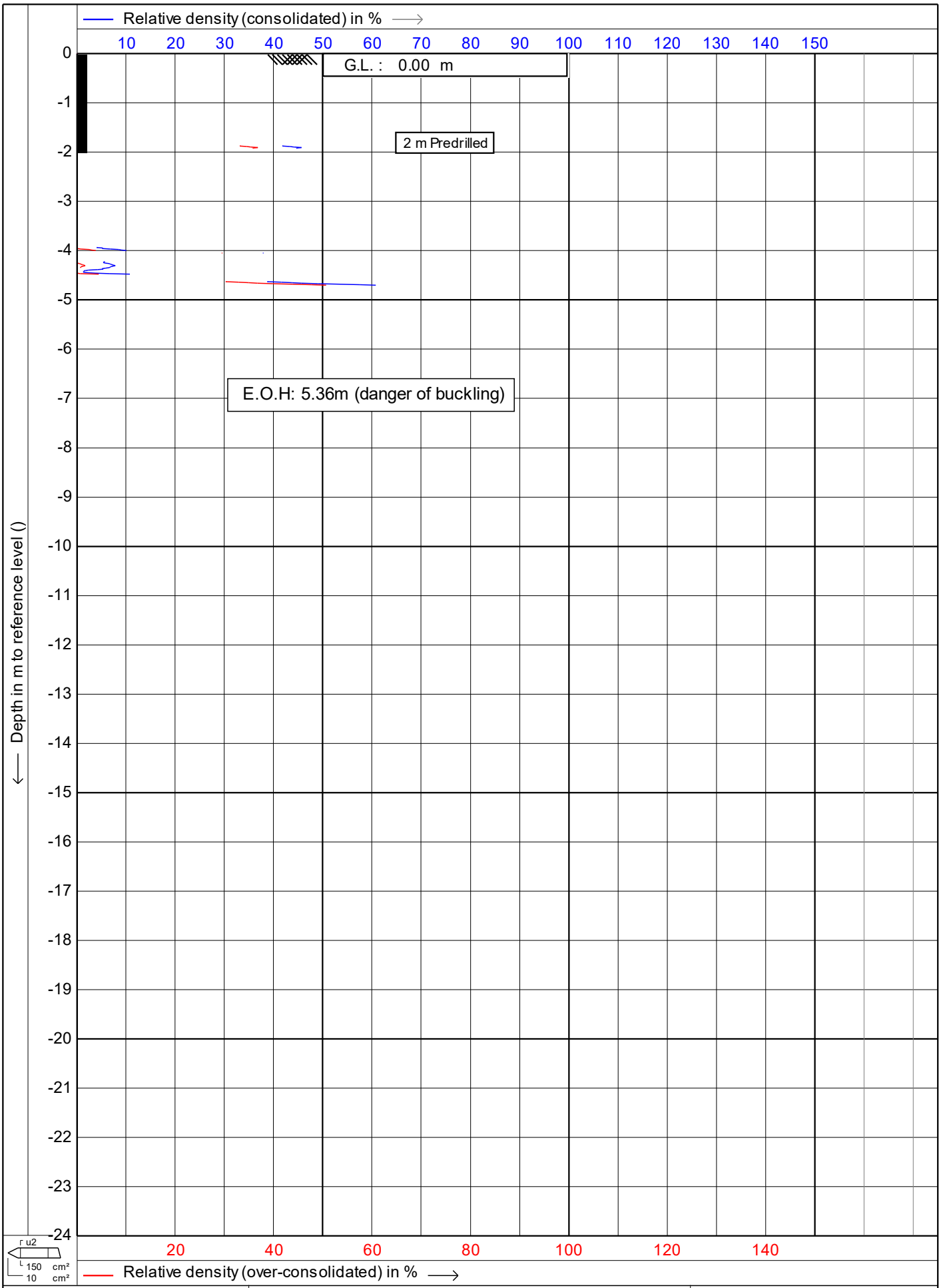
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **10/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

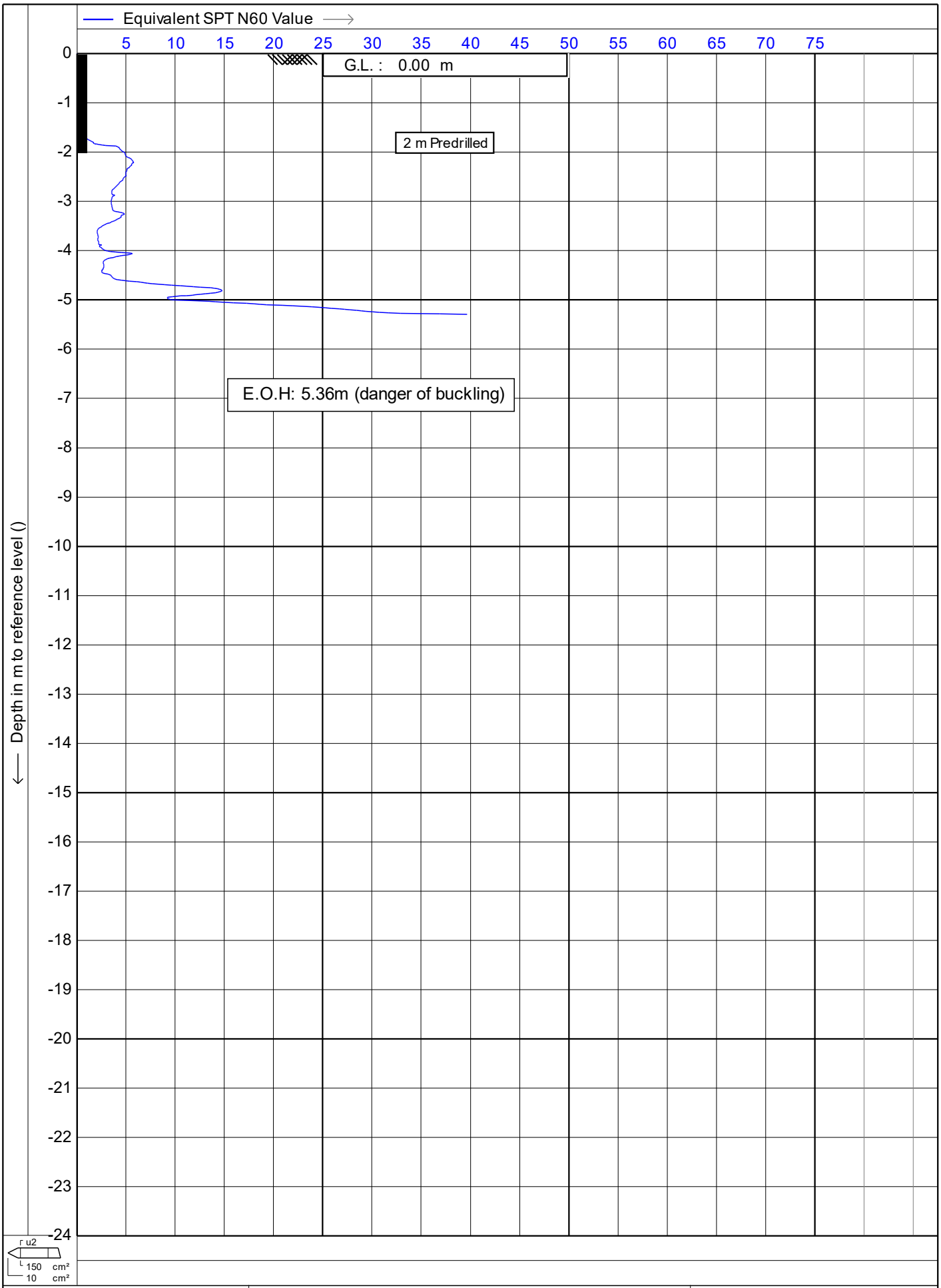
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** 11/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

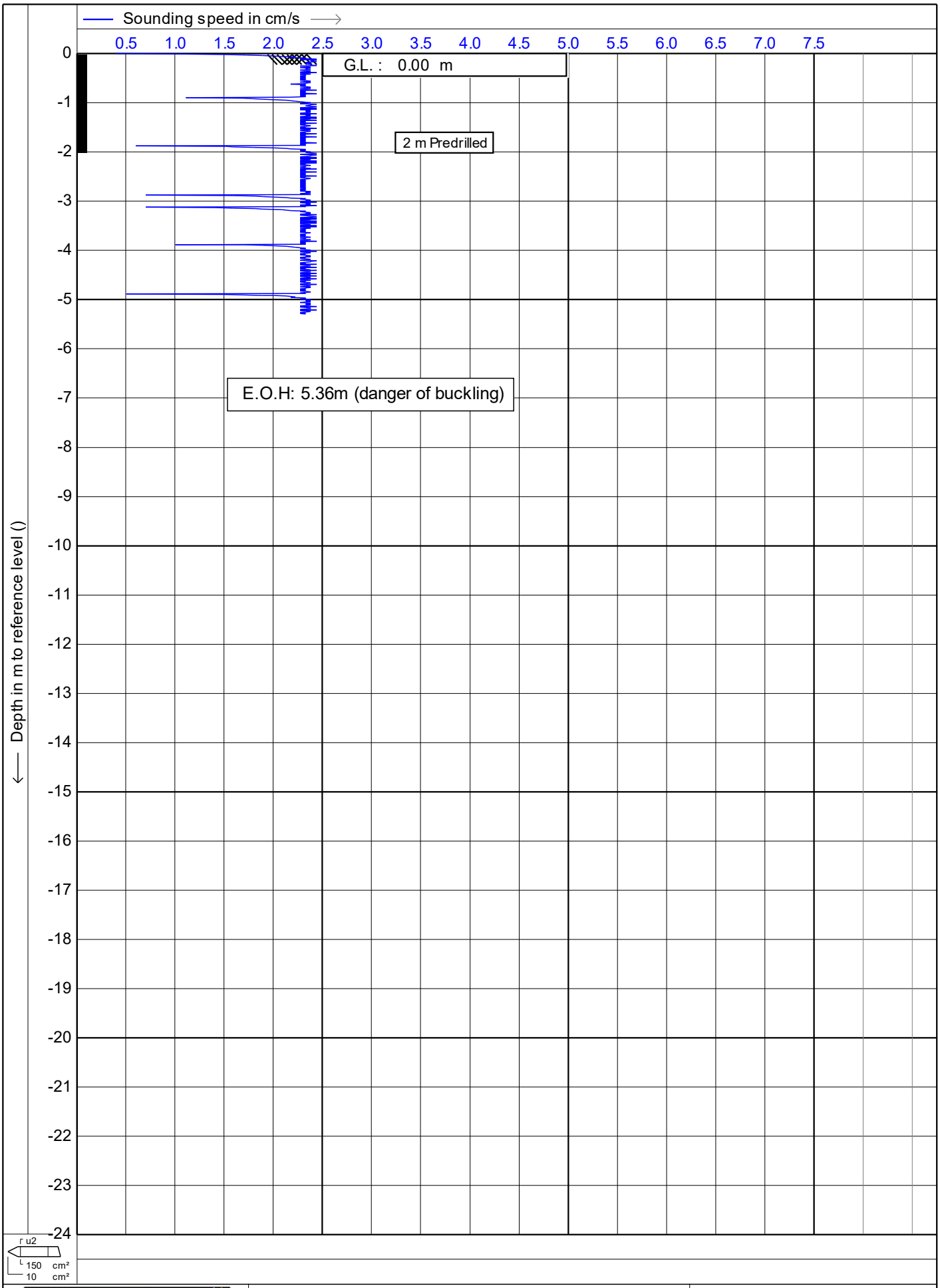
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **12/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

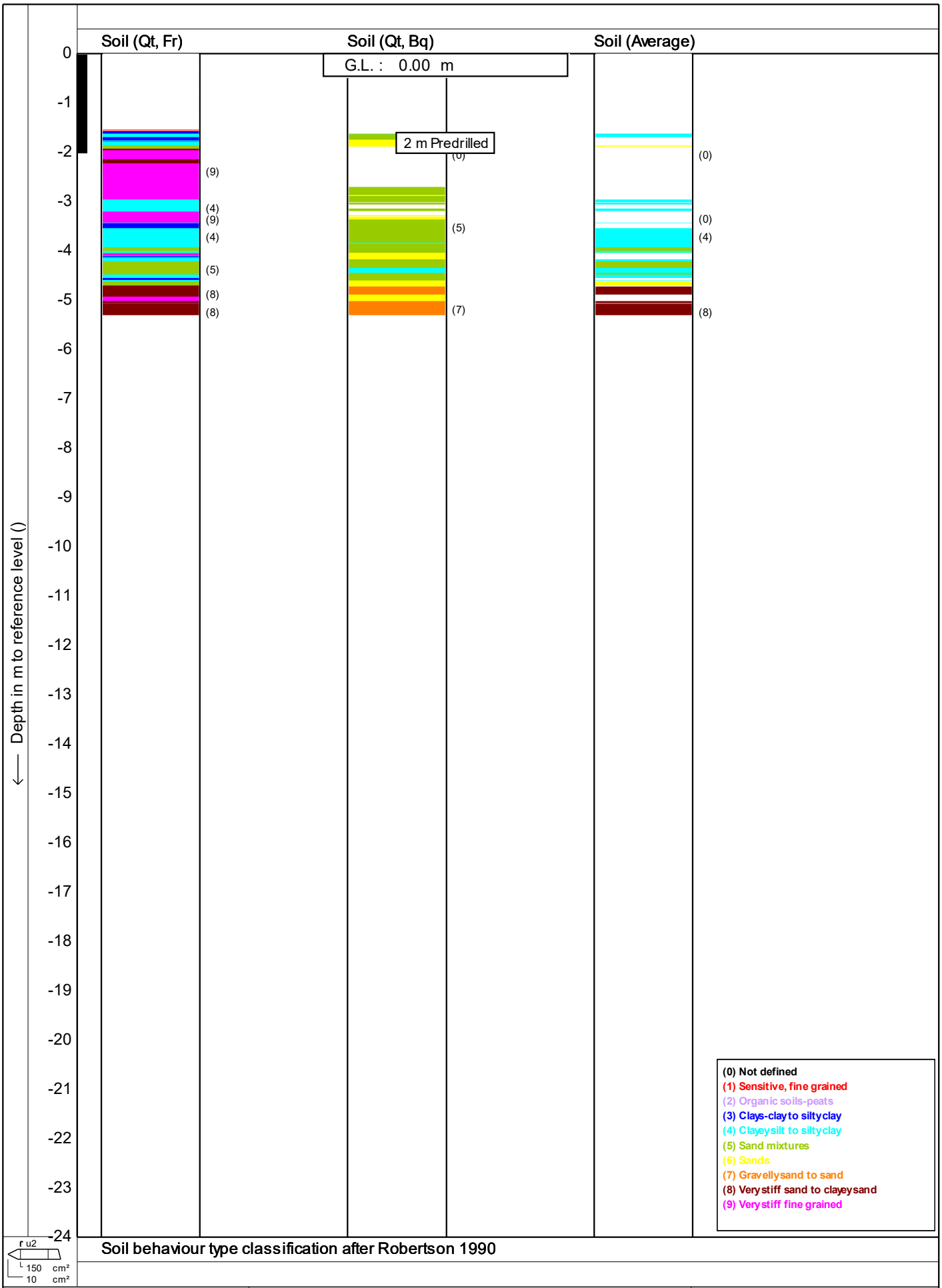
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01**

1.47



Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

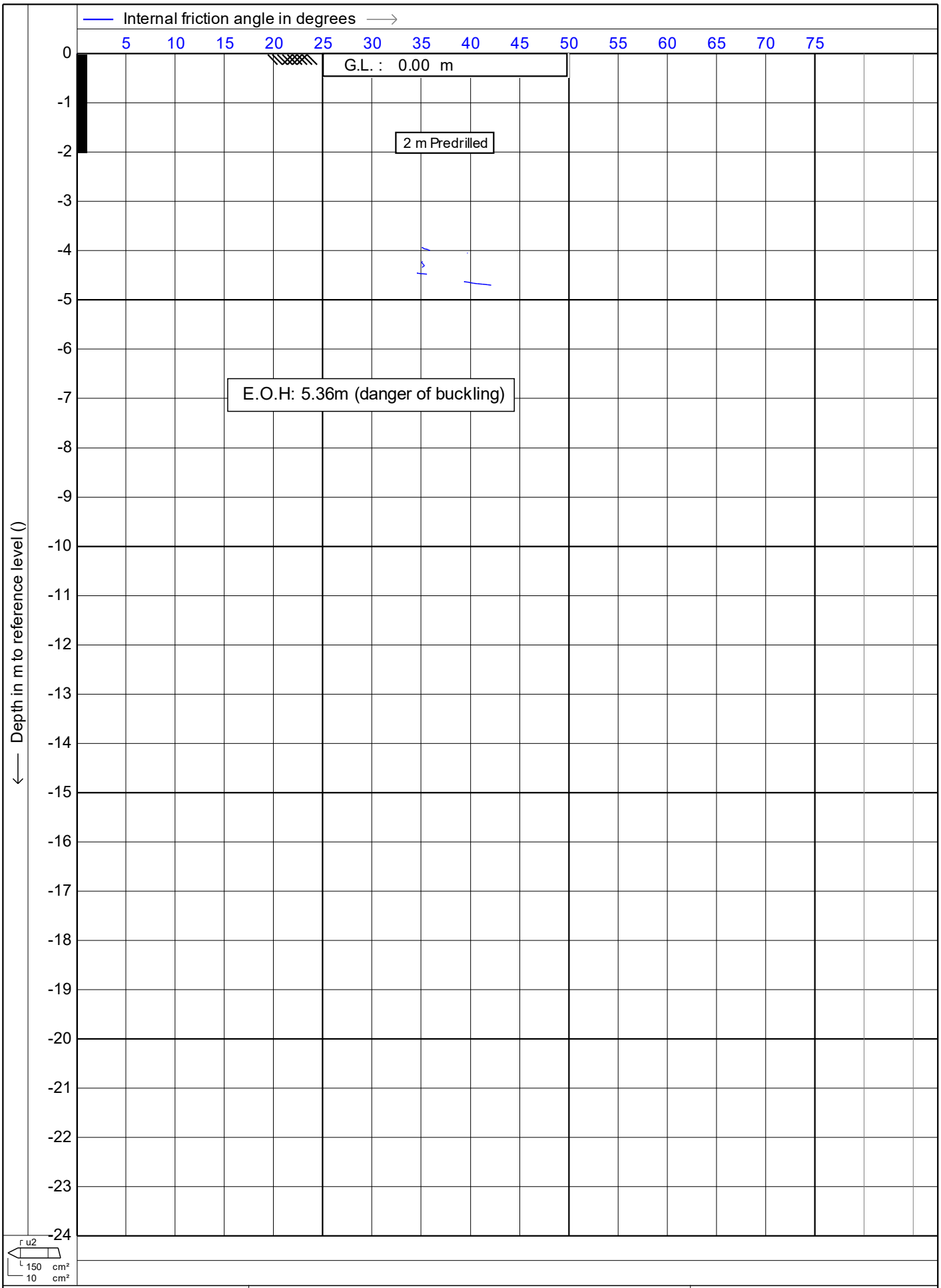
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** 14/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

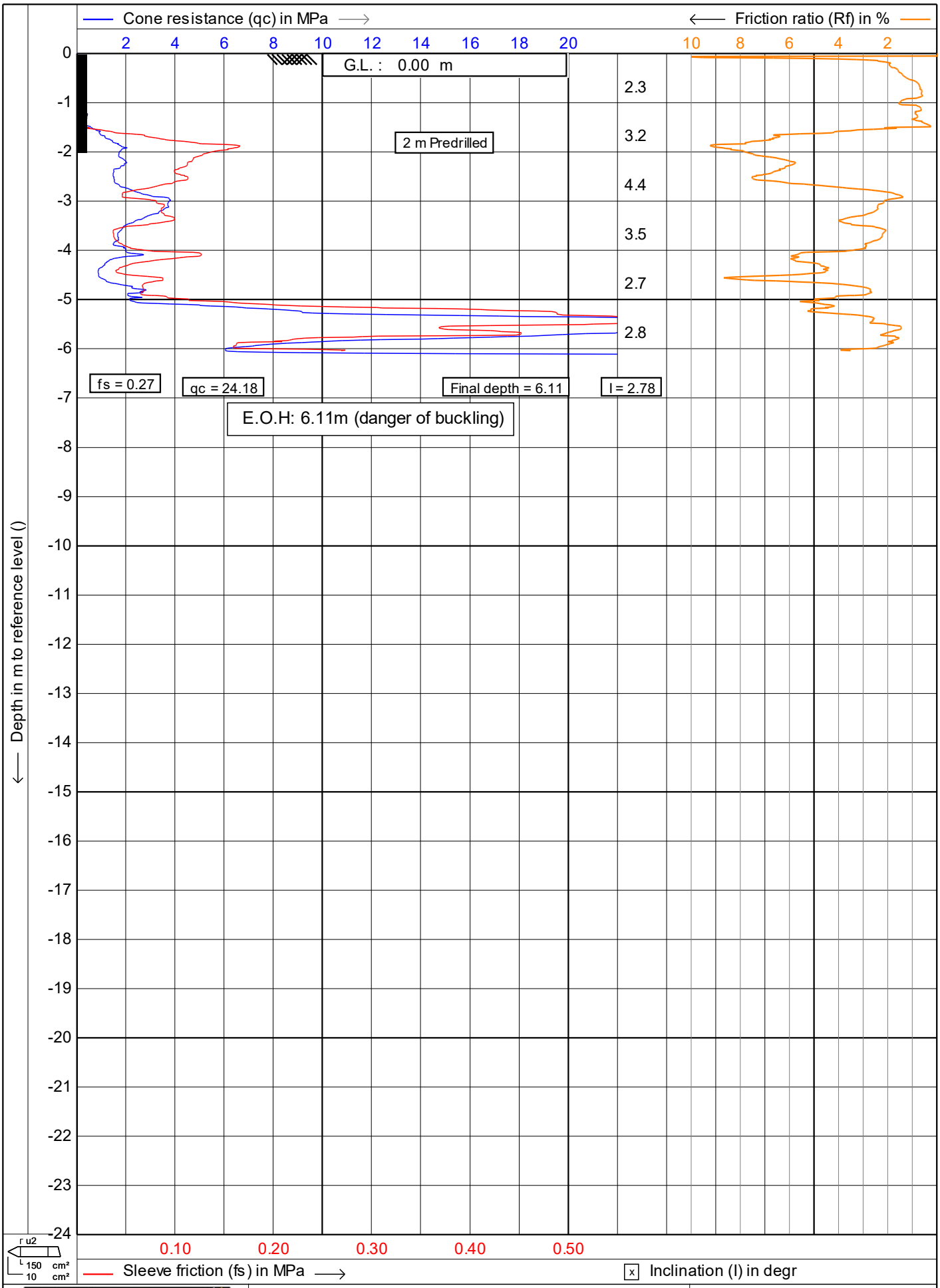
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01** **15/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

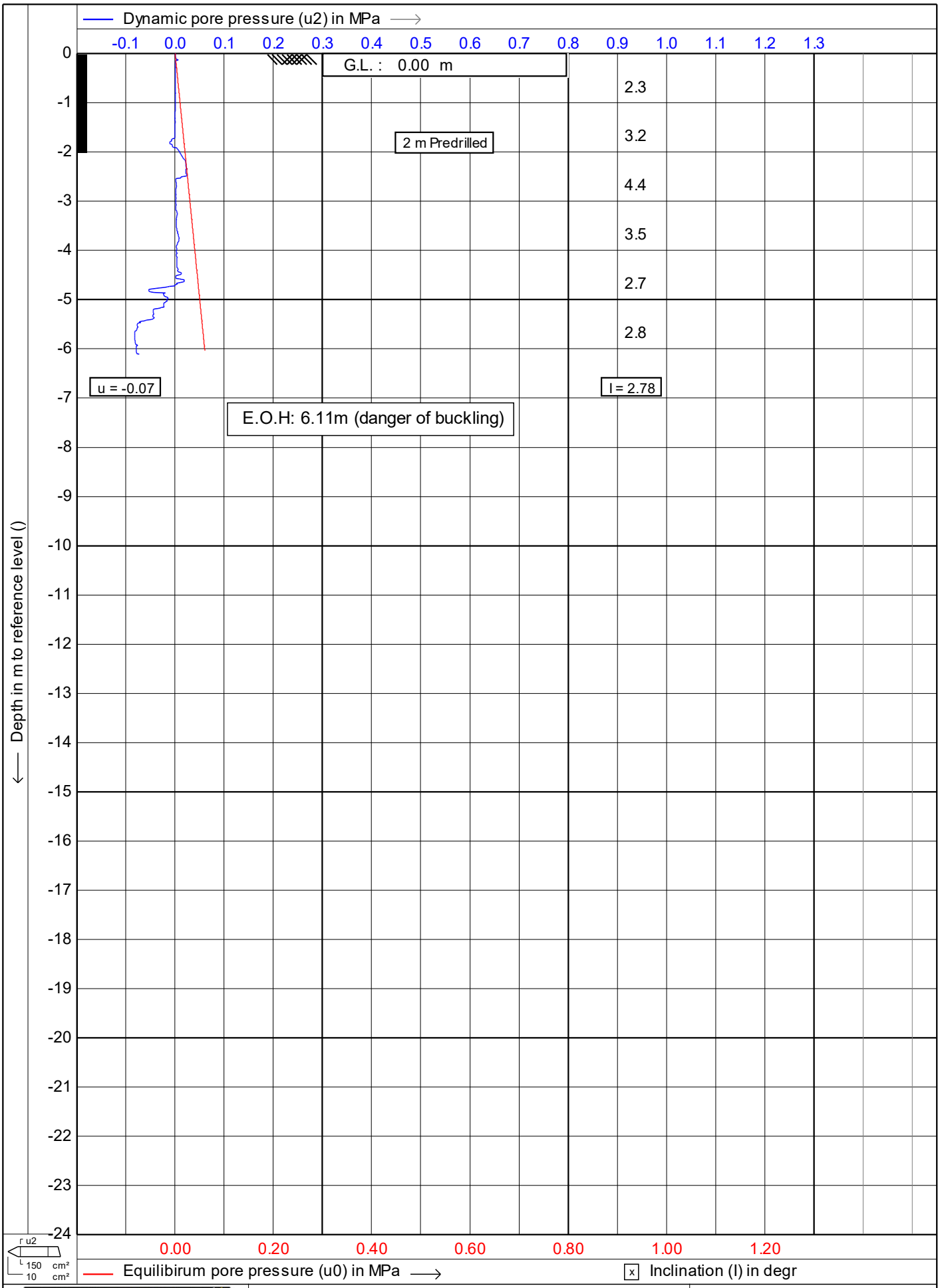
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **1/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

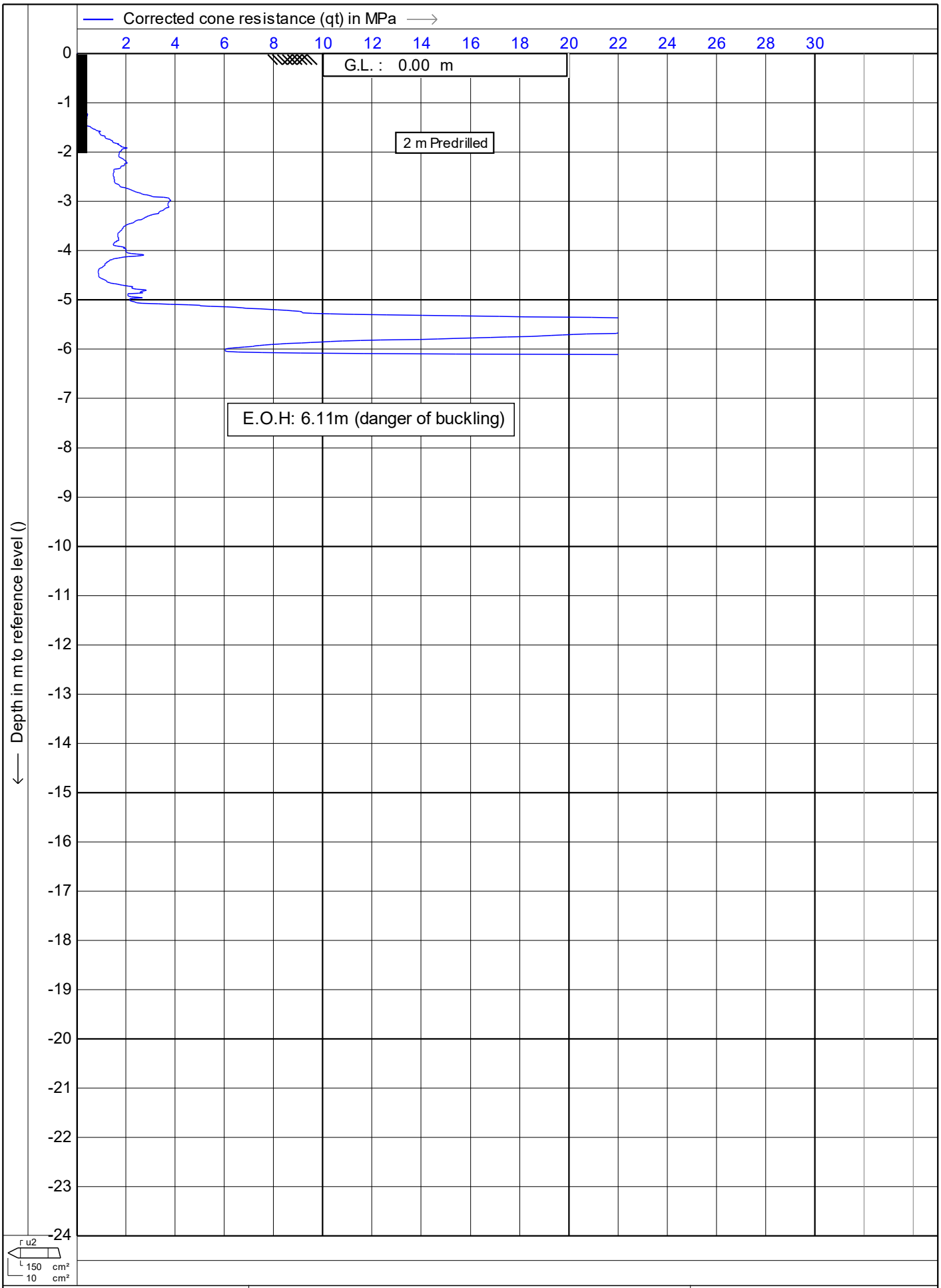
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

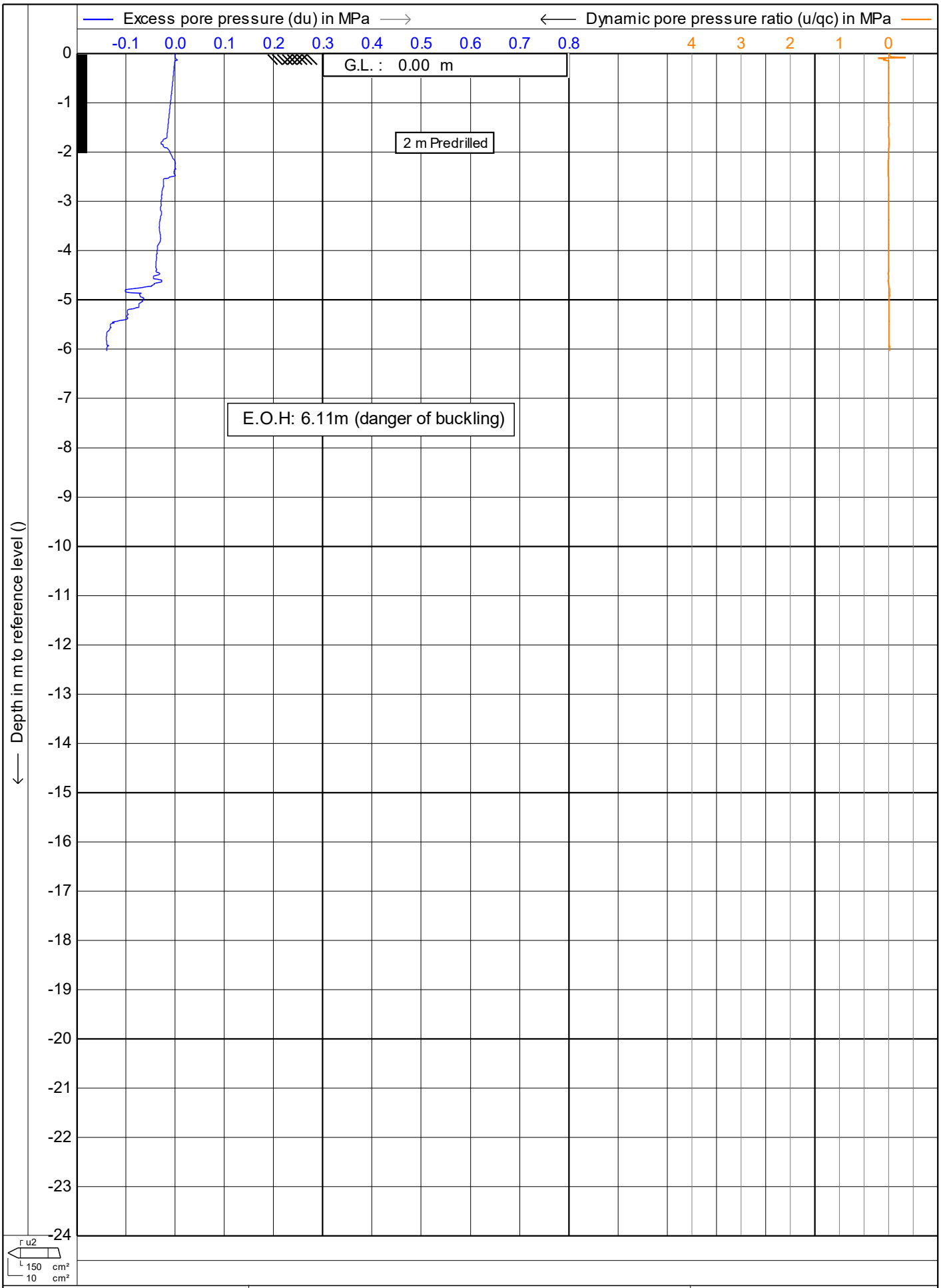
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **3/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

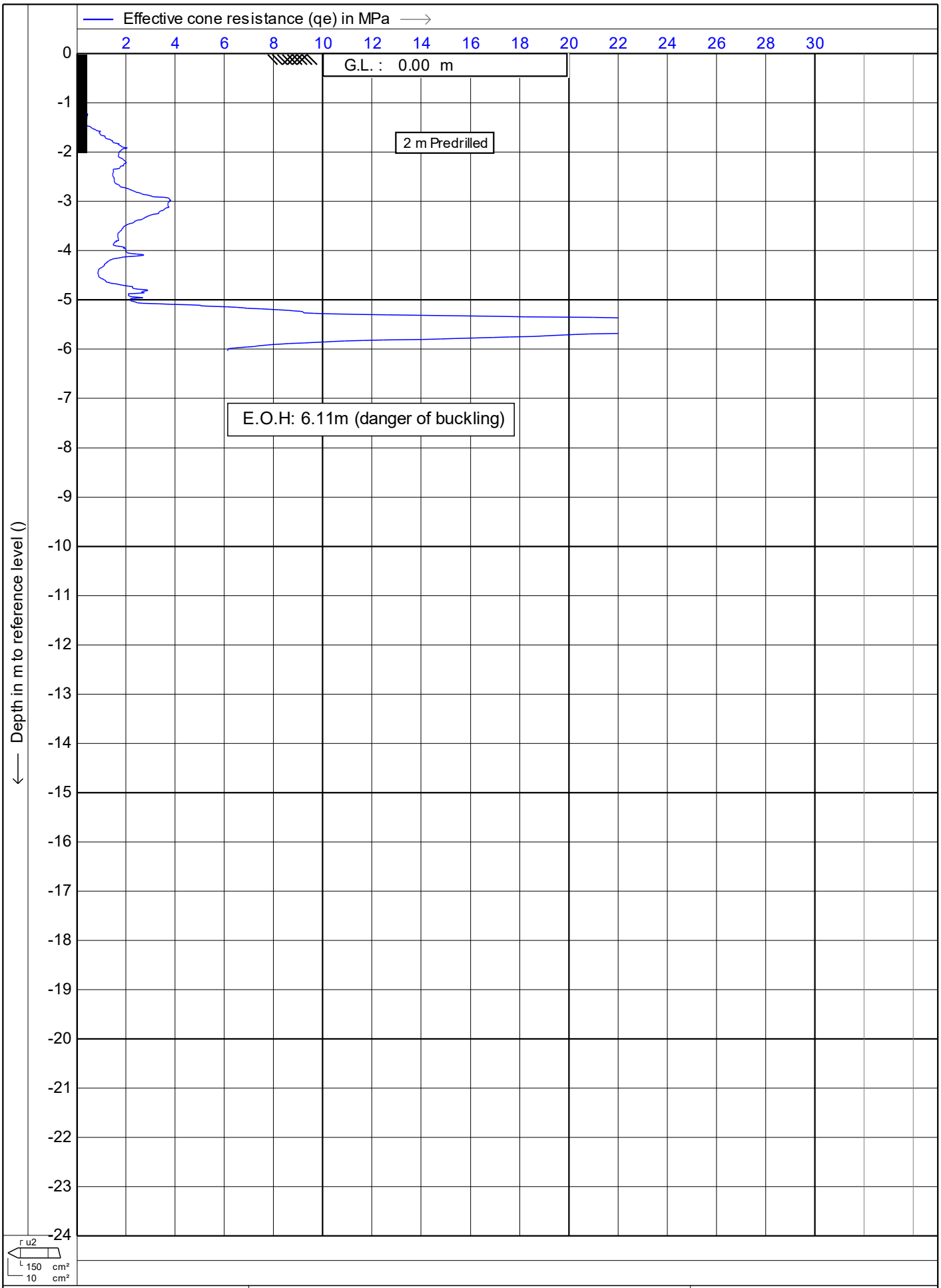
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

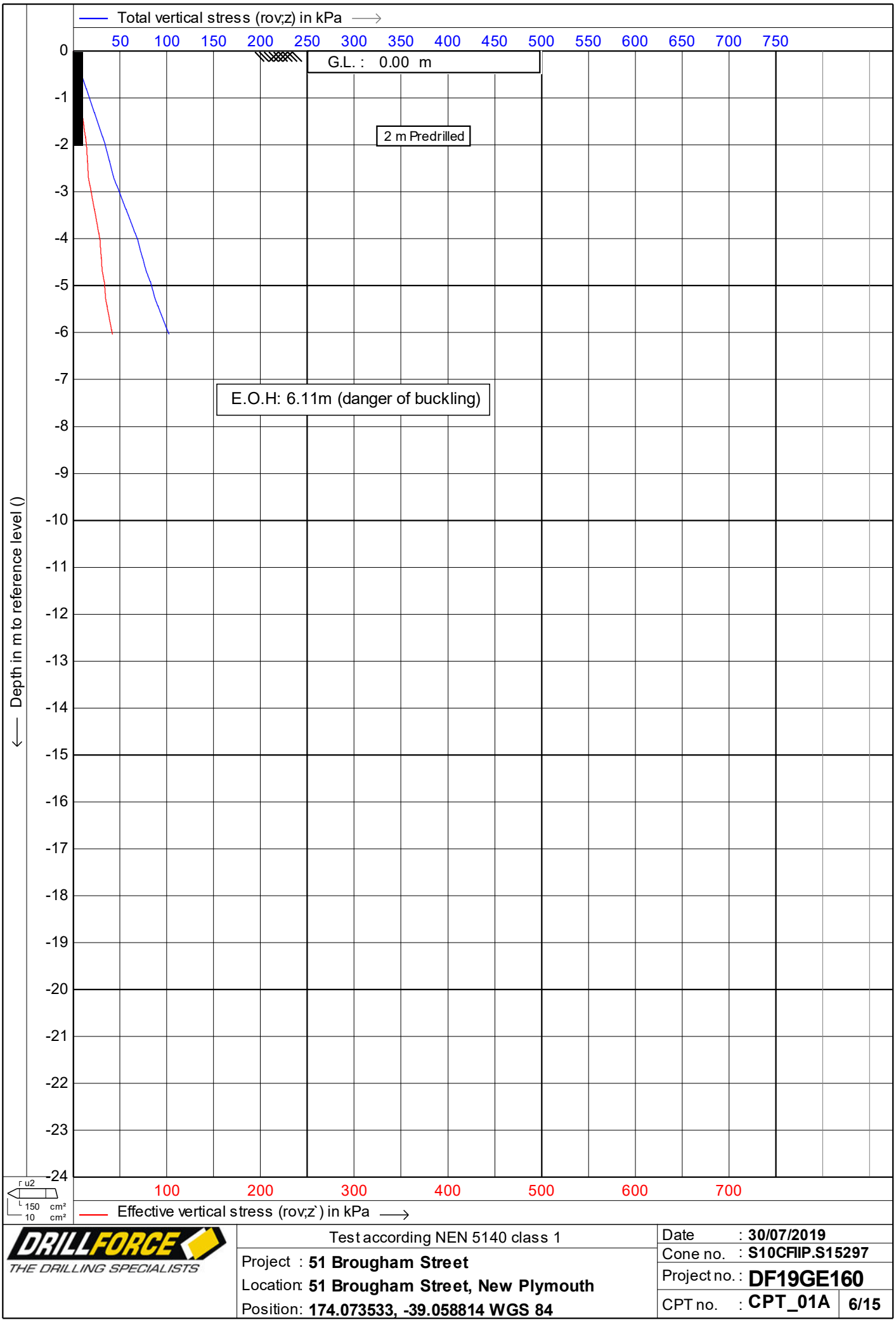
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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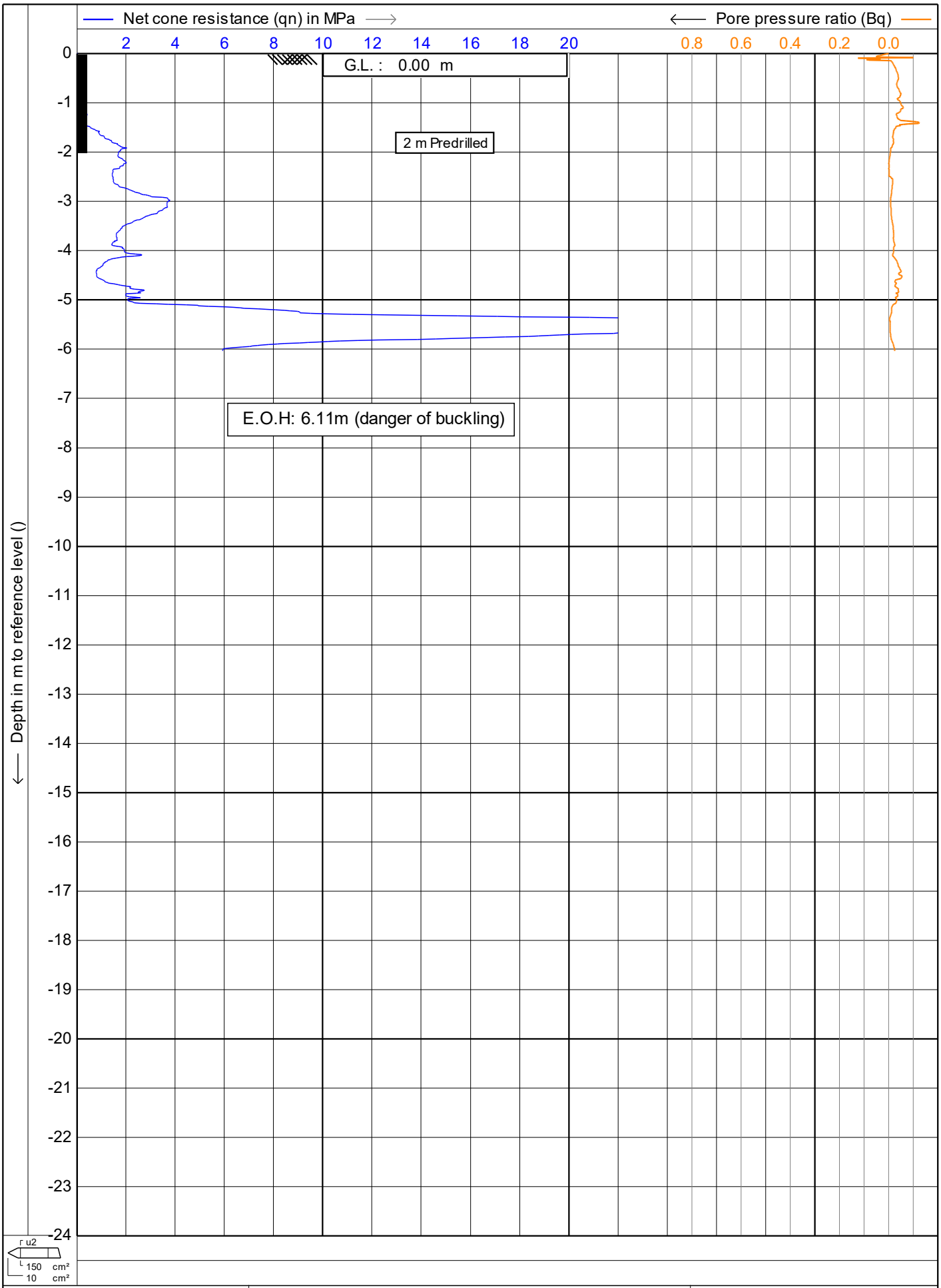
Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

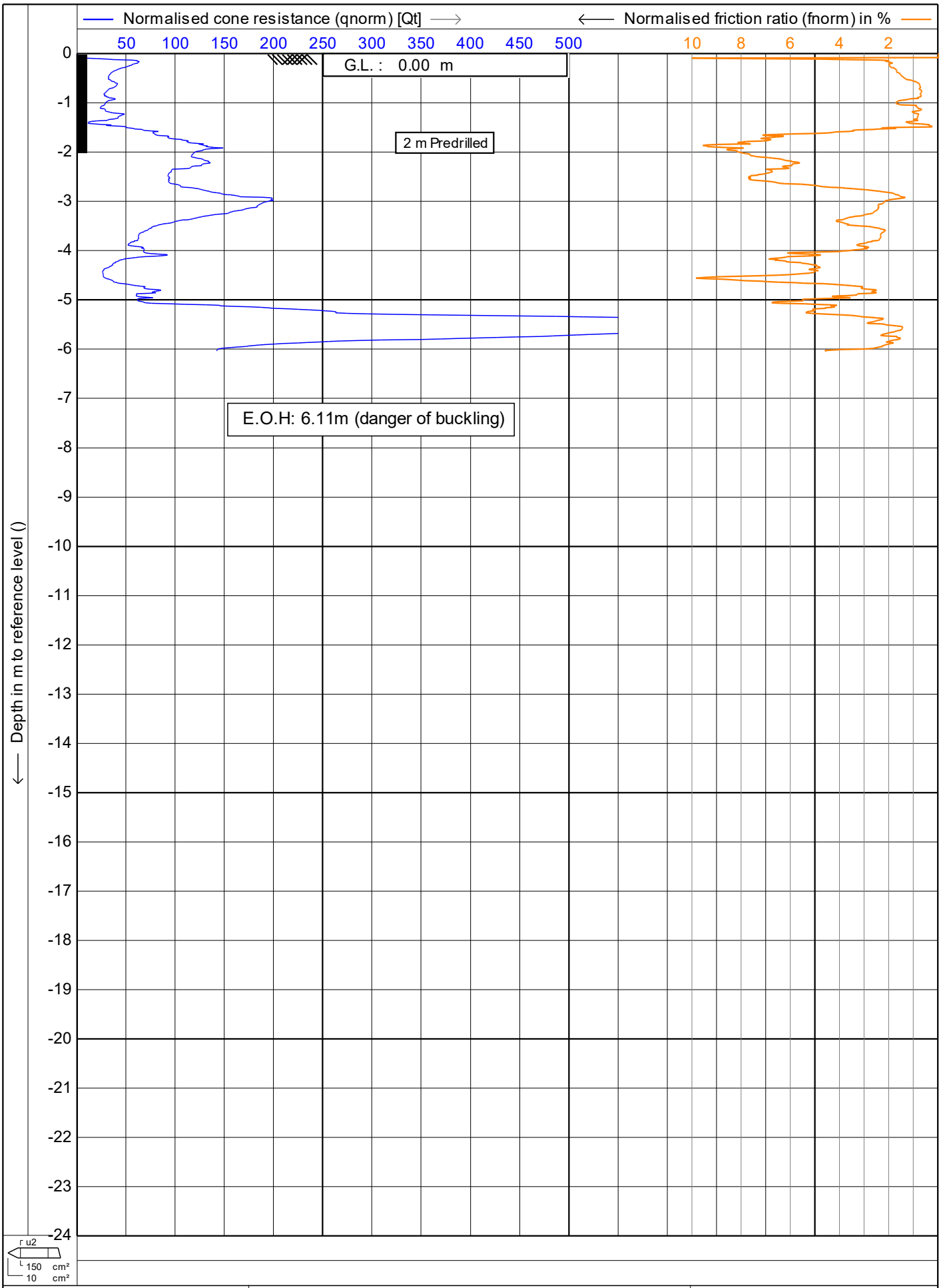
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **7/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

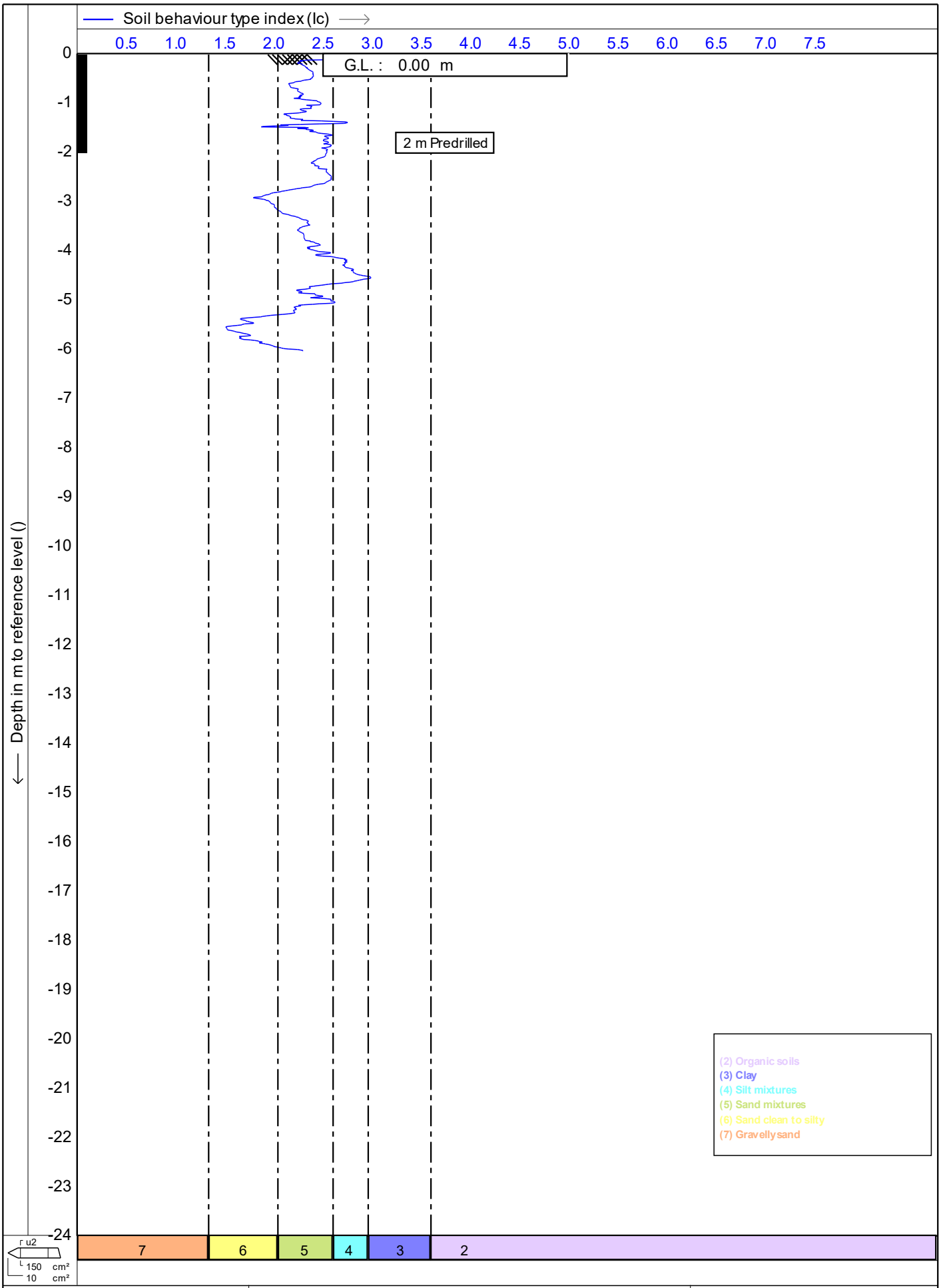
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

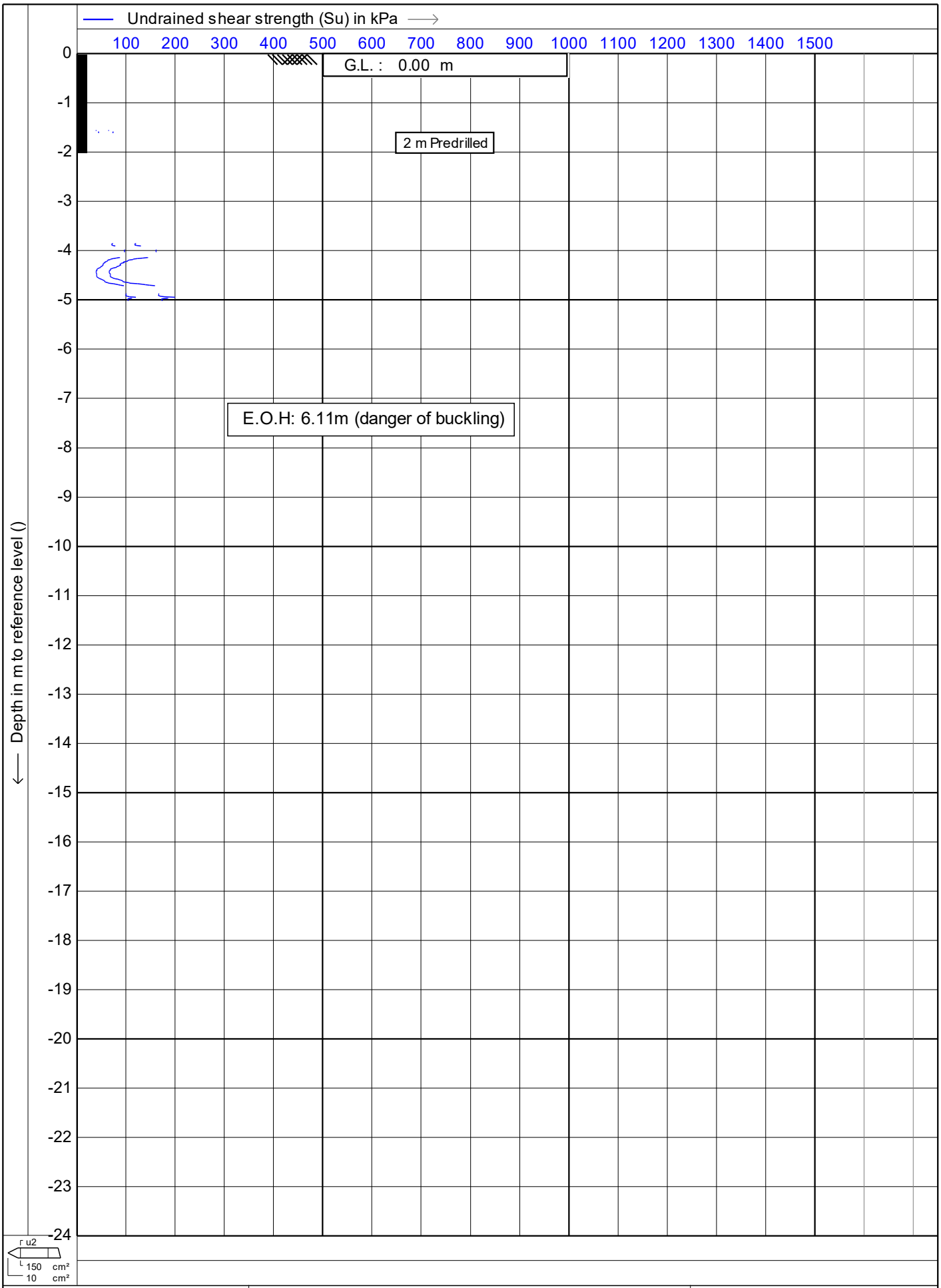
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

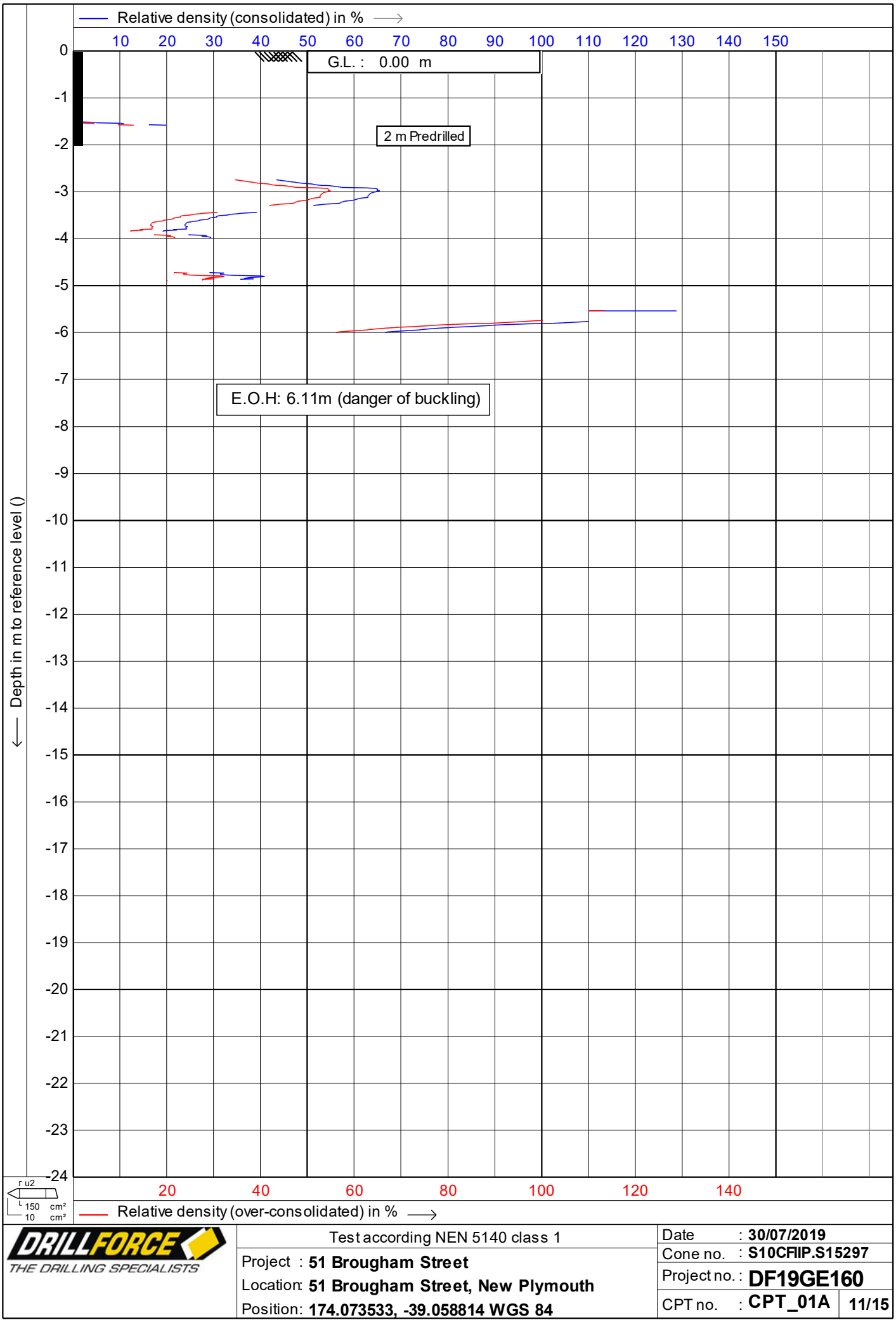
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **10/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

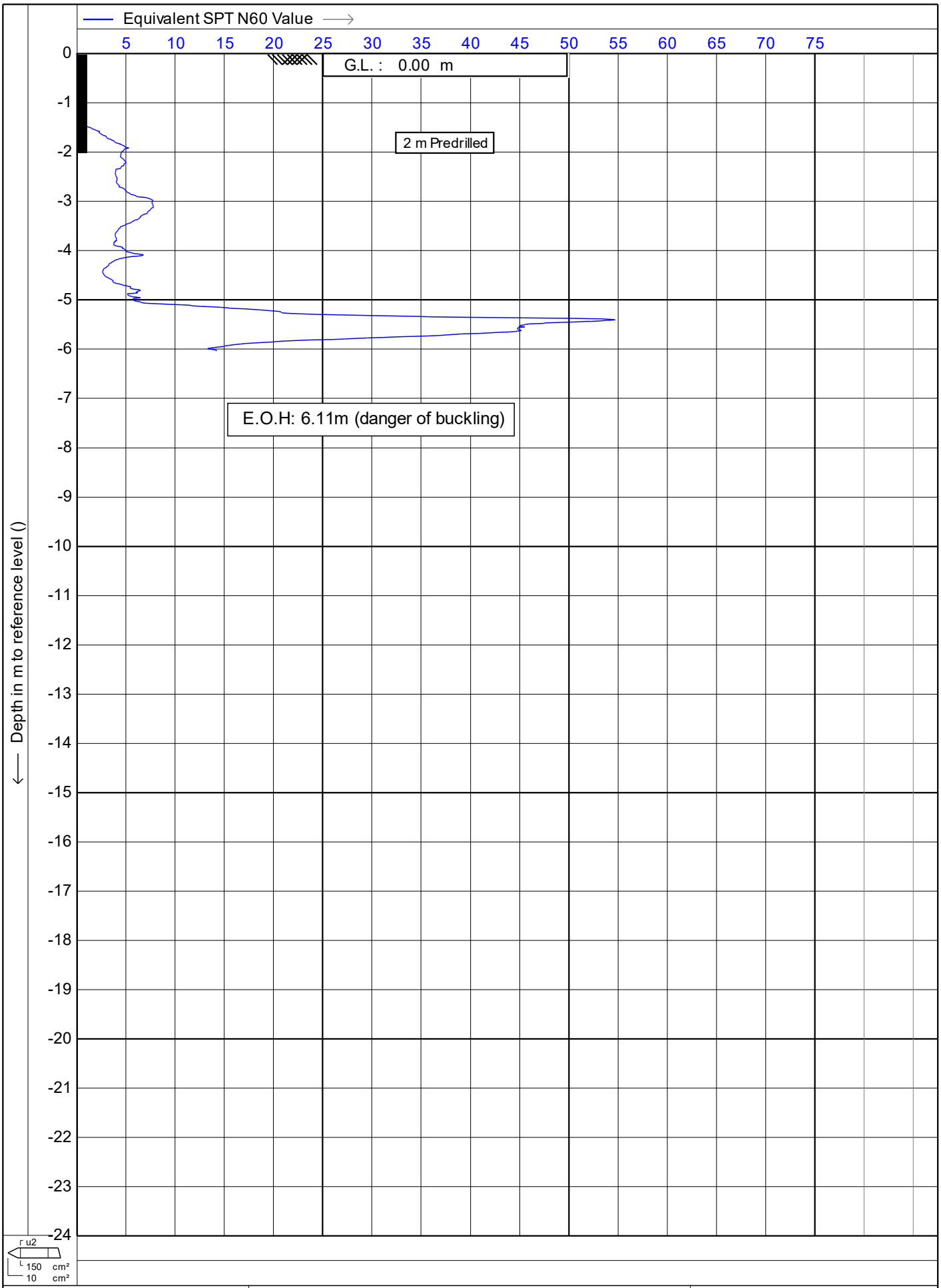
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **11/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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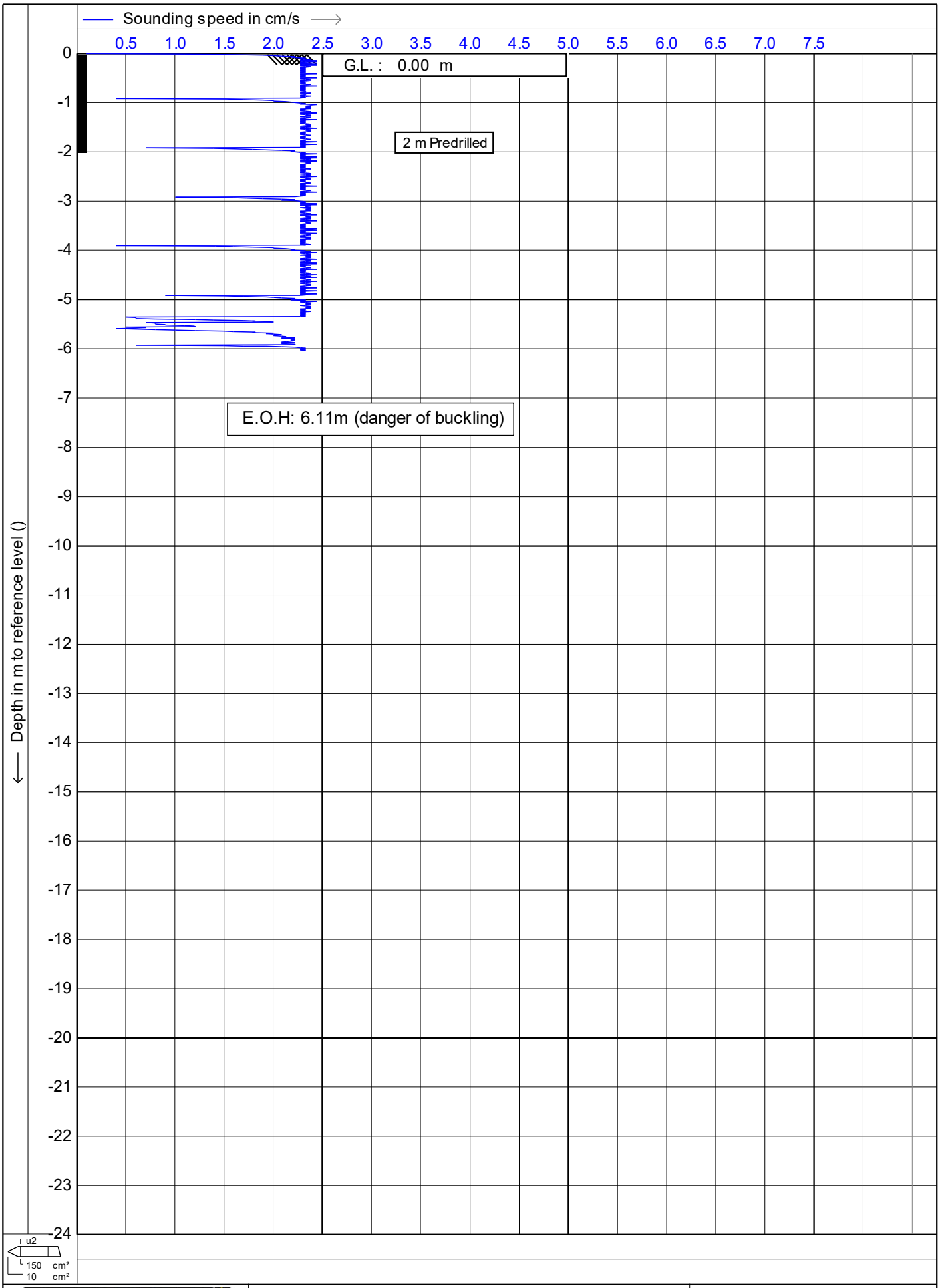
Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **12/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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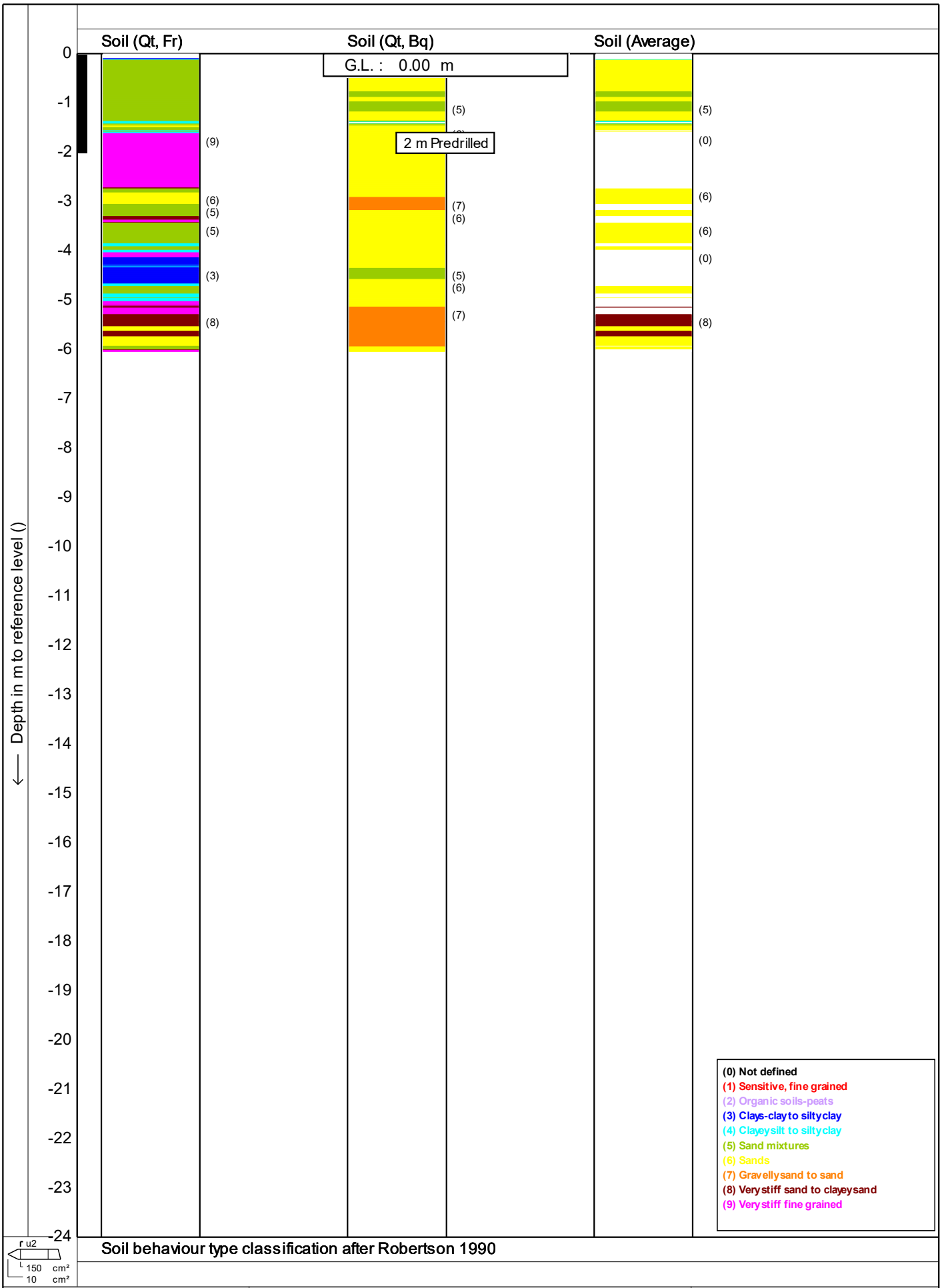
Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A**

1.47



Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

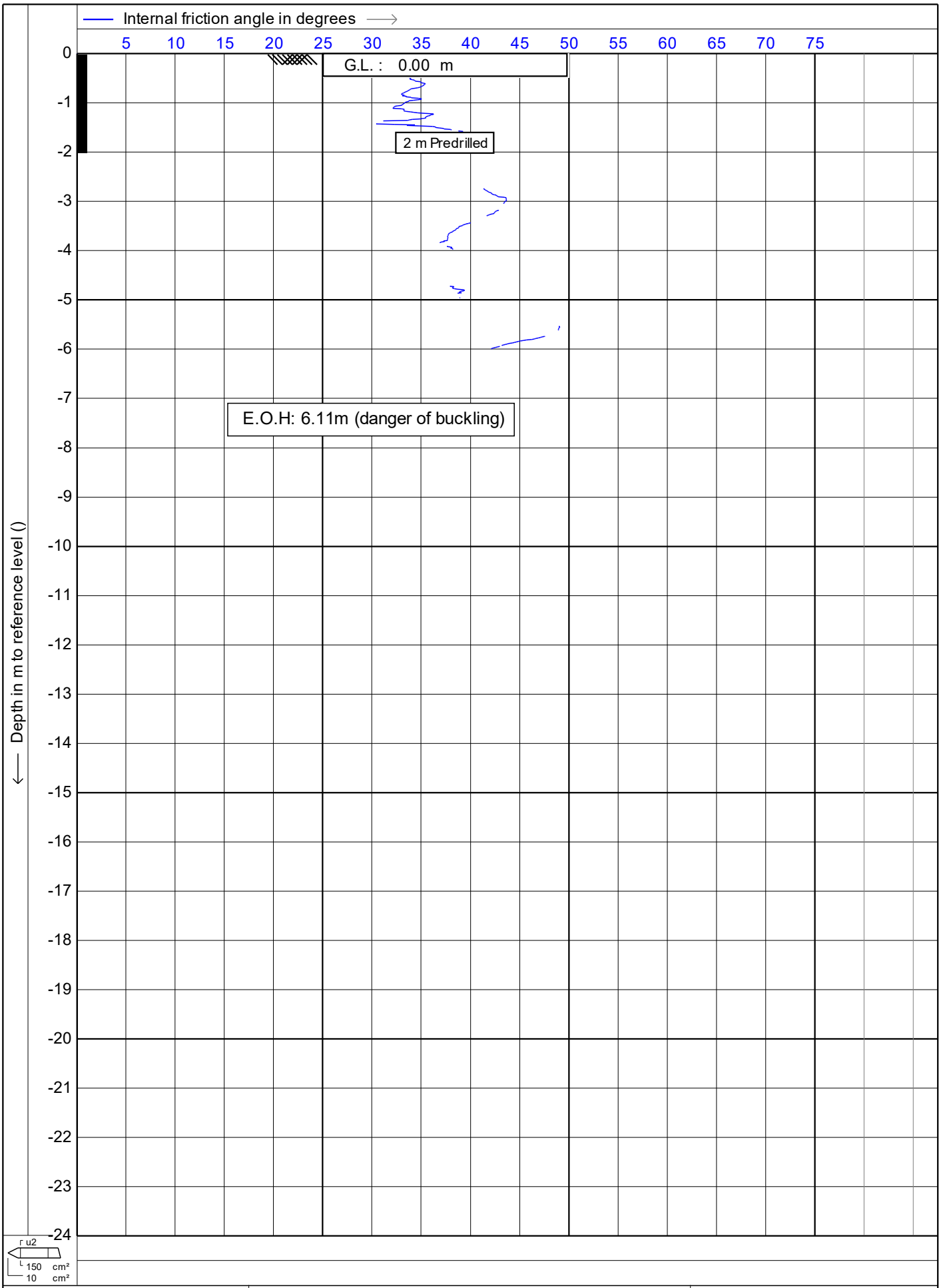
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

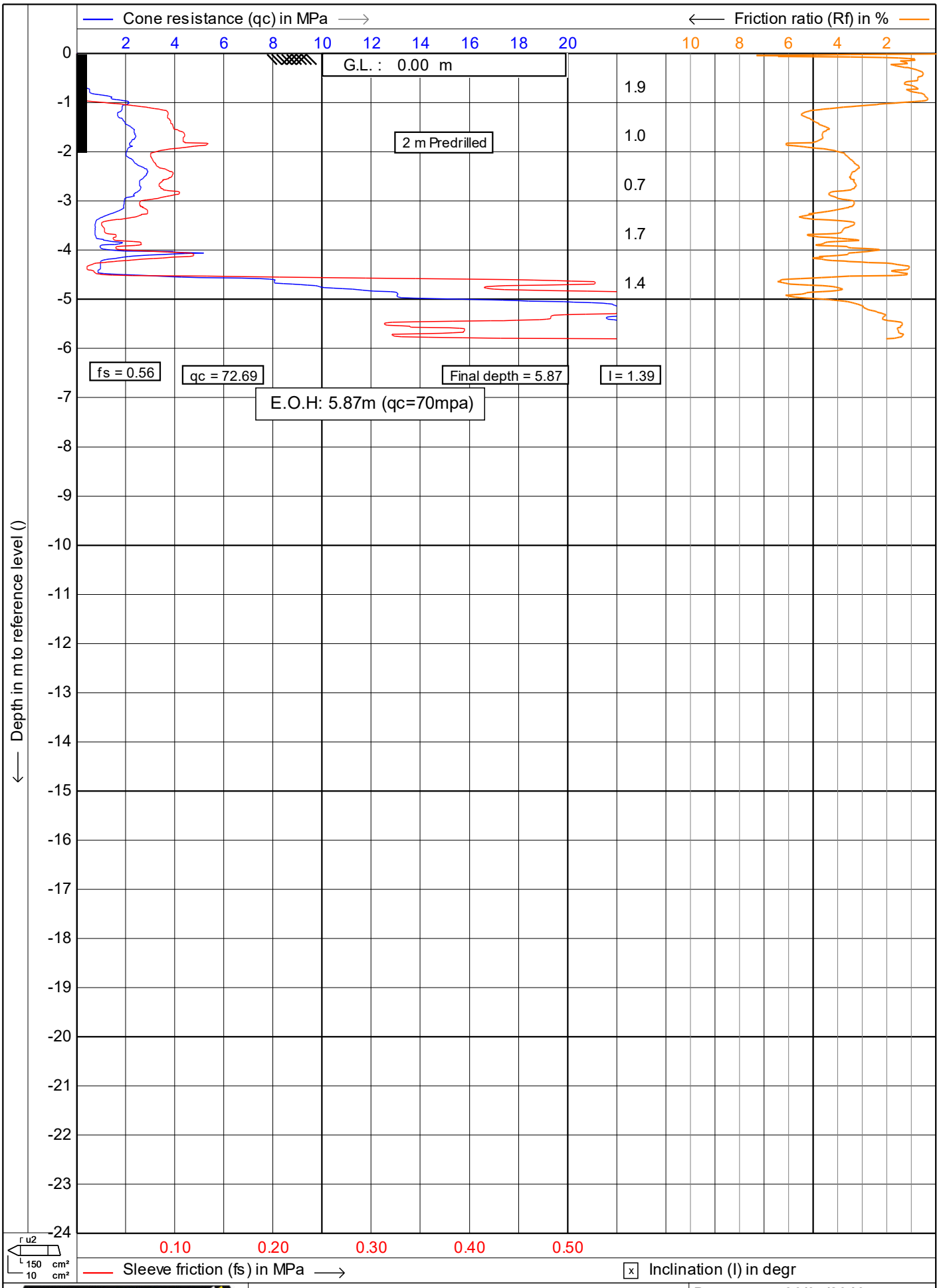
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073533, -39.058814 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_01A** **15/15**

1.47



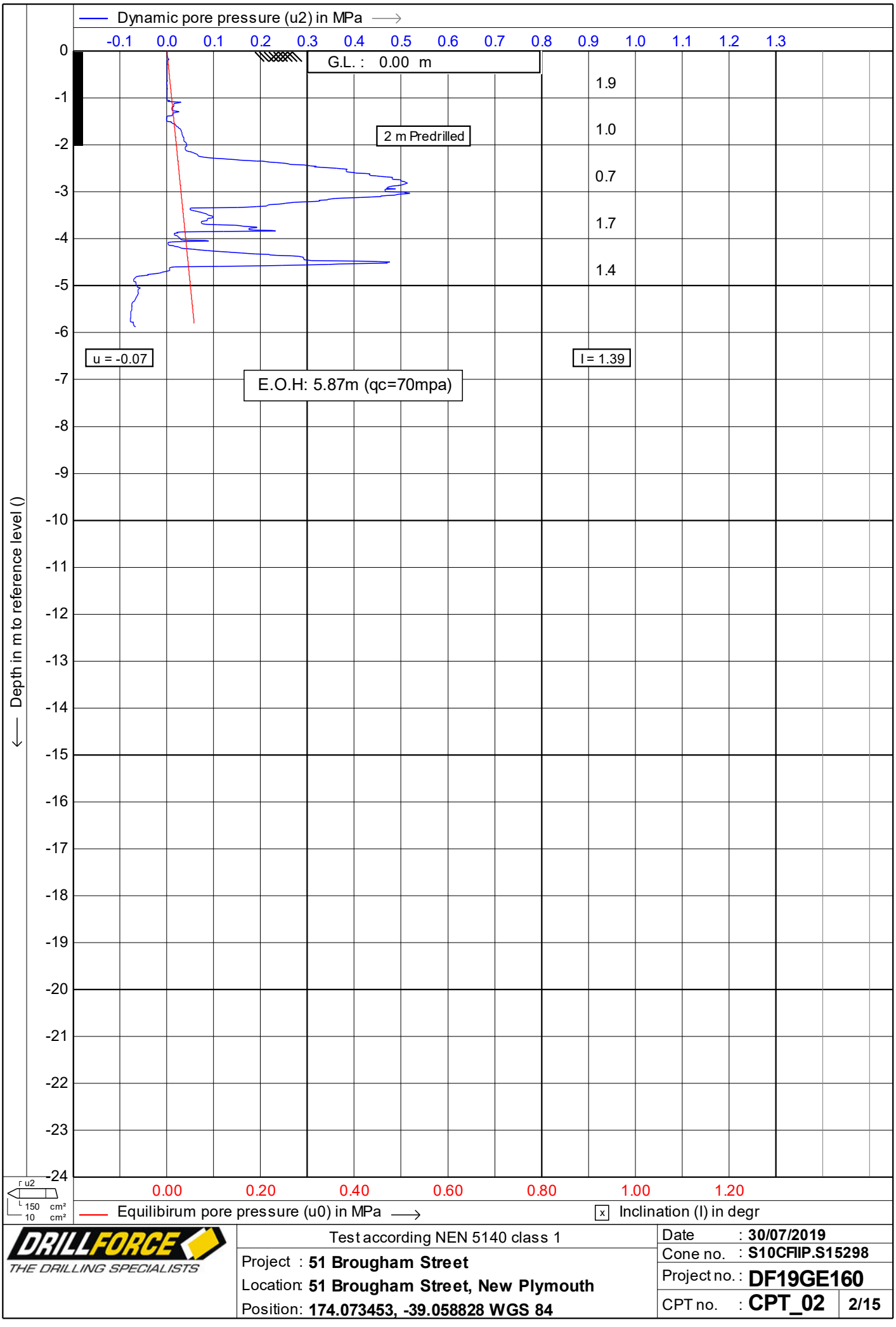
DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**
Location: **51 Brougham Street, New Plymouth**
Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **1/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

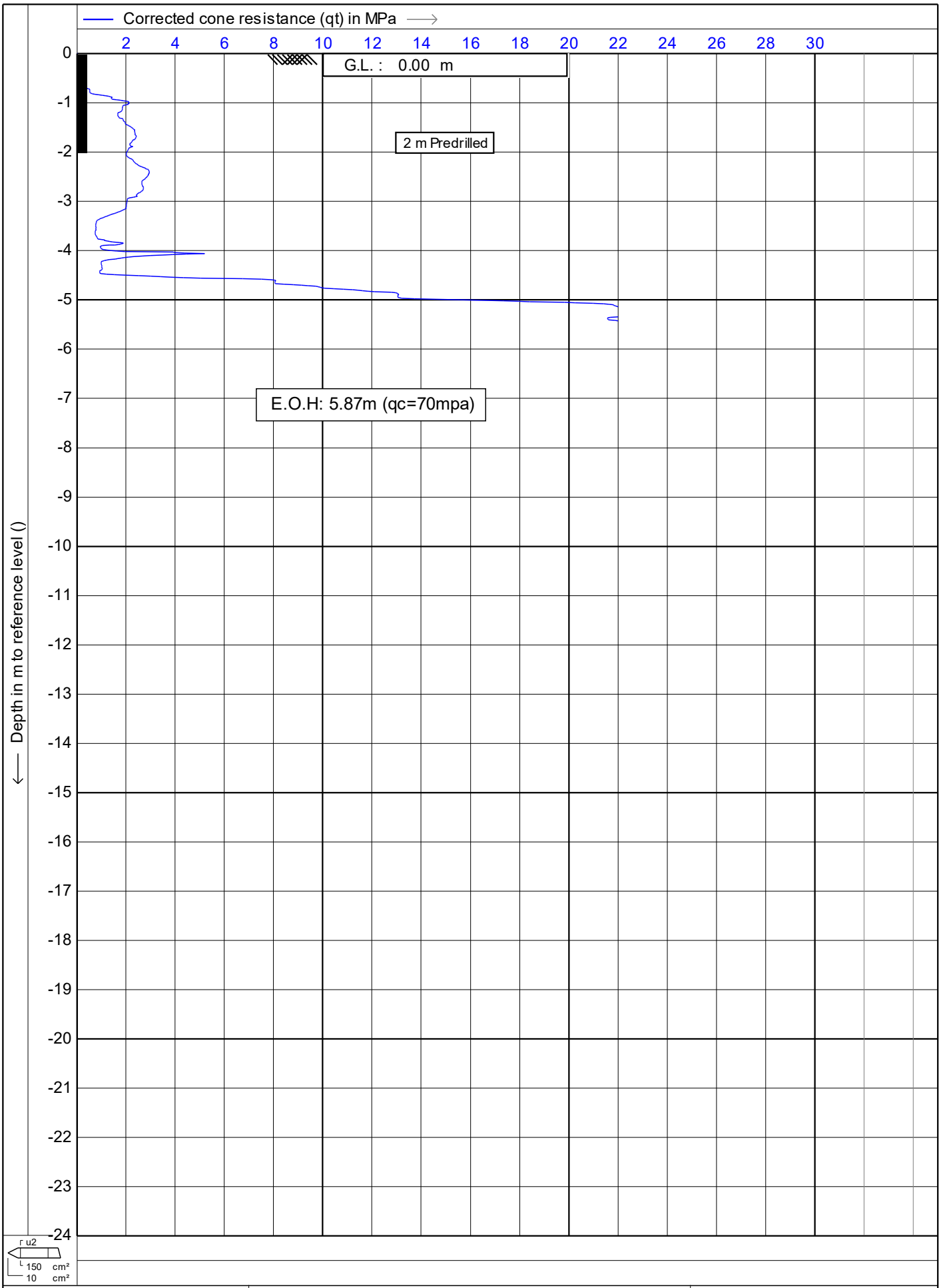
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

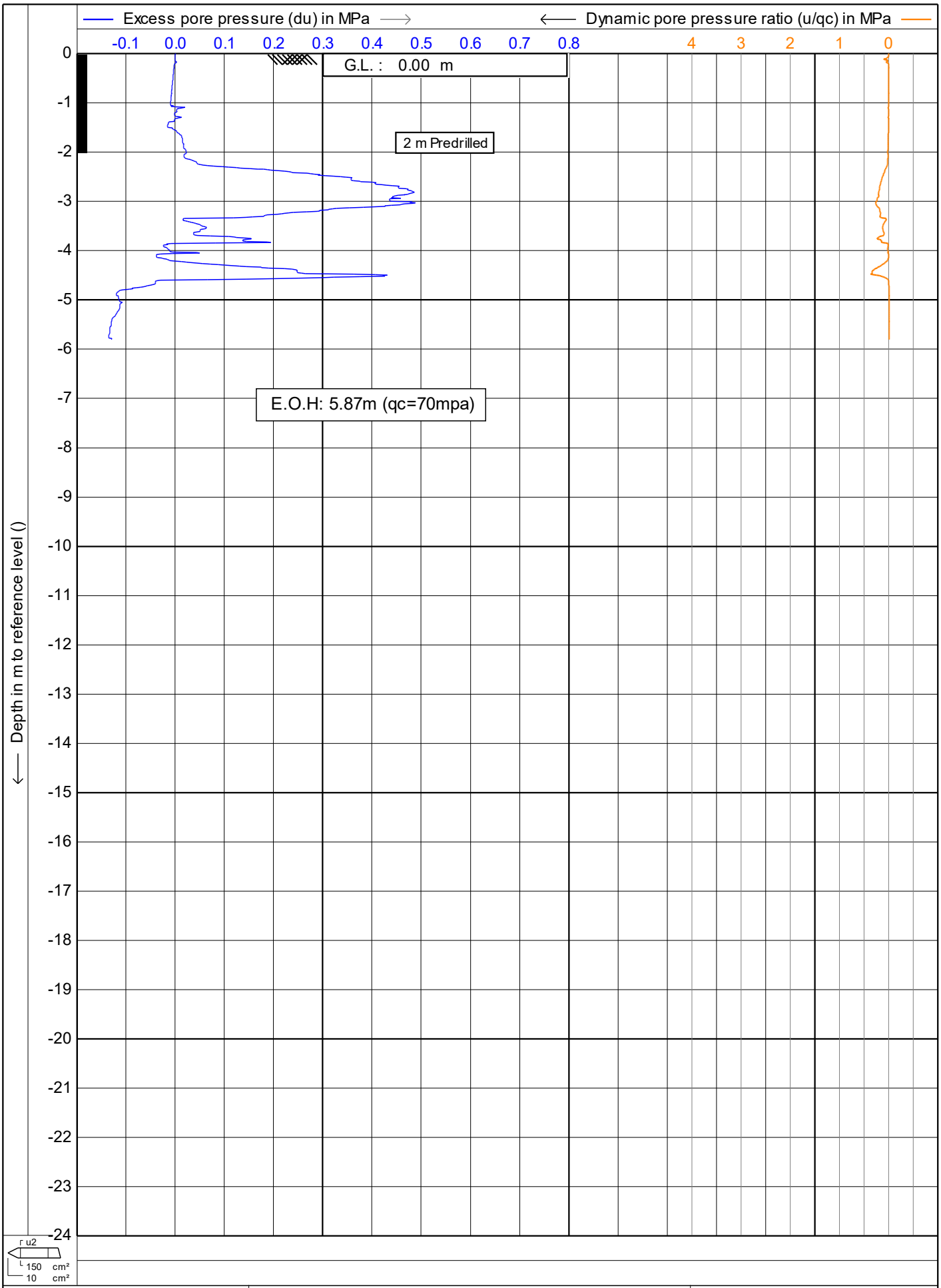
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **3/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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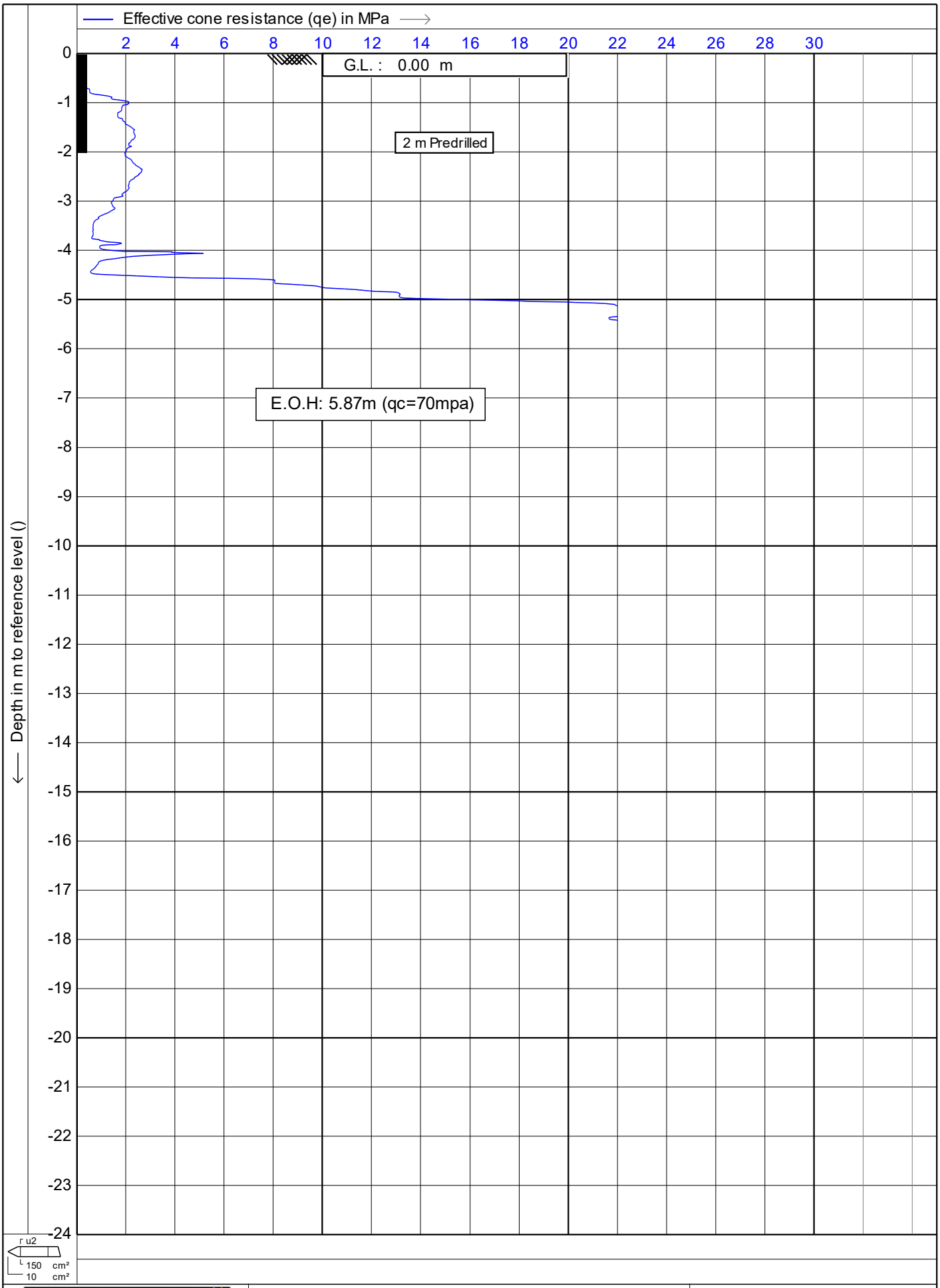
Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

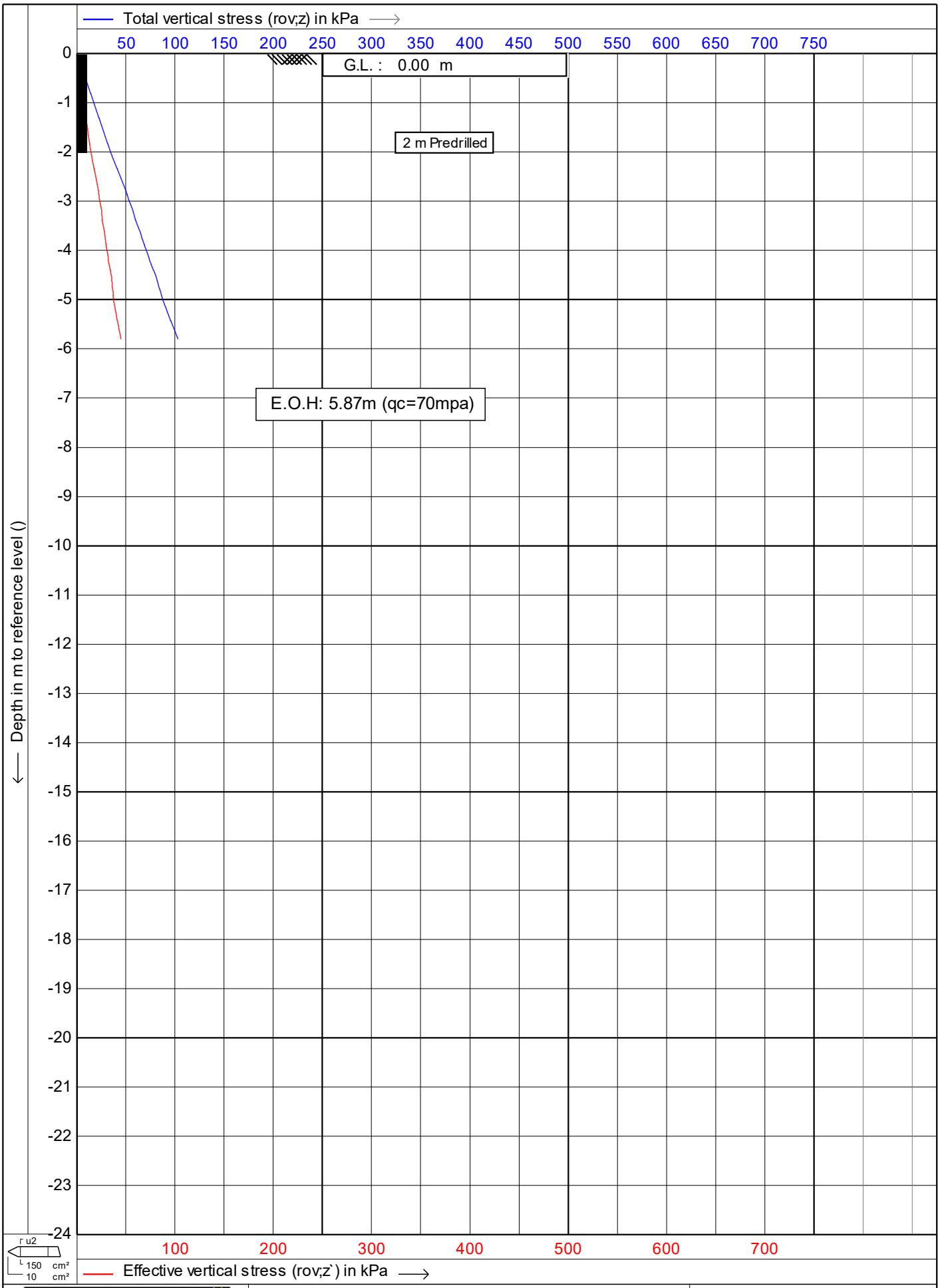
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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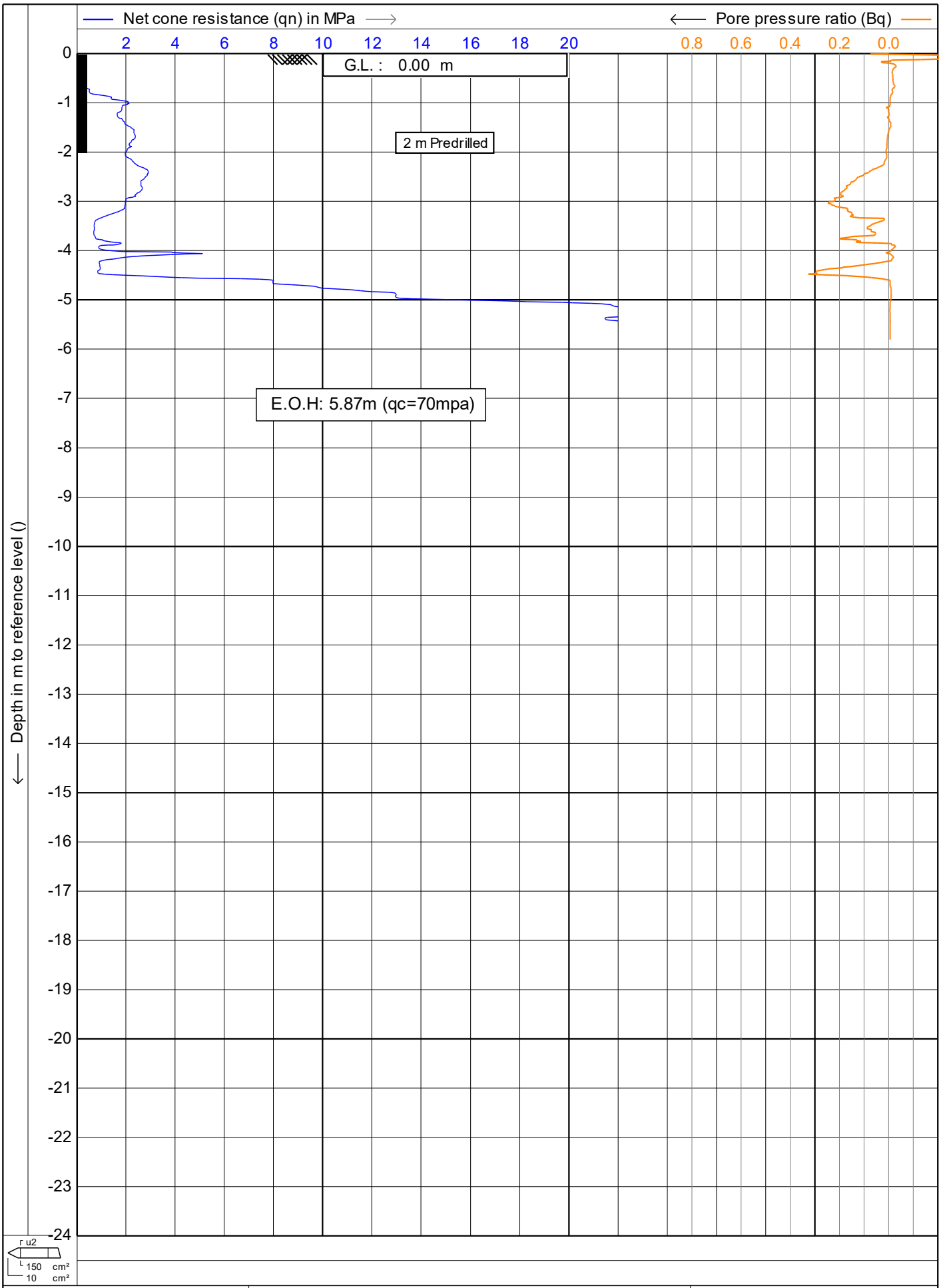
Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **6/15**

1.47



DRILLFORCE
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Test according NEN 5140 class 1

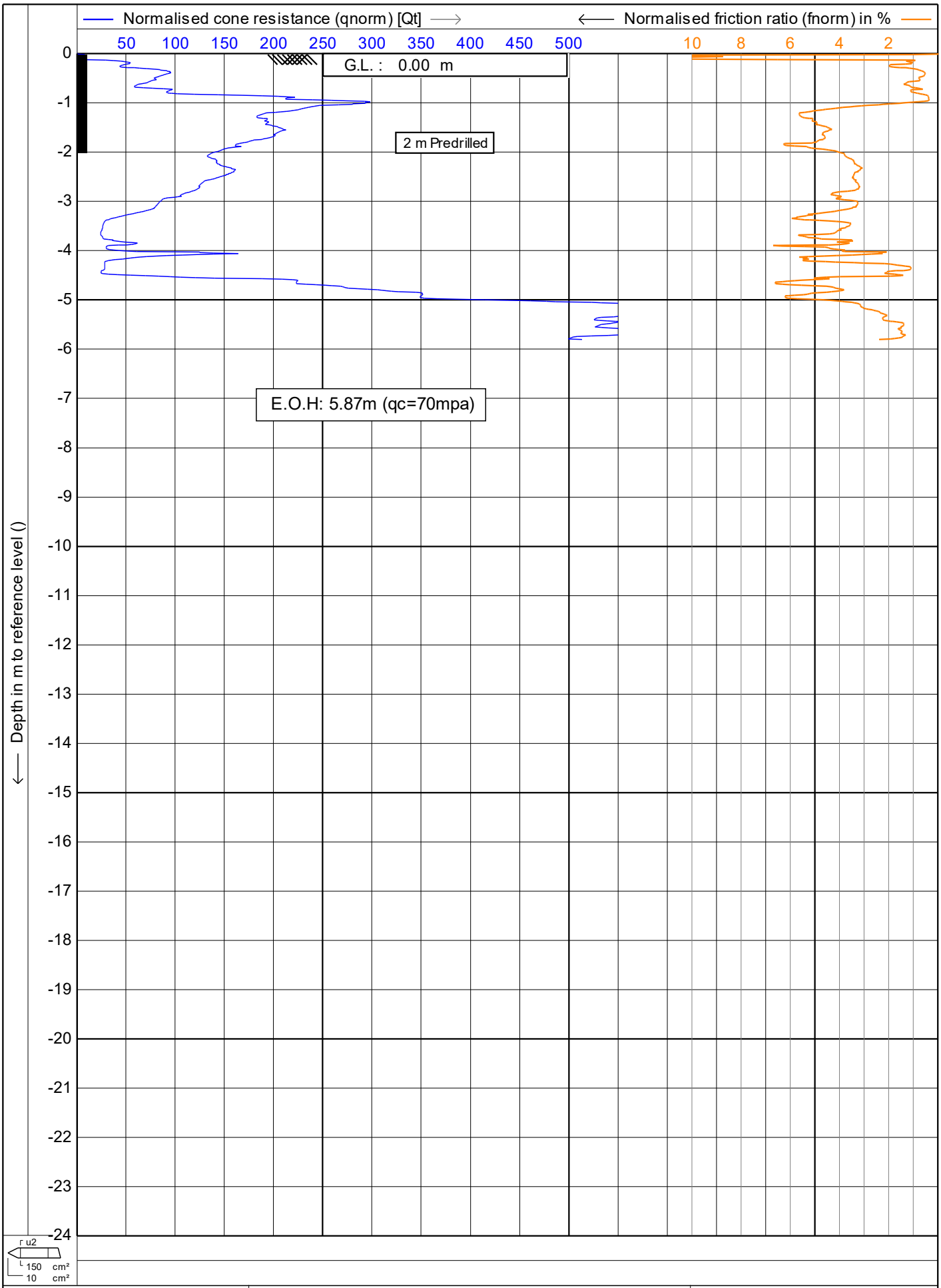
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **7/15**

1.47



DRILLFORCE
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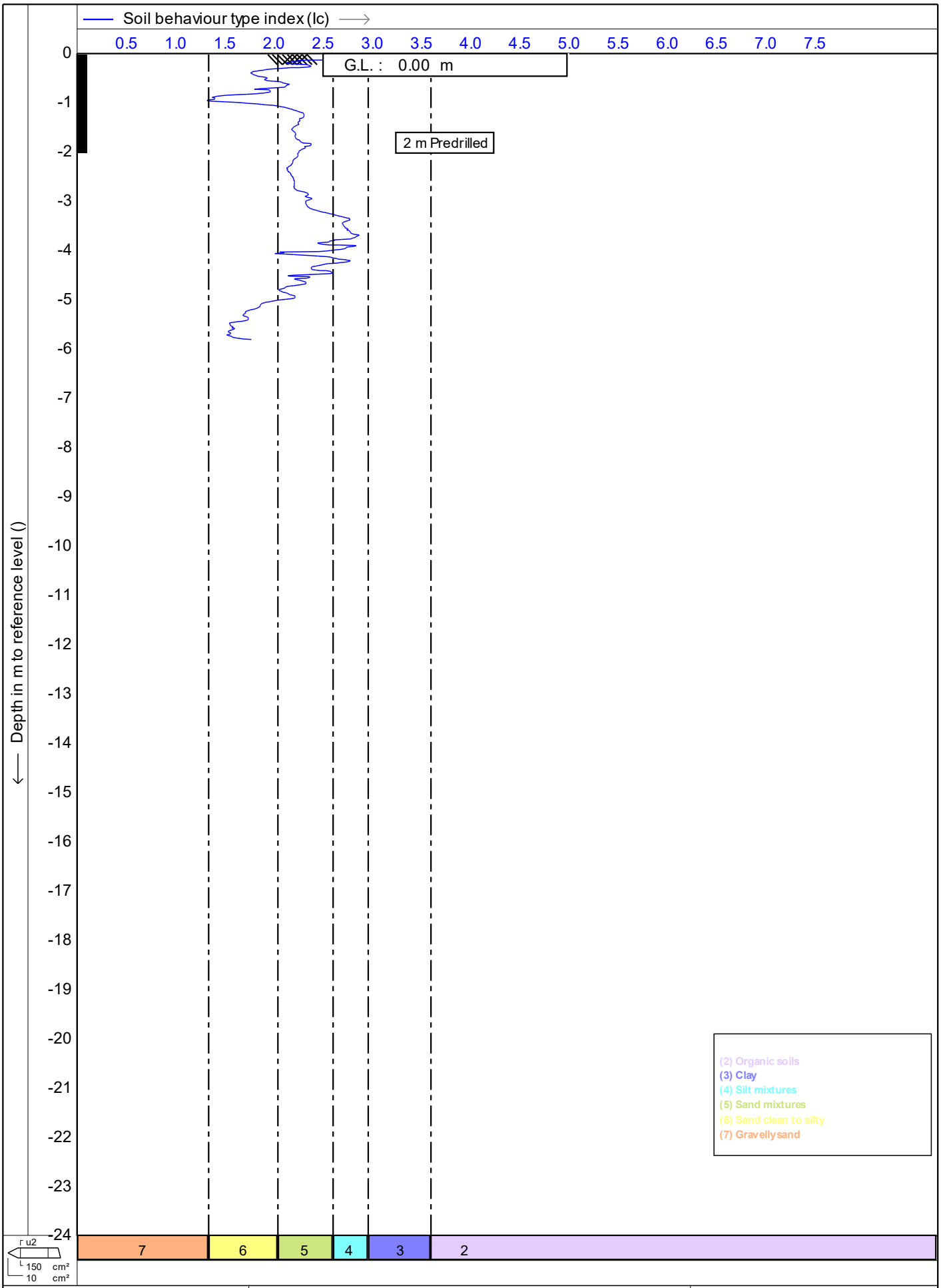
Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **8/15**

1.47



DRILLFORCE
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Test according NEN 5140 class 1

Project : **51 Brougham Street**

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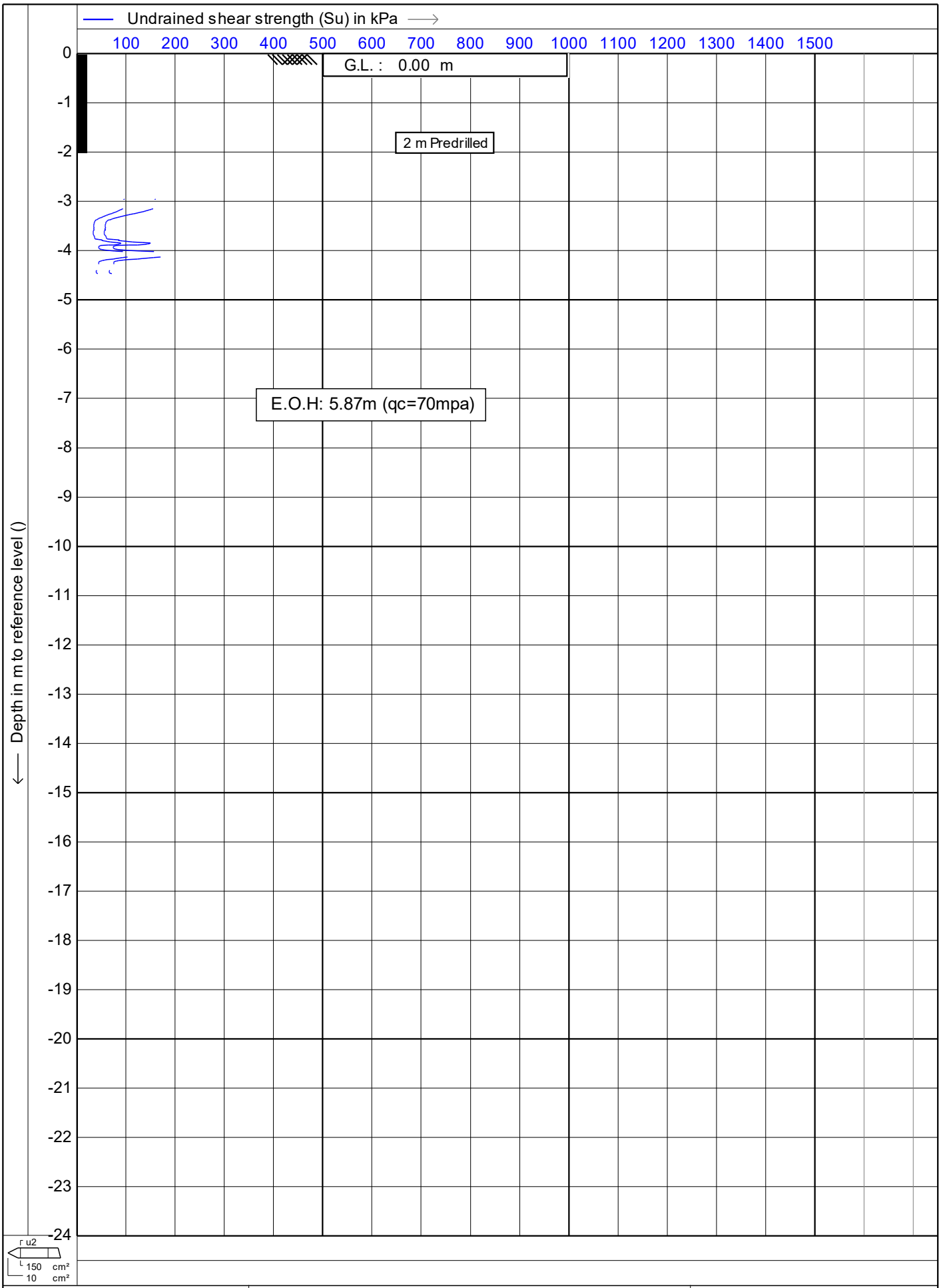
Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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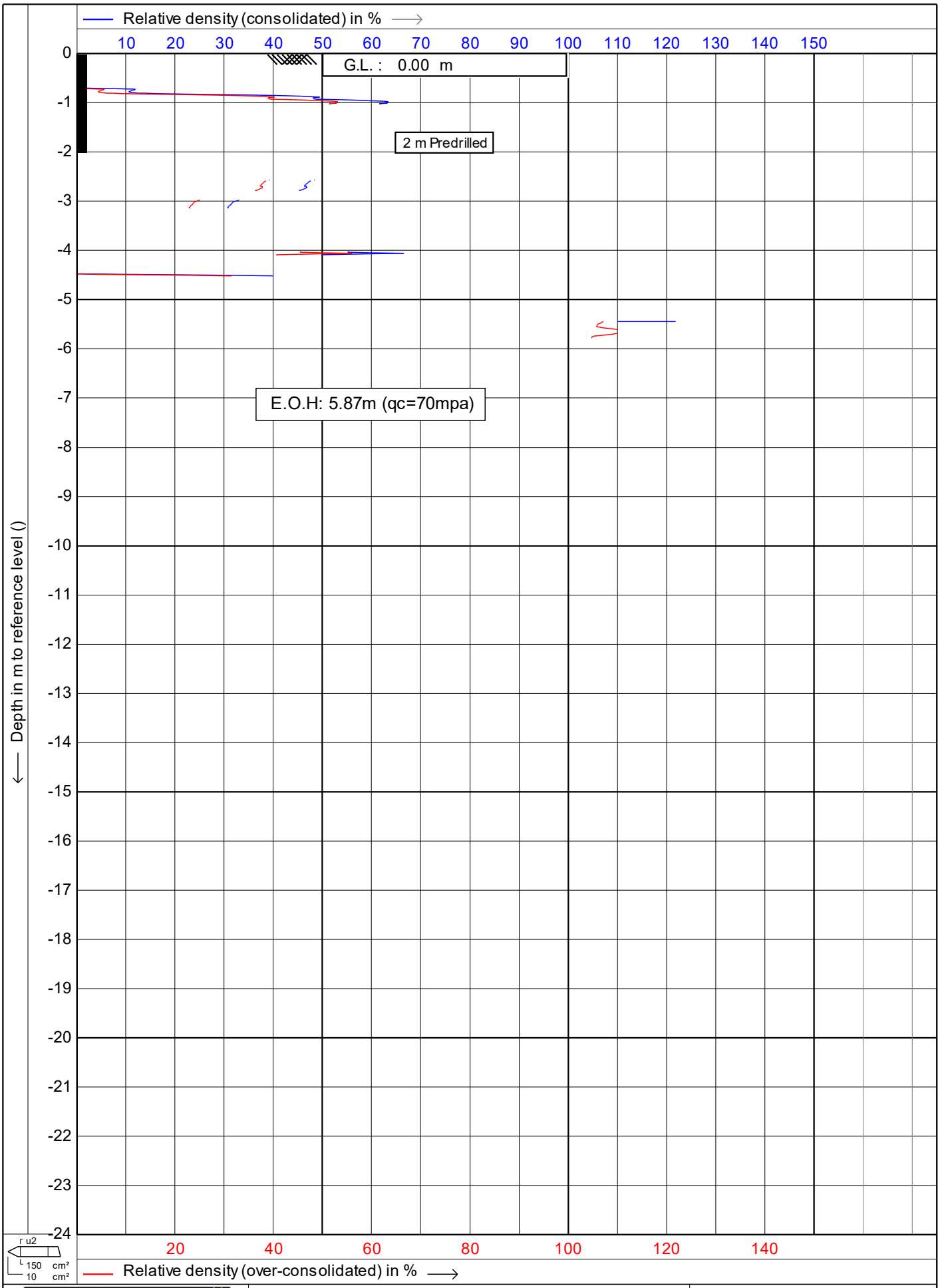
Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **10/15**

1.47



DRILLFORCE
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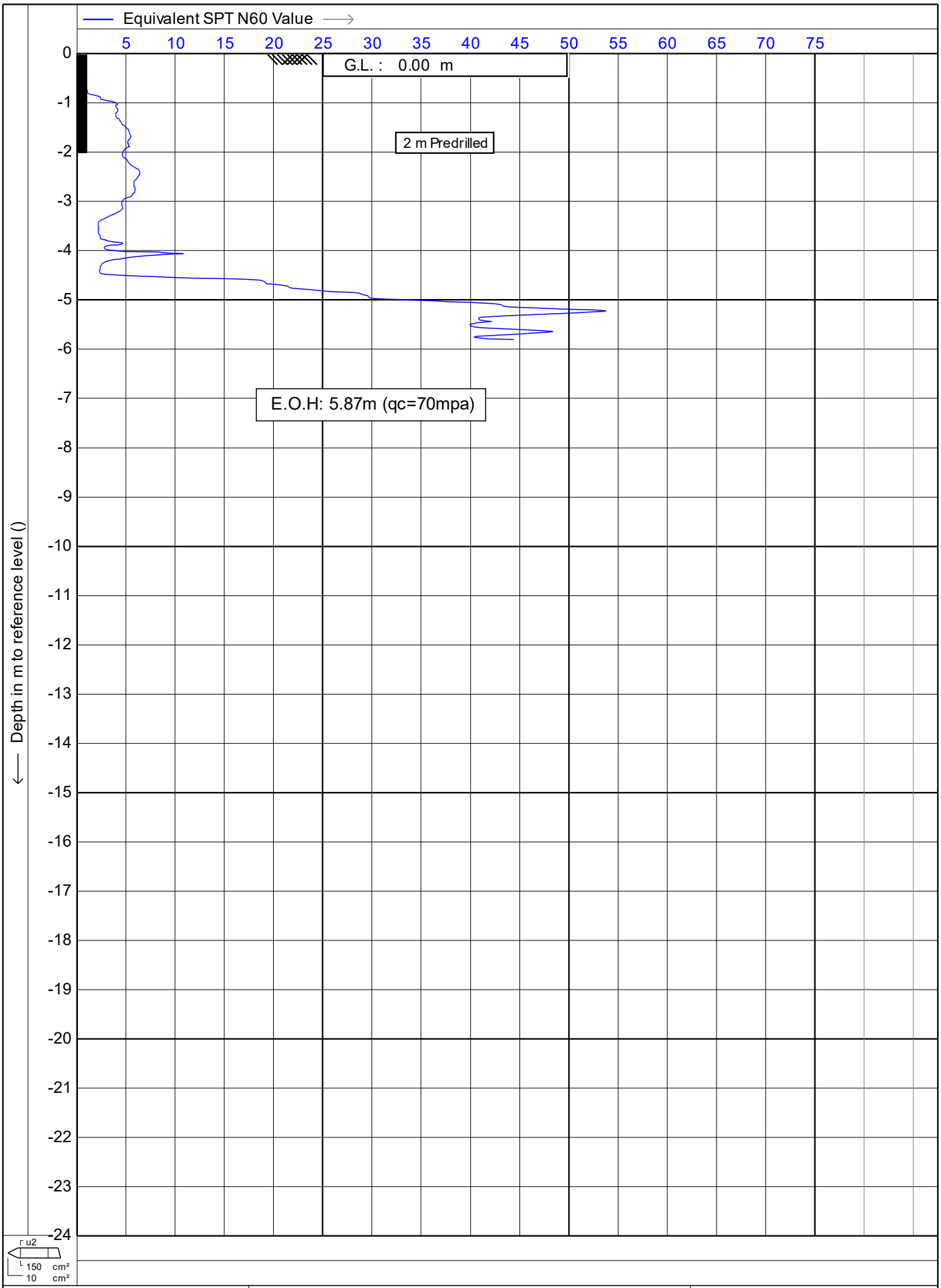
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **11/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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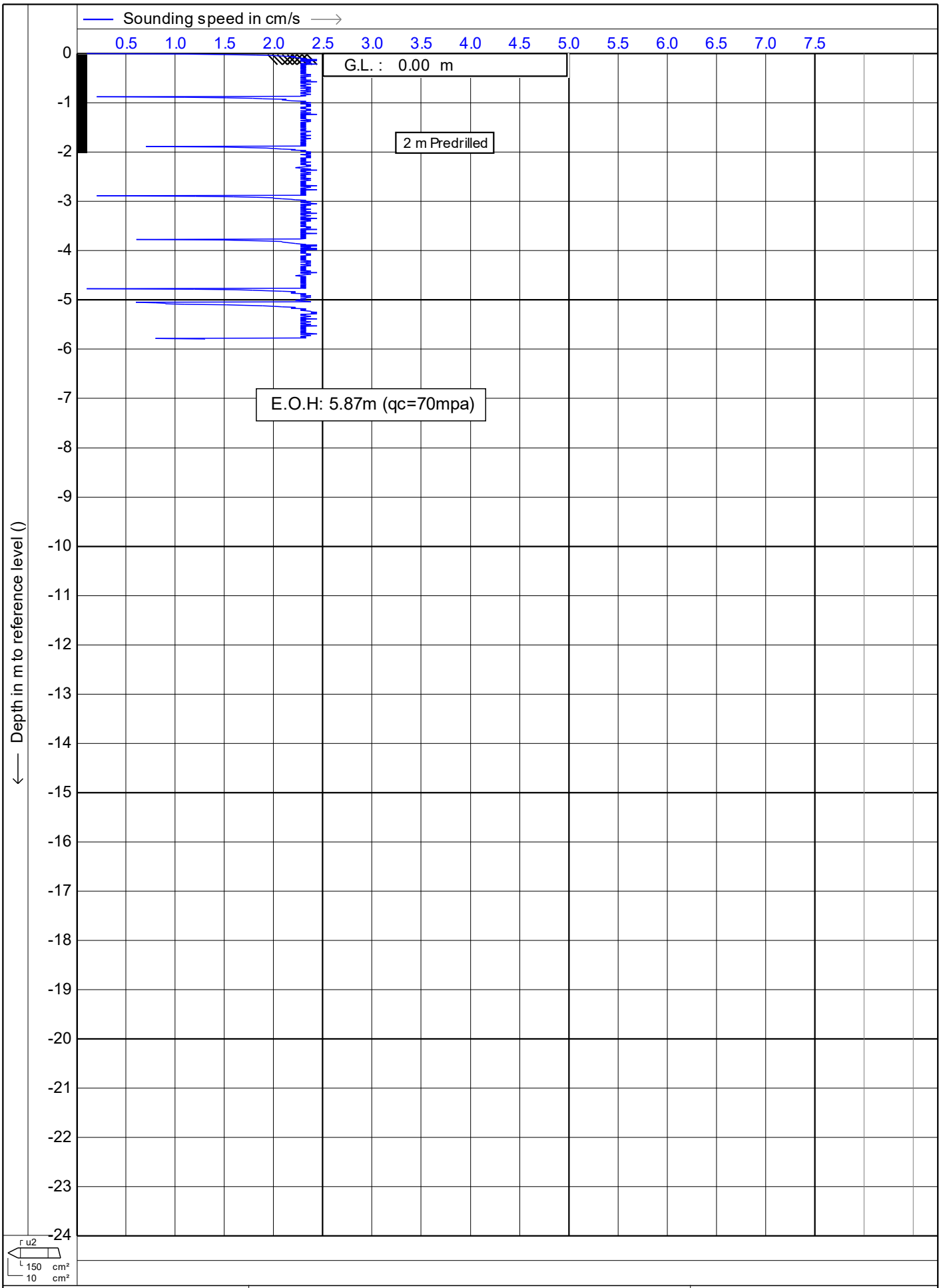
Position: **174.073453, -39.058828 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** 12/15

1.47



DRILLFORCE
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Date	: **30/07/2019**
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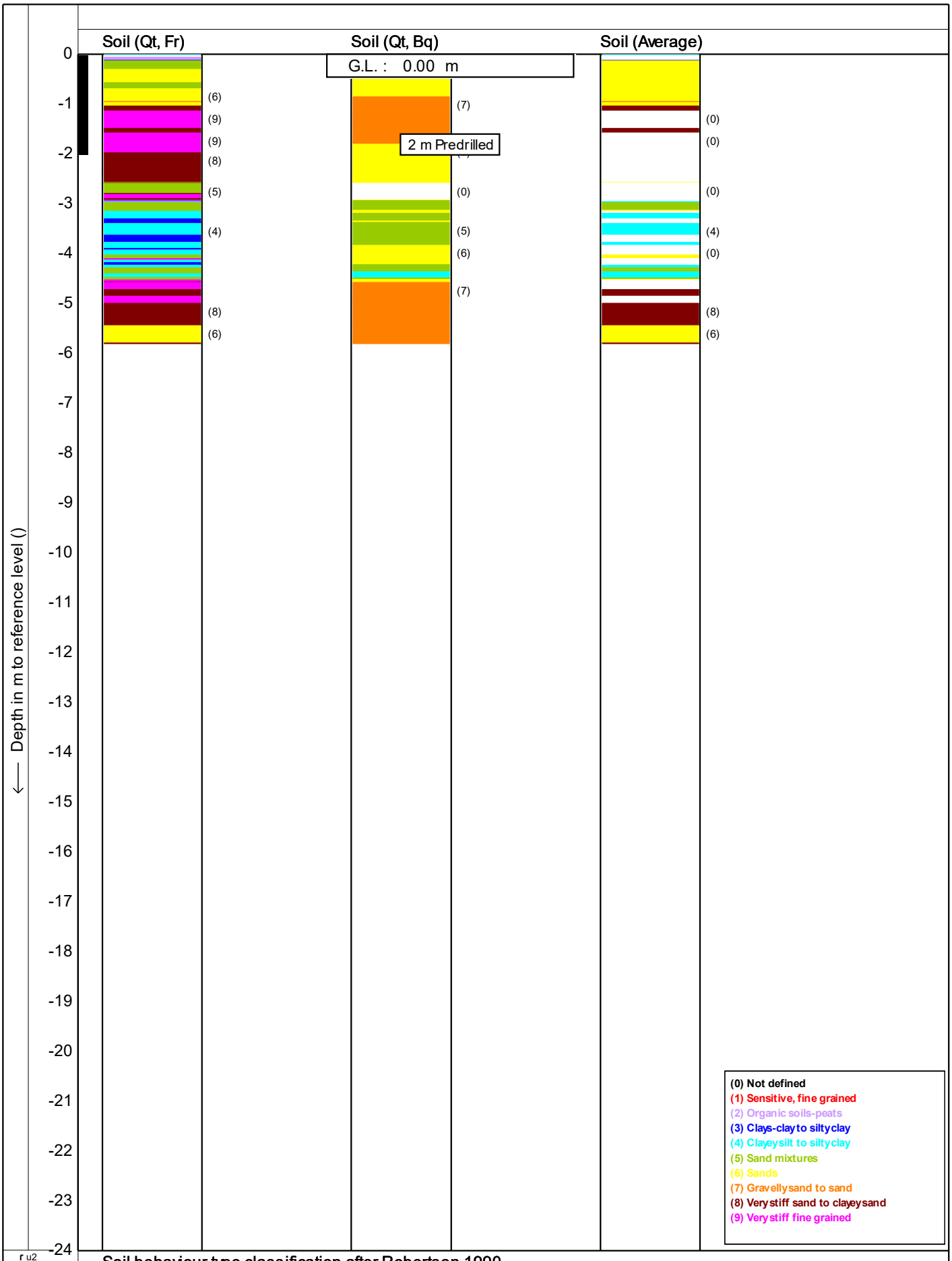
Project no.	: **DF19GE160**
CPT no.	: **CPT_02**

1.47



DRILLFORCE
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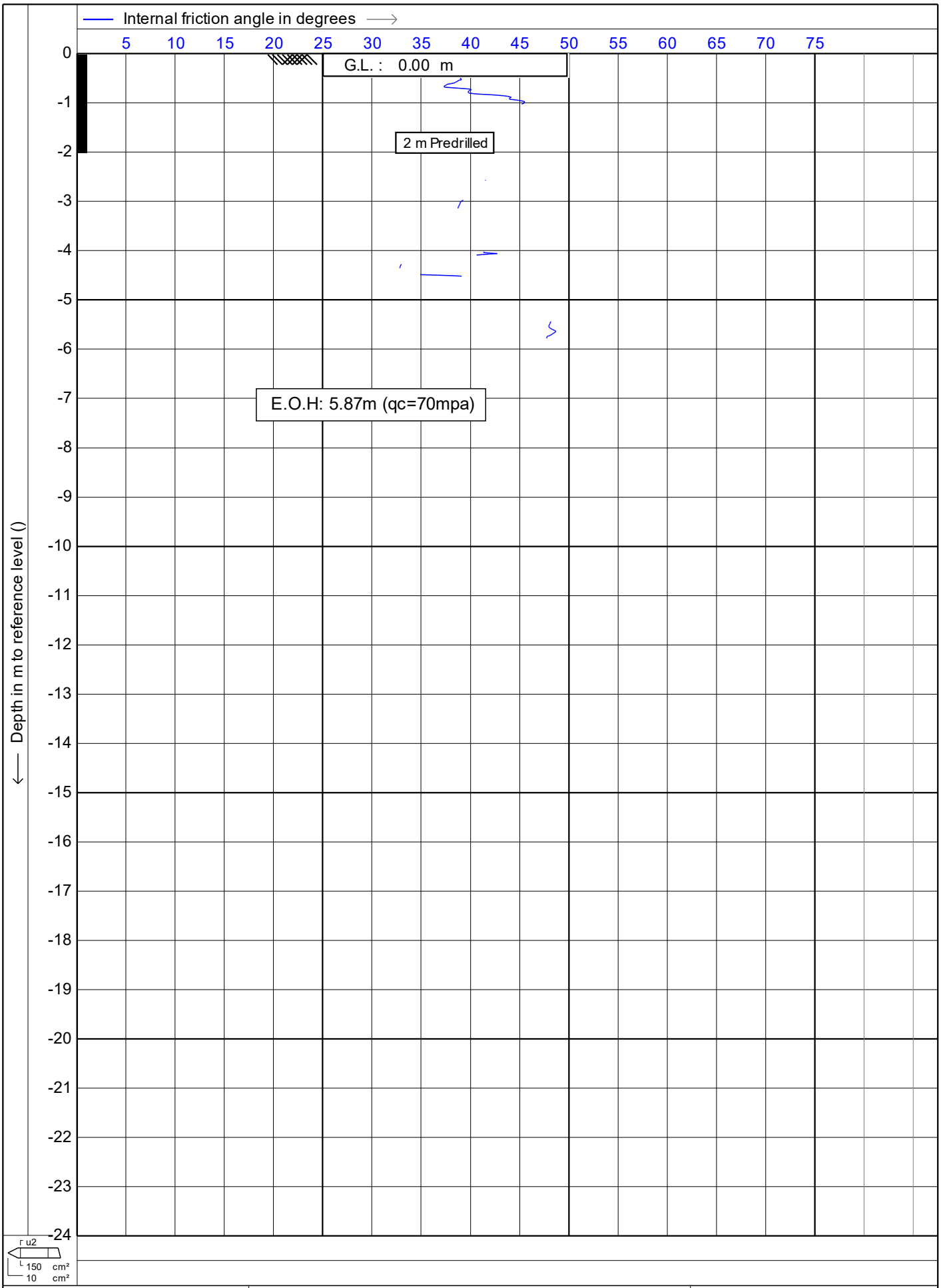
CPT no.	: **CPT_02**

1.47



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Date	: **30/07/2019**
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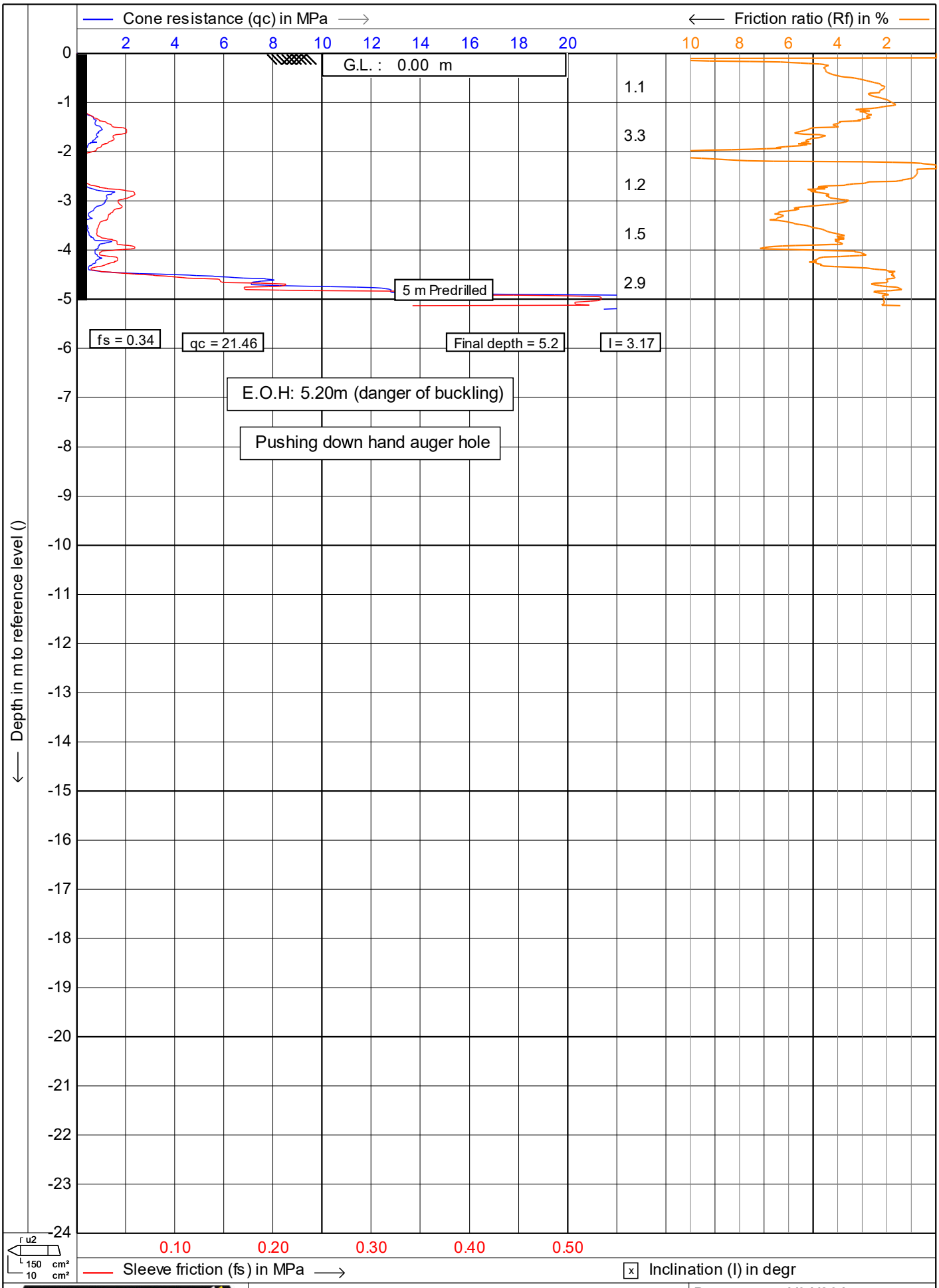
Project no.	: **DF19GE160**
CPT no.	: **CPT_02** **15/15**

1.47



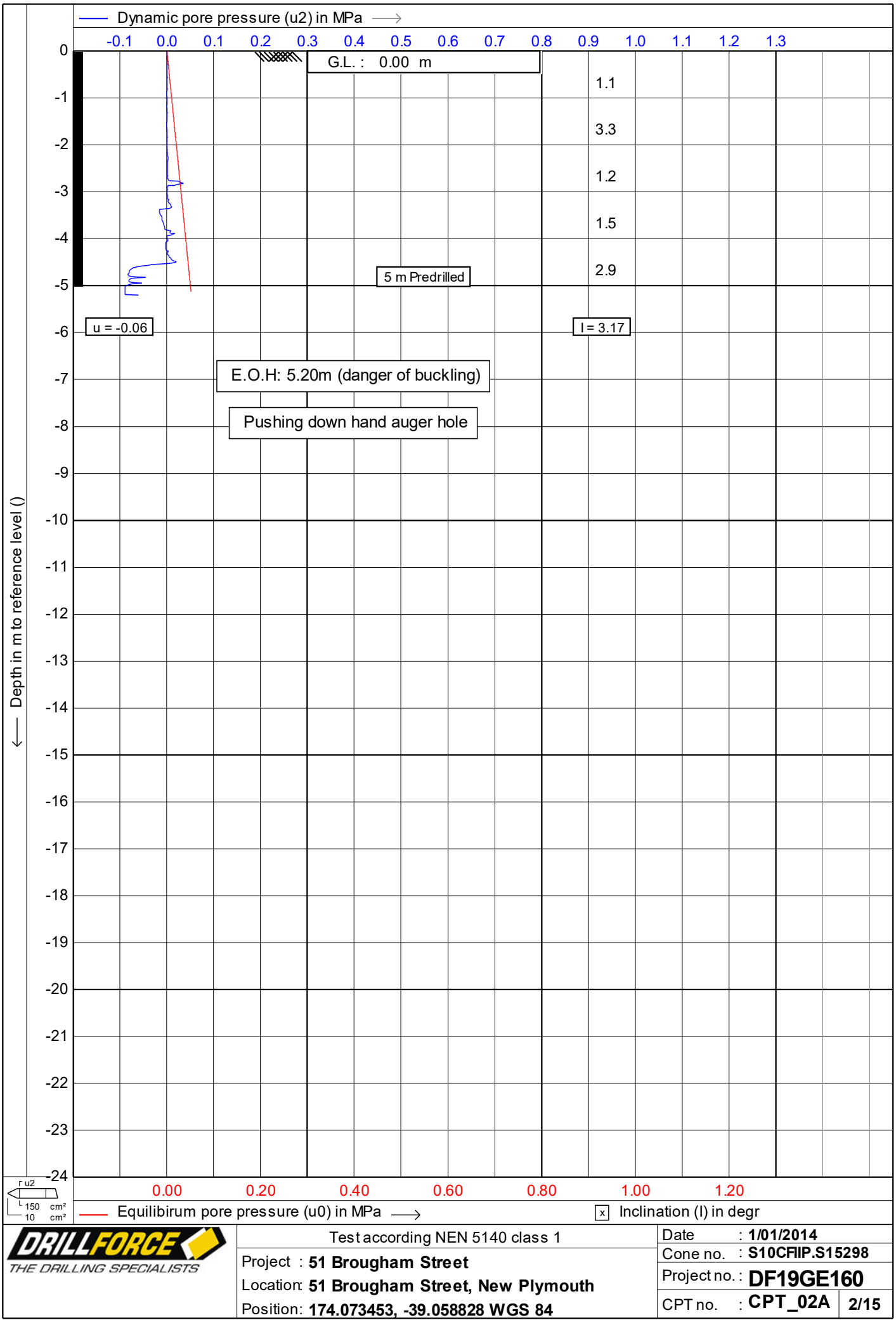
DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**
Location: **51 Brougham Street, New Plymouth**
Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **1/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

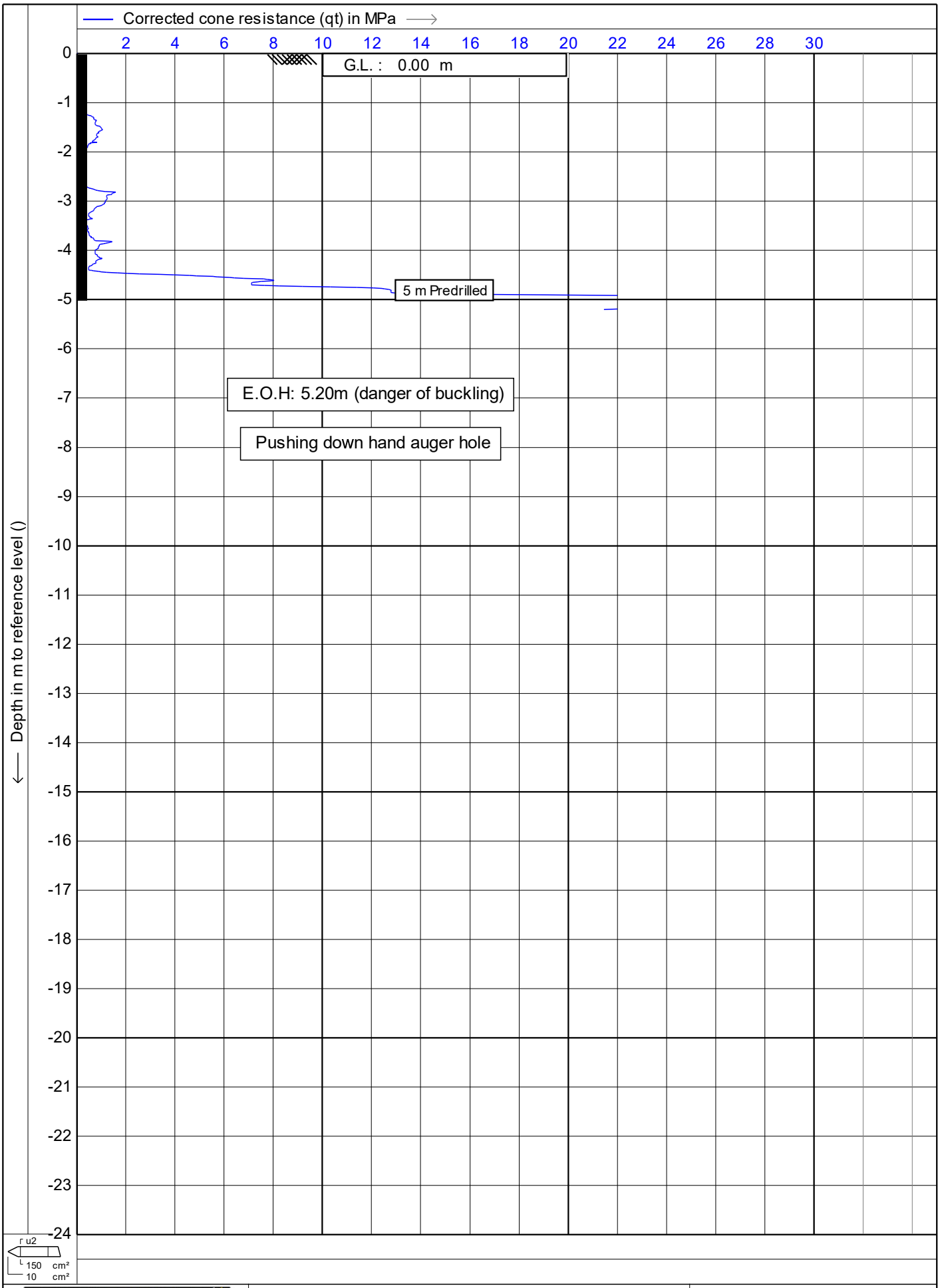
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **2/15**

1.47



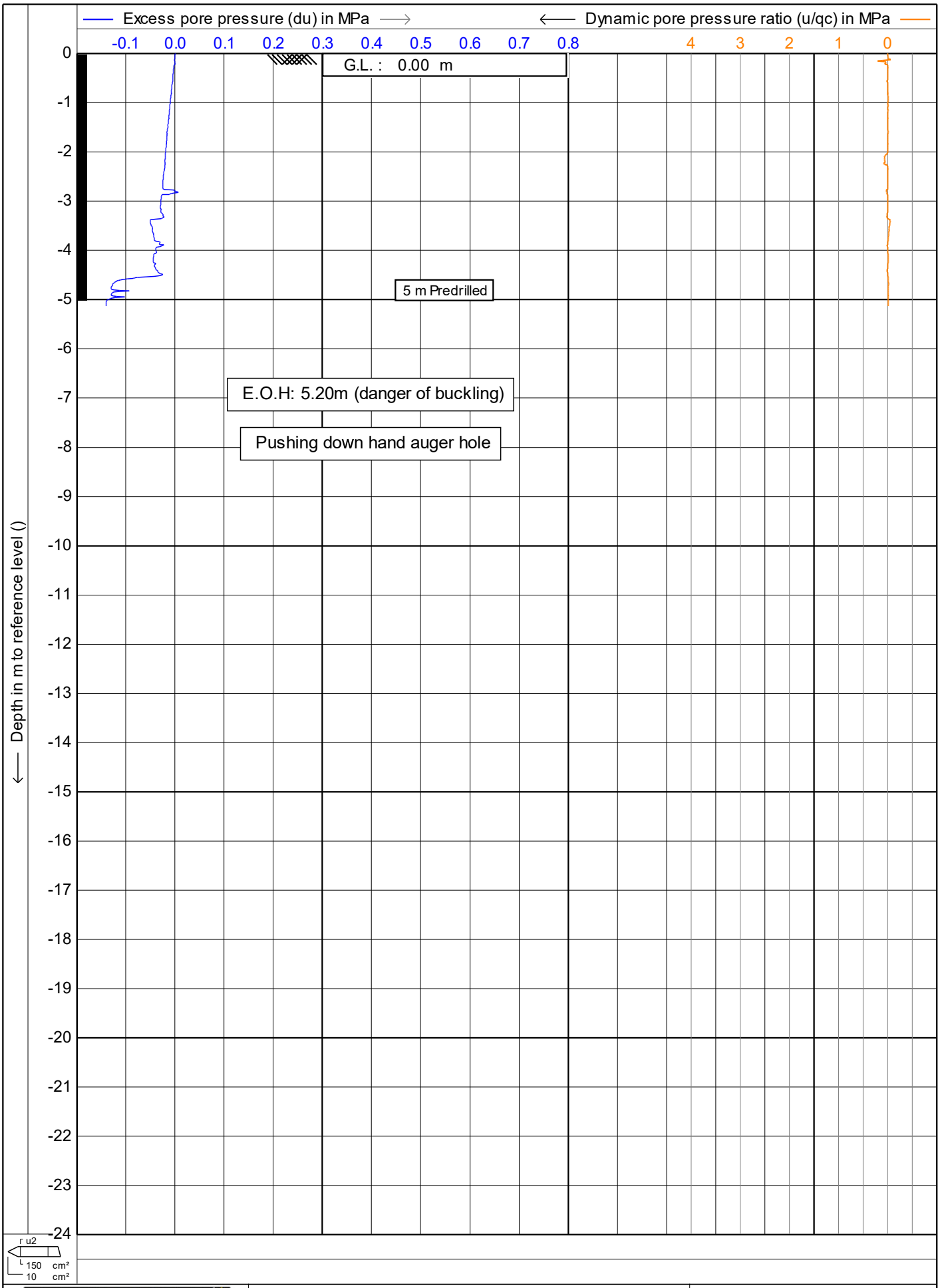
Test according NEN 5140 class 1

DRILLFORCE
THE DRILLING SPECIALISTS

Project : **51 Brougham Street**
Location: **51 Brougham Street, New Plymouth**
Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **3/15**

1.47



DRILLFORCE
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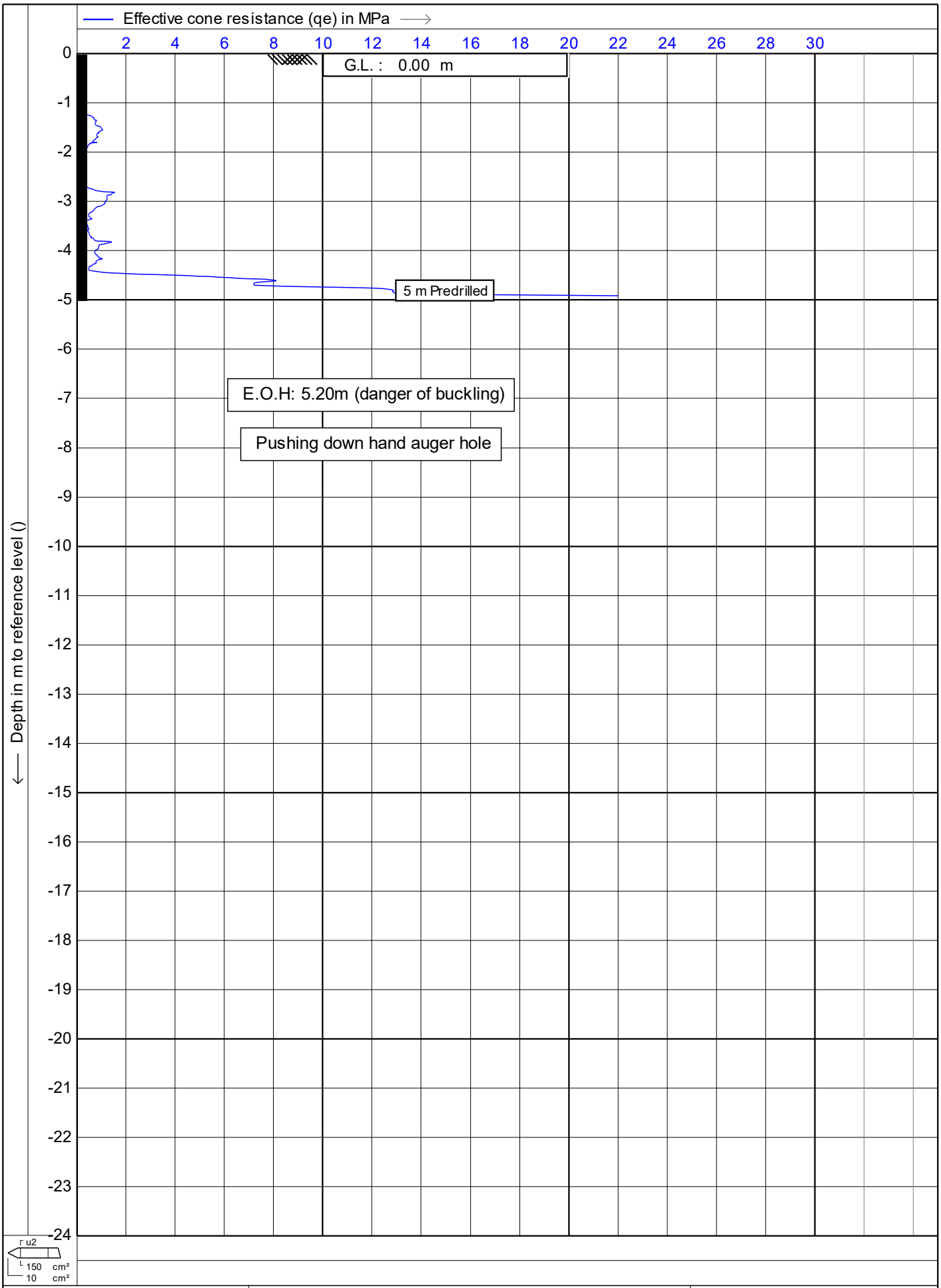
Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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Project : **51 Brougham Street**

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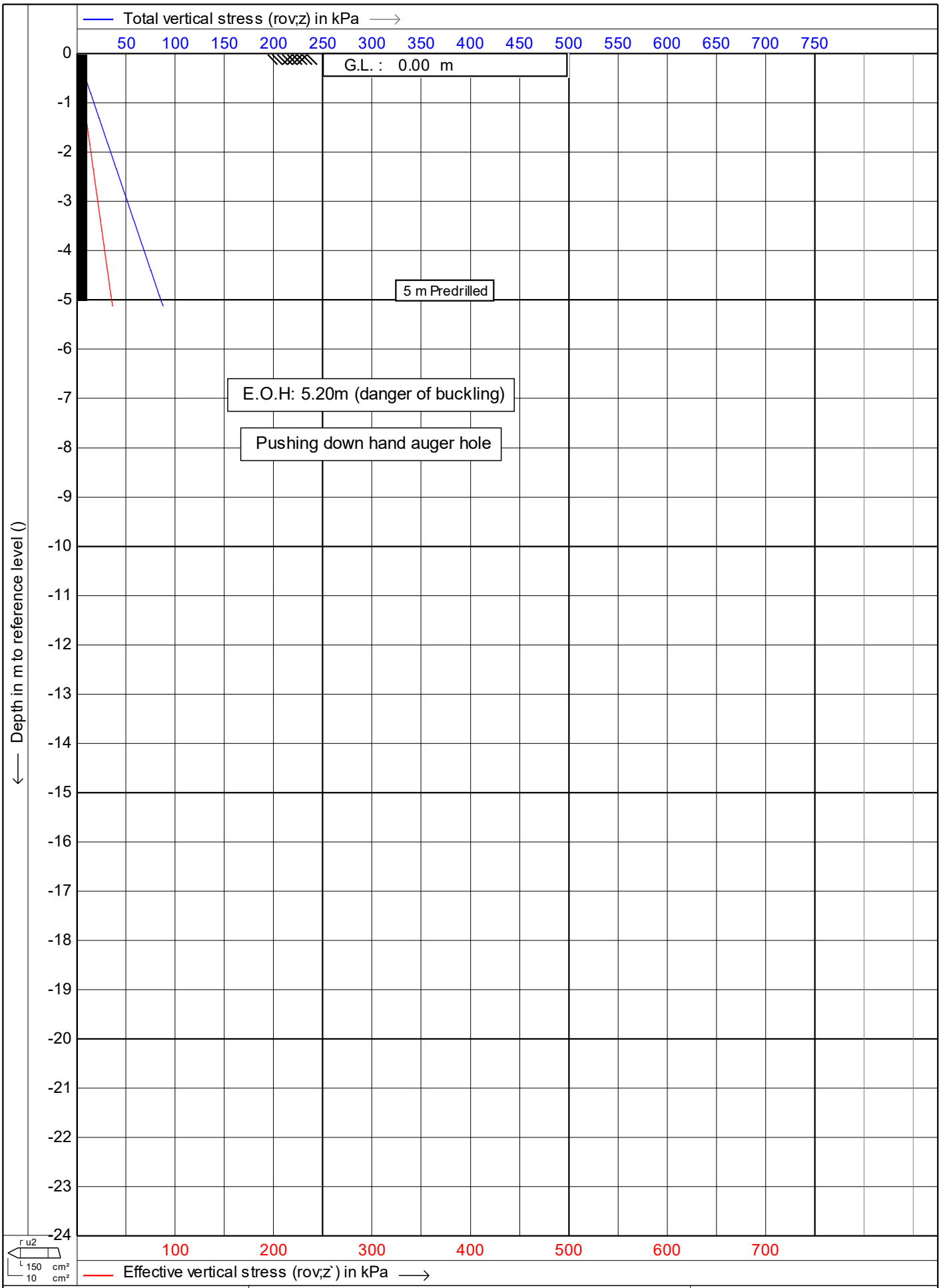
Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **5/15**

1.47



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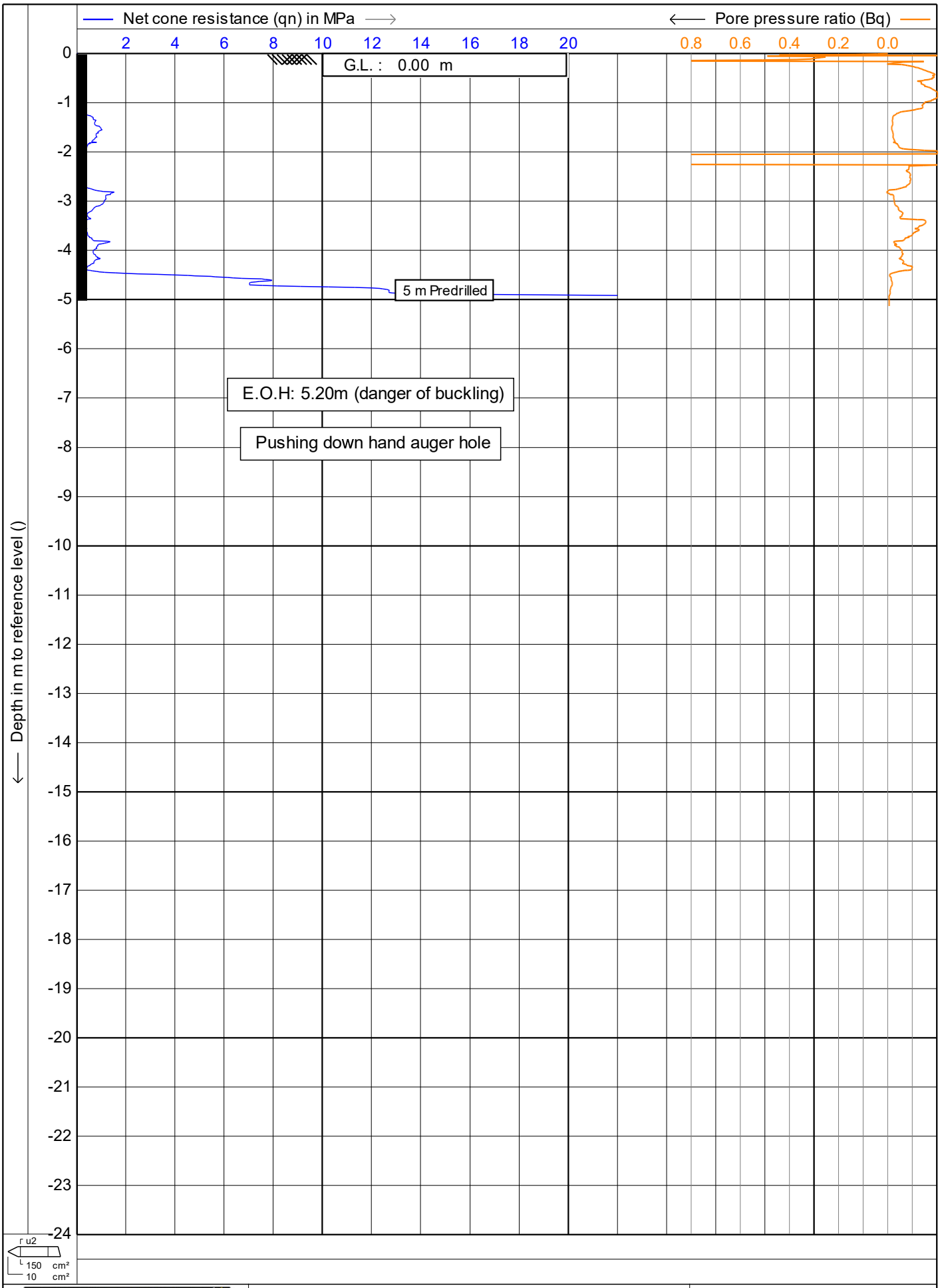
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

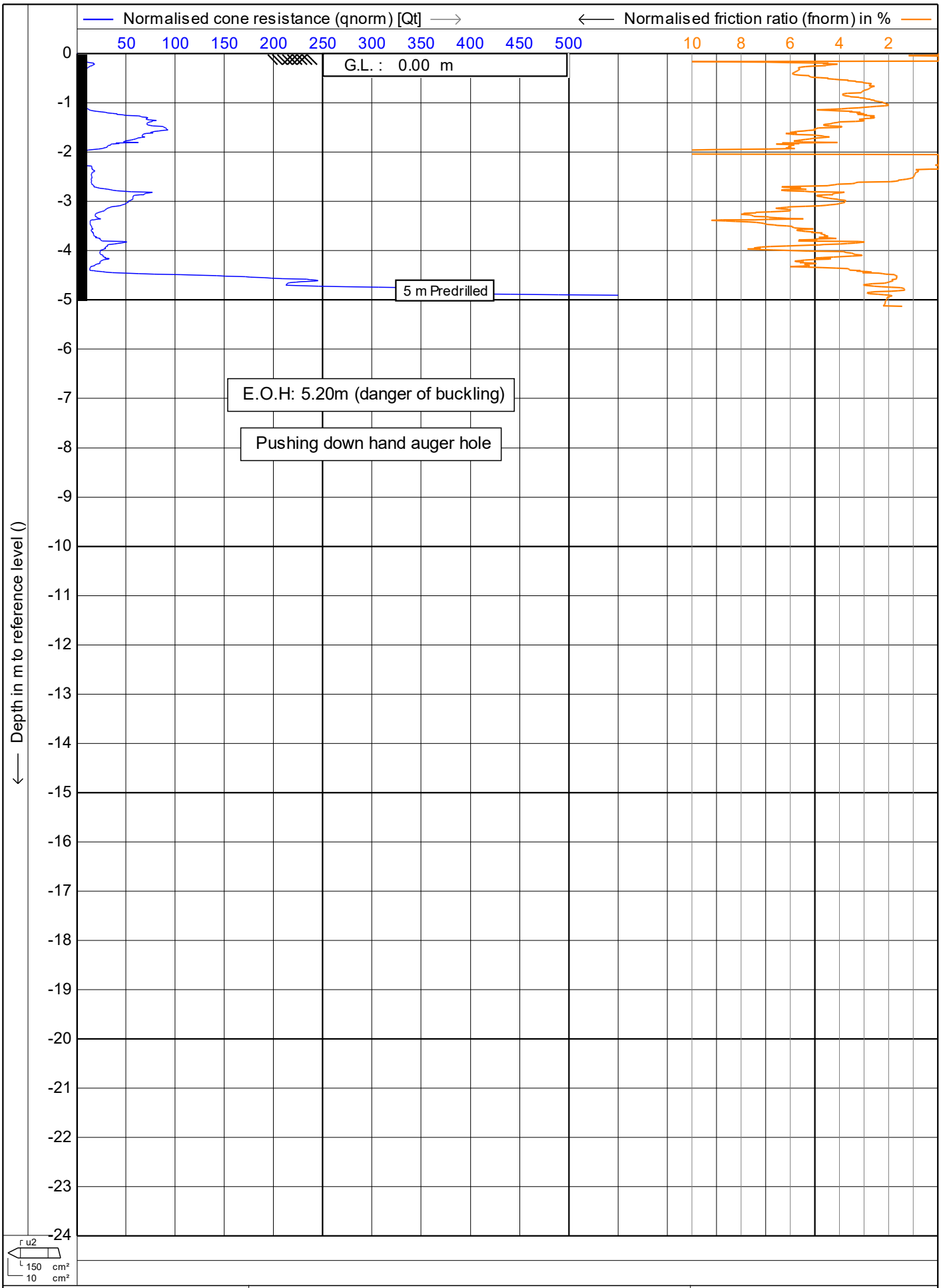
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **7/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

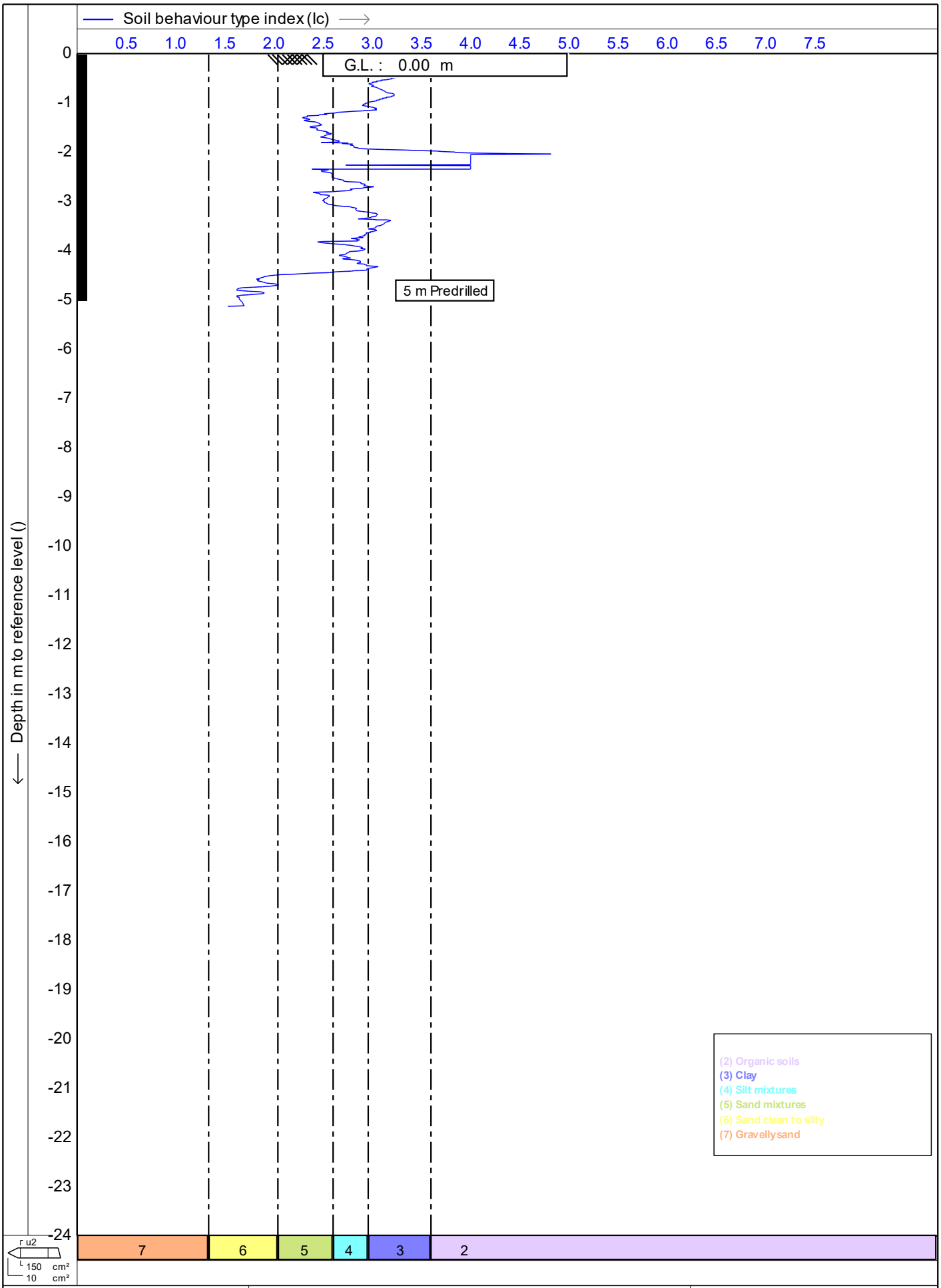
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

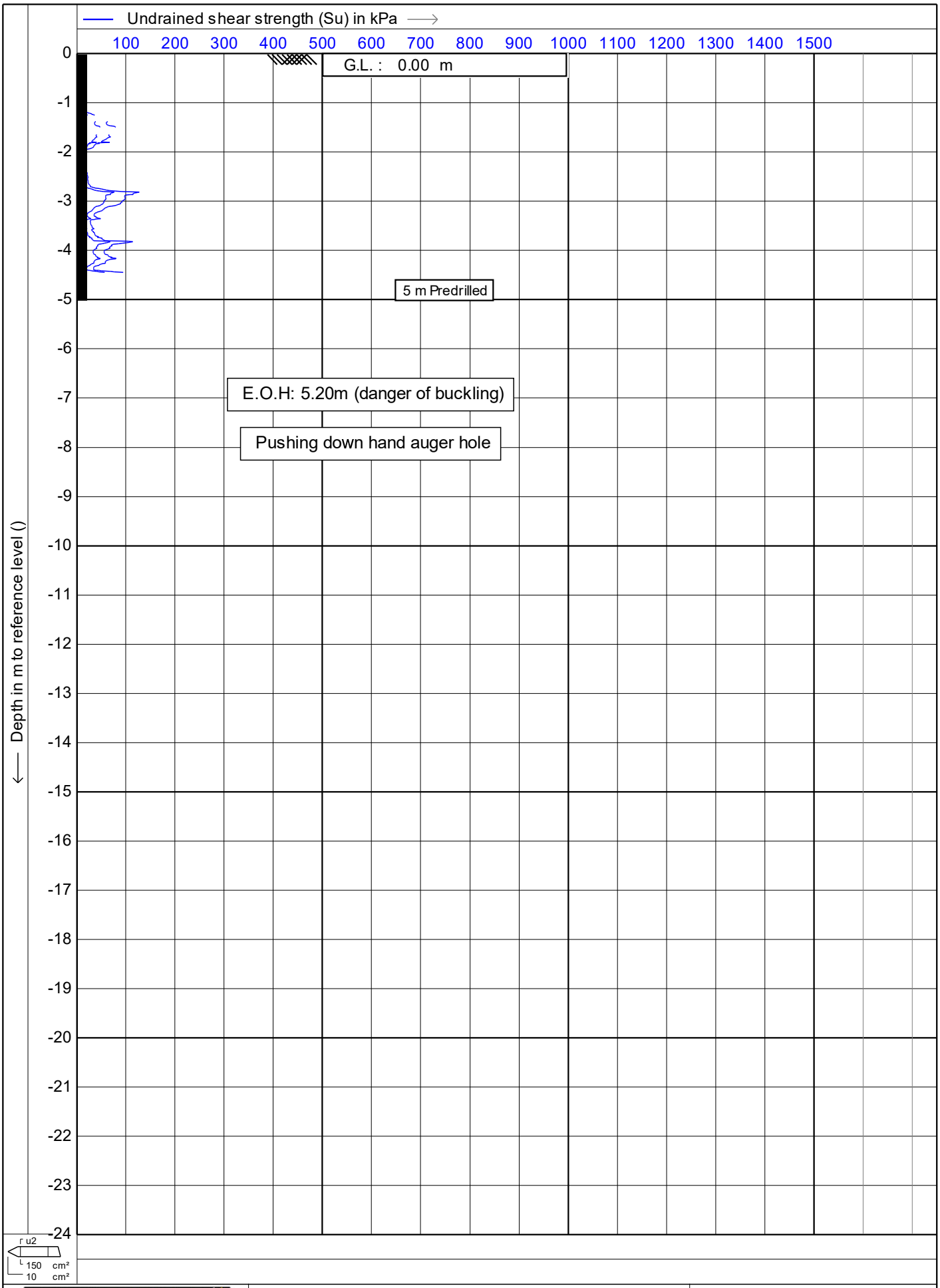
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **10/15**

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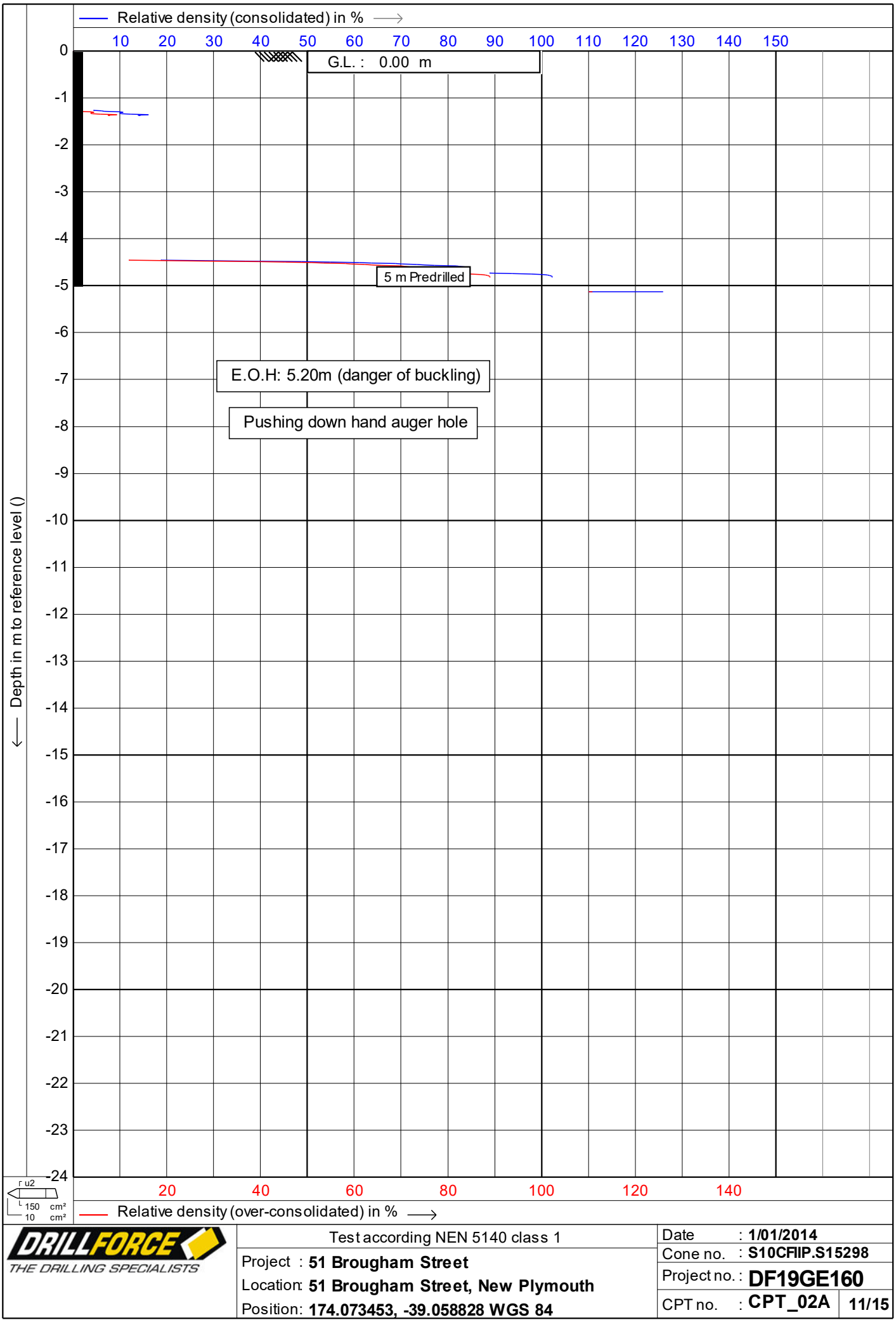


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

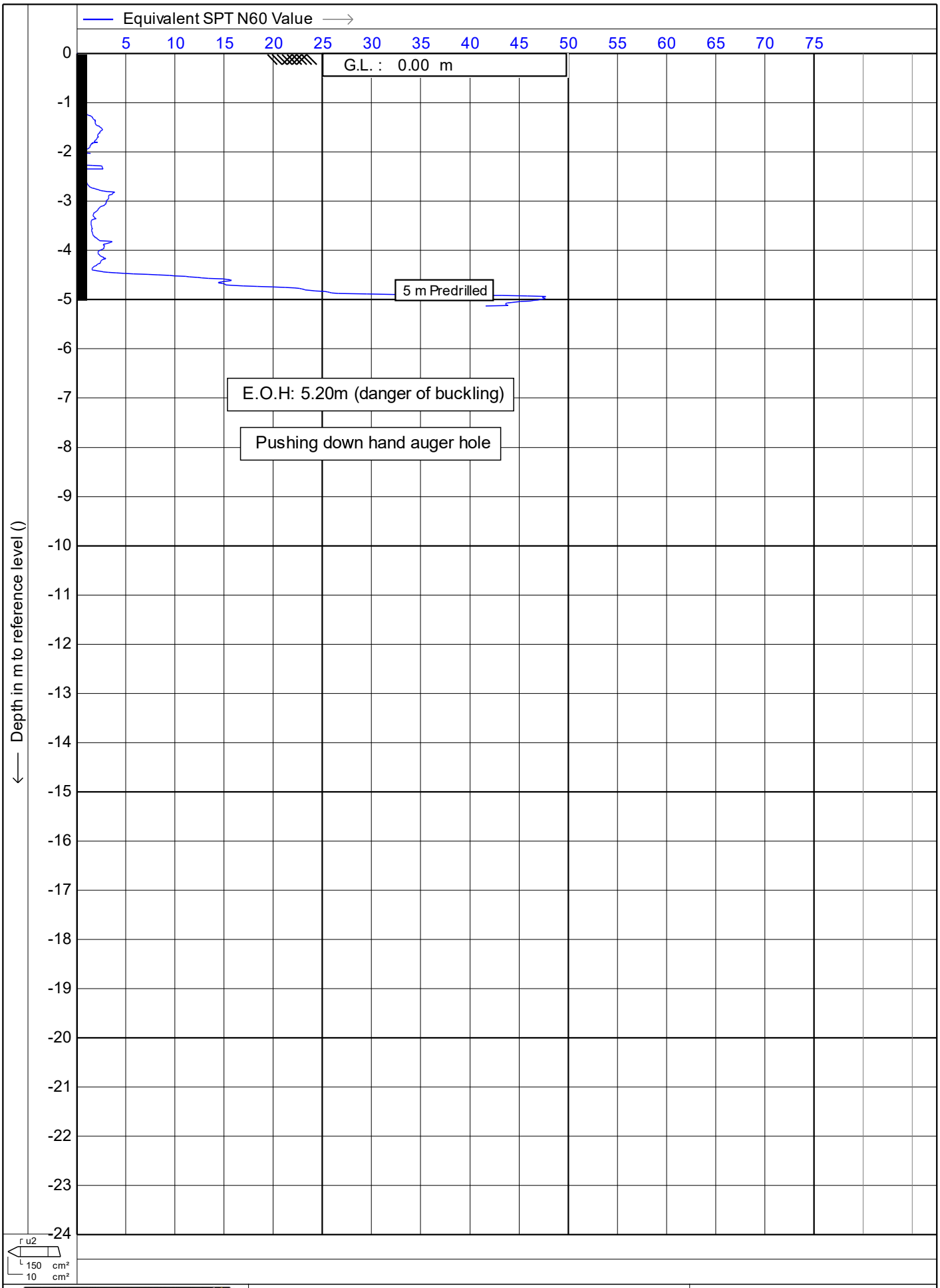
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **11/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

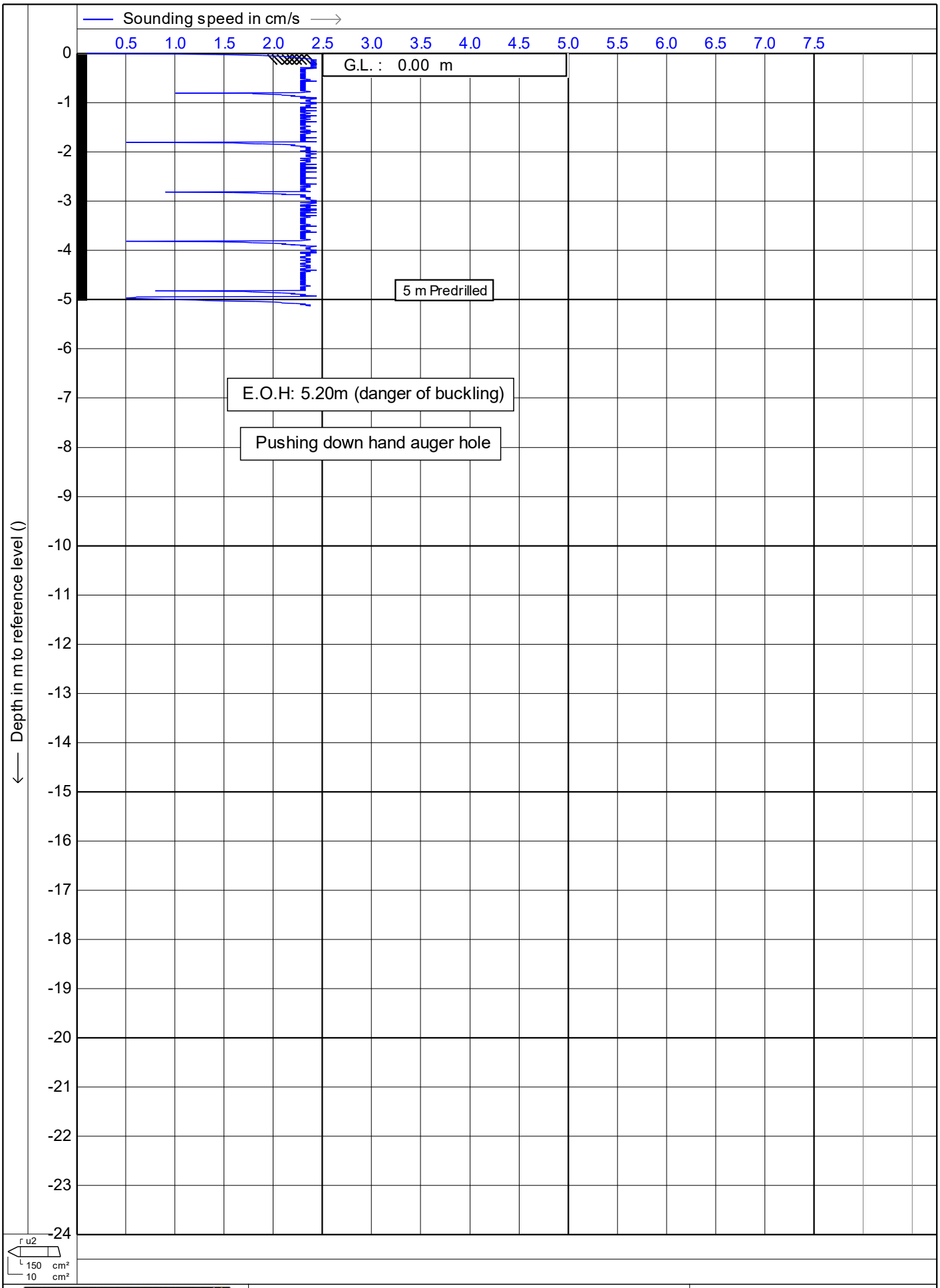
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **12/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
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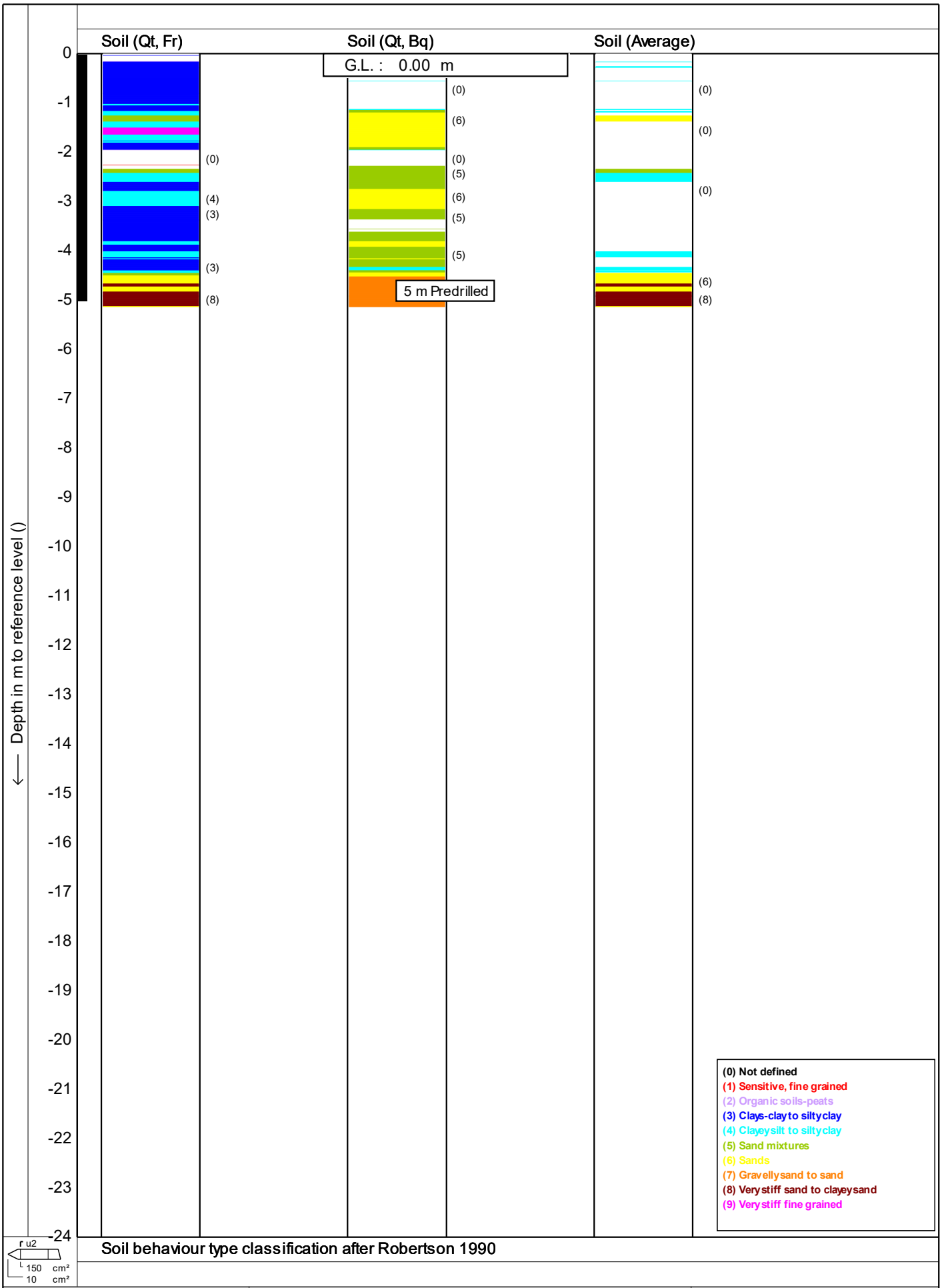
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A**

1.47



Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

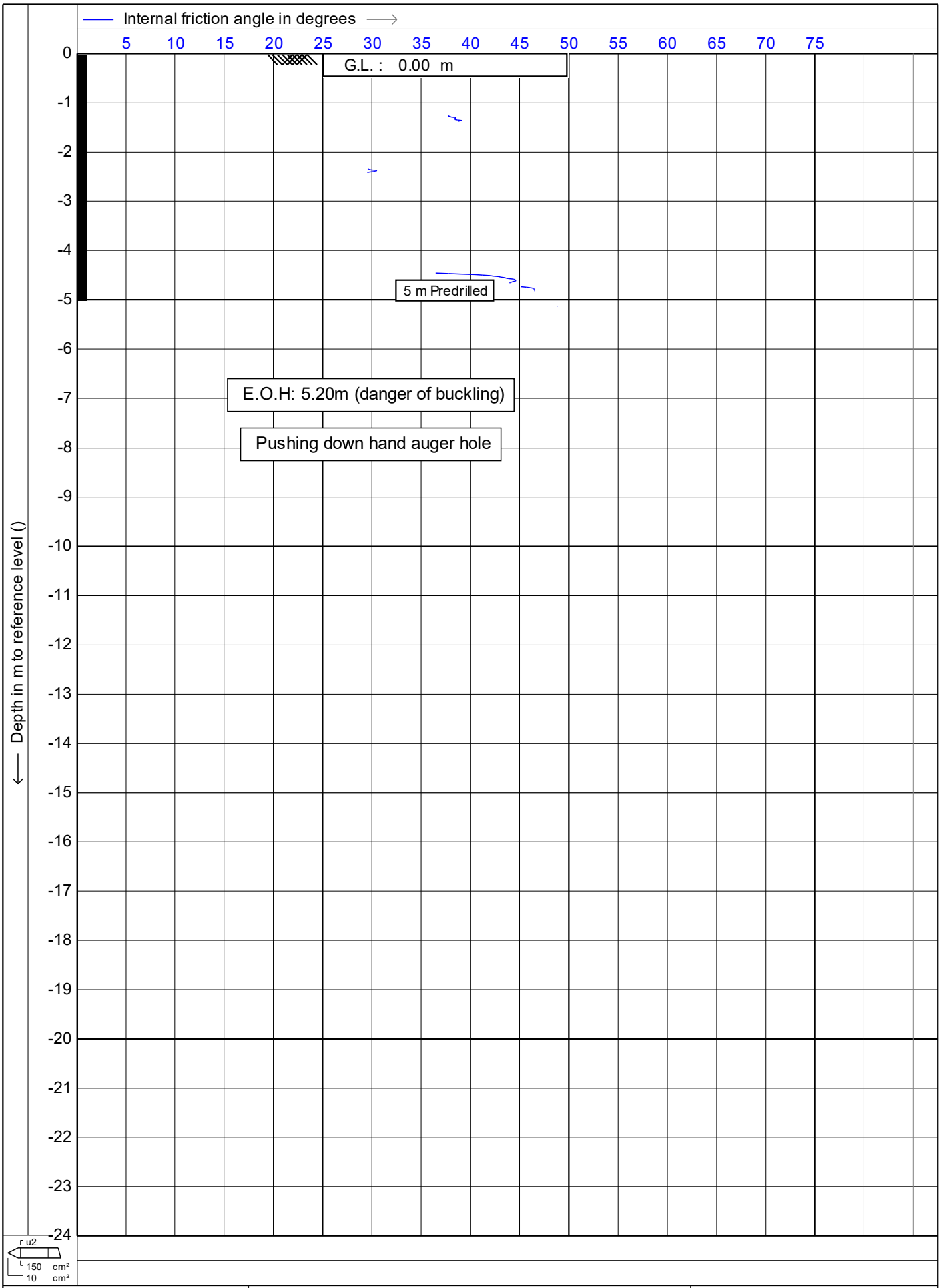
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **14/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

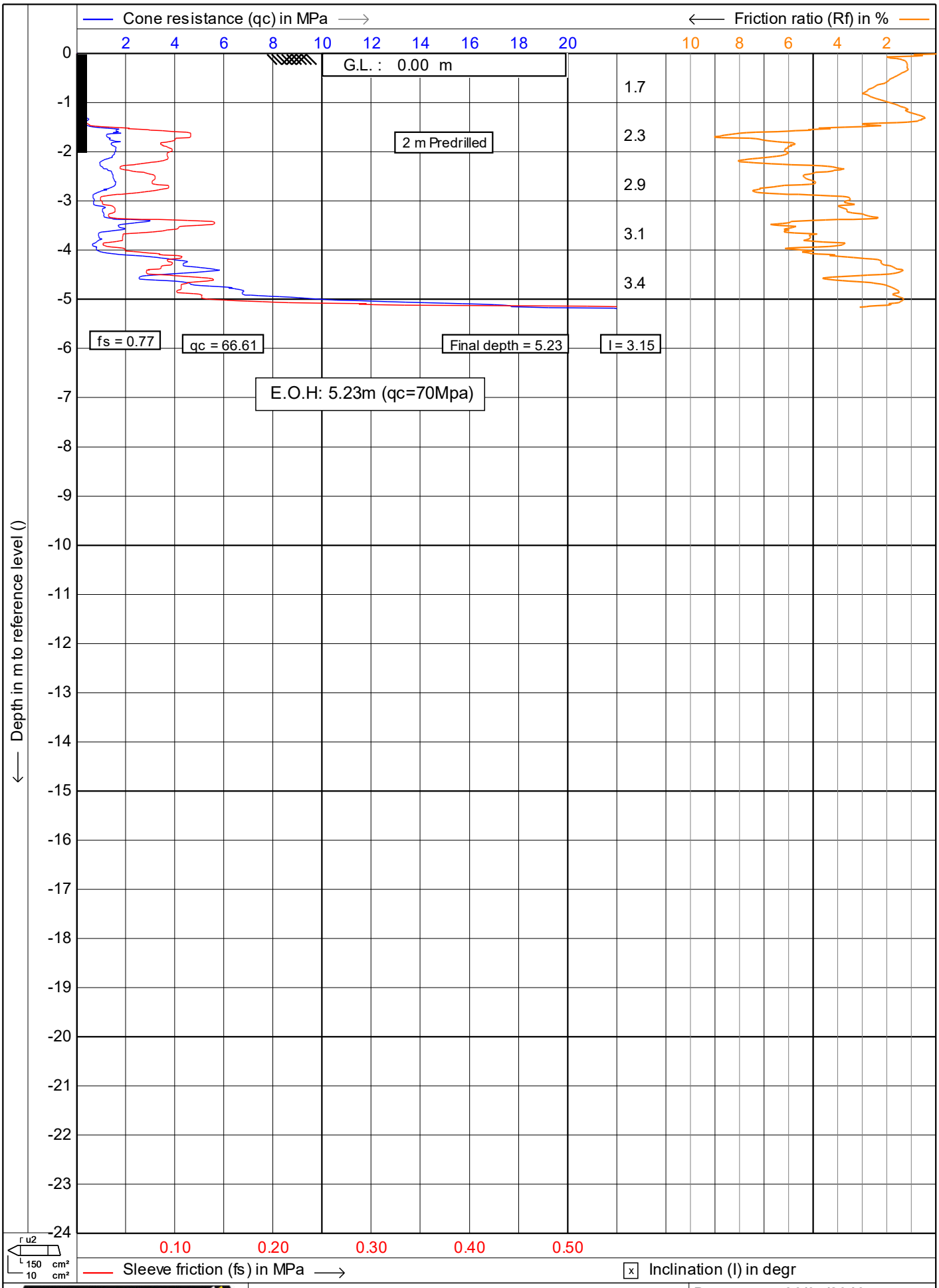
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073453, -39.058828 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_02A** **15/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

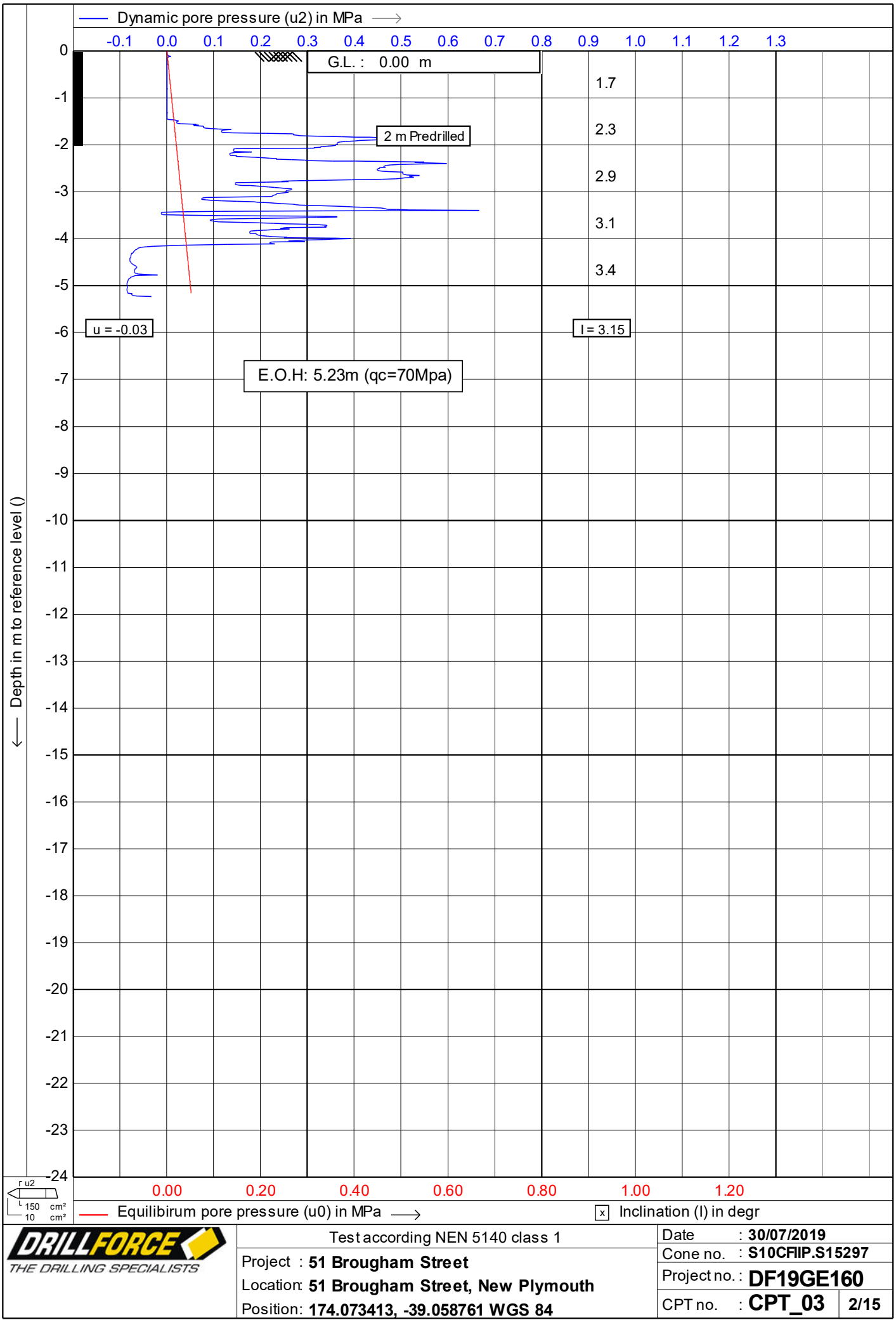
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** 1/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

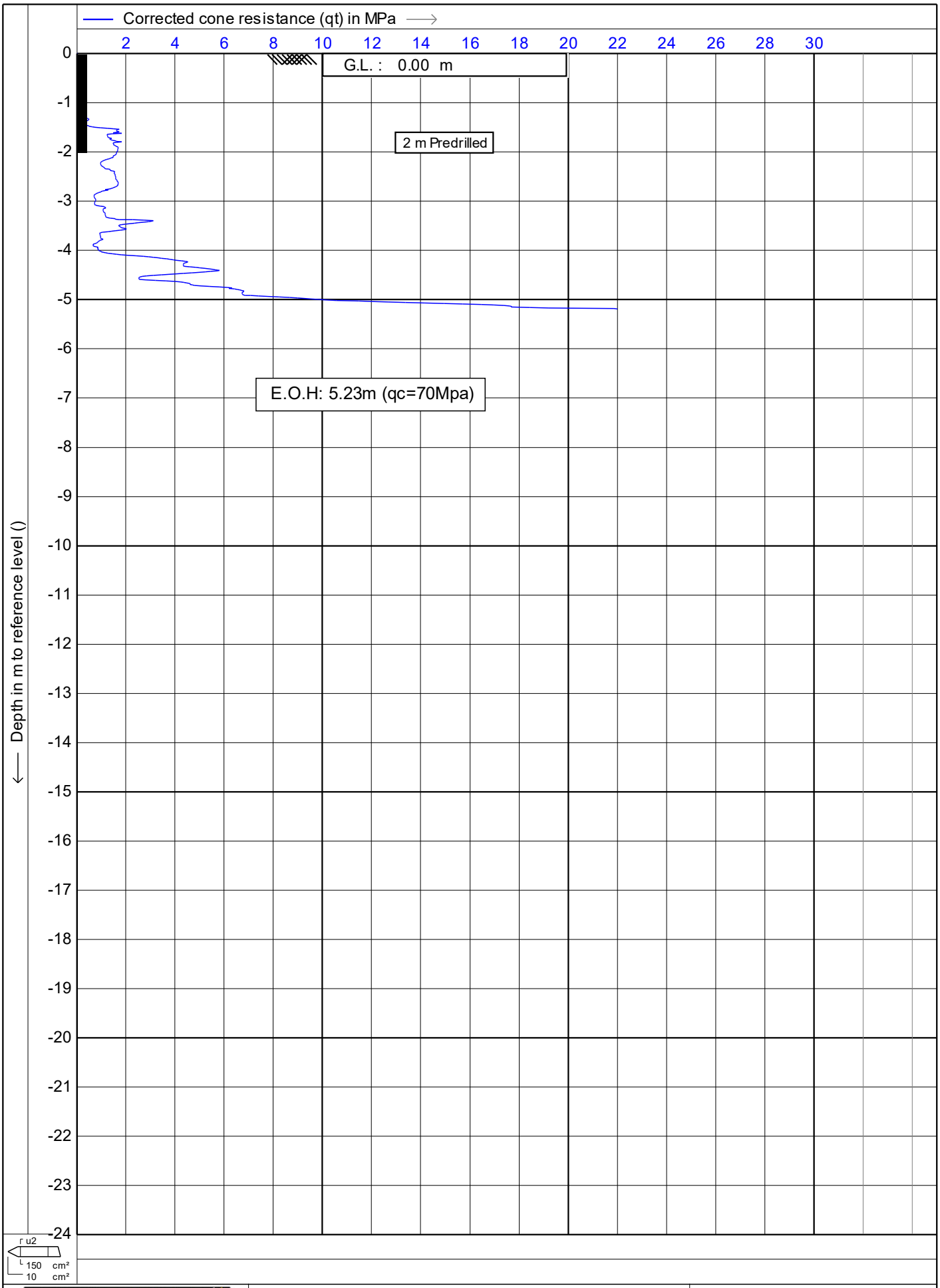
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

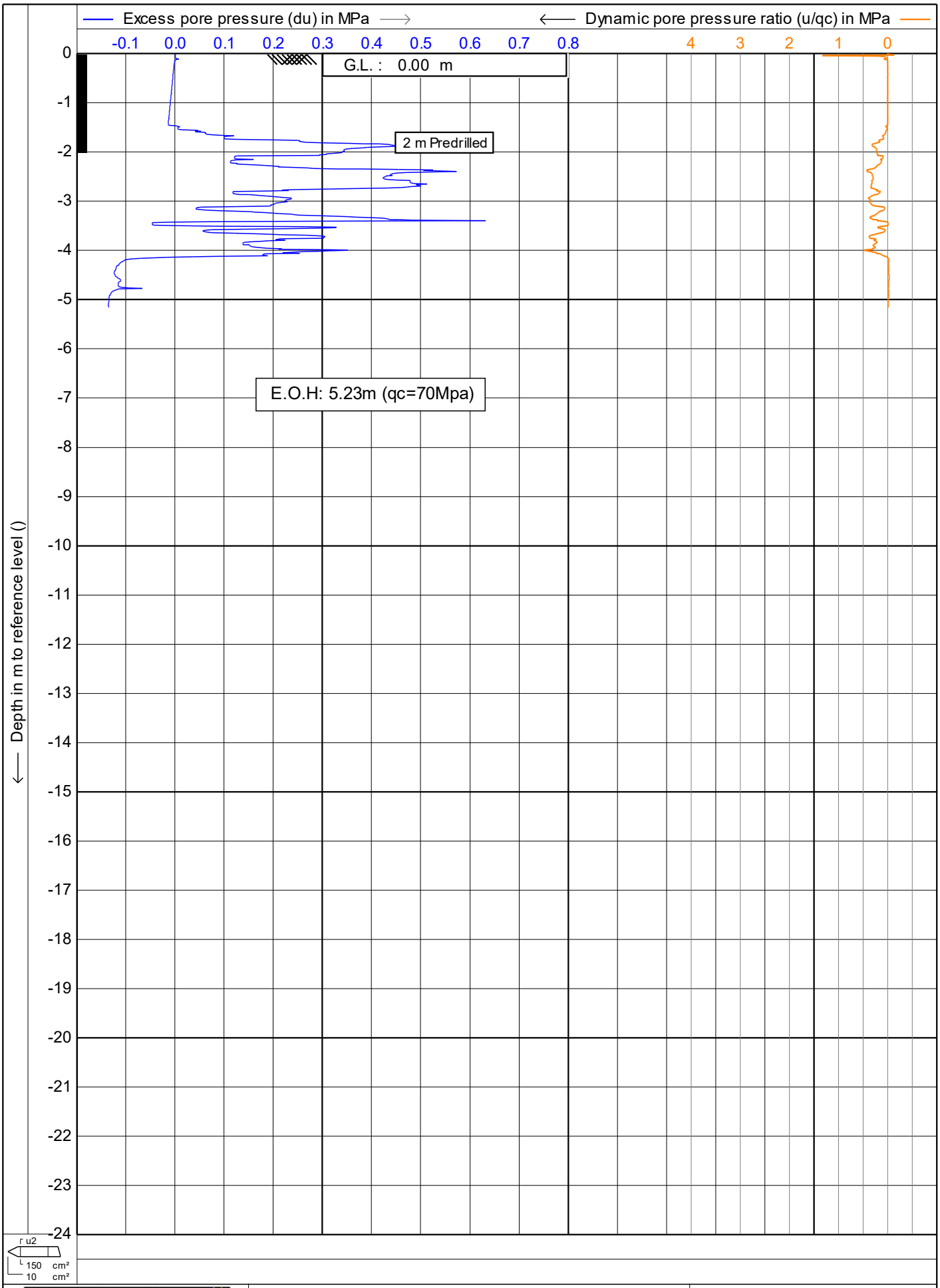
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **3/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

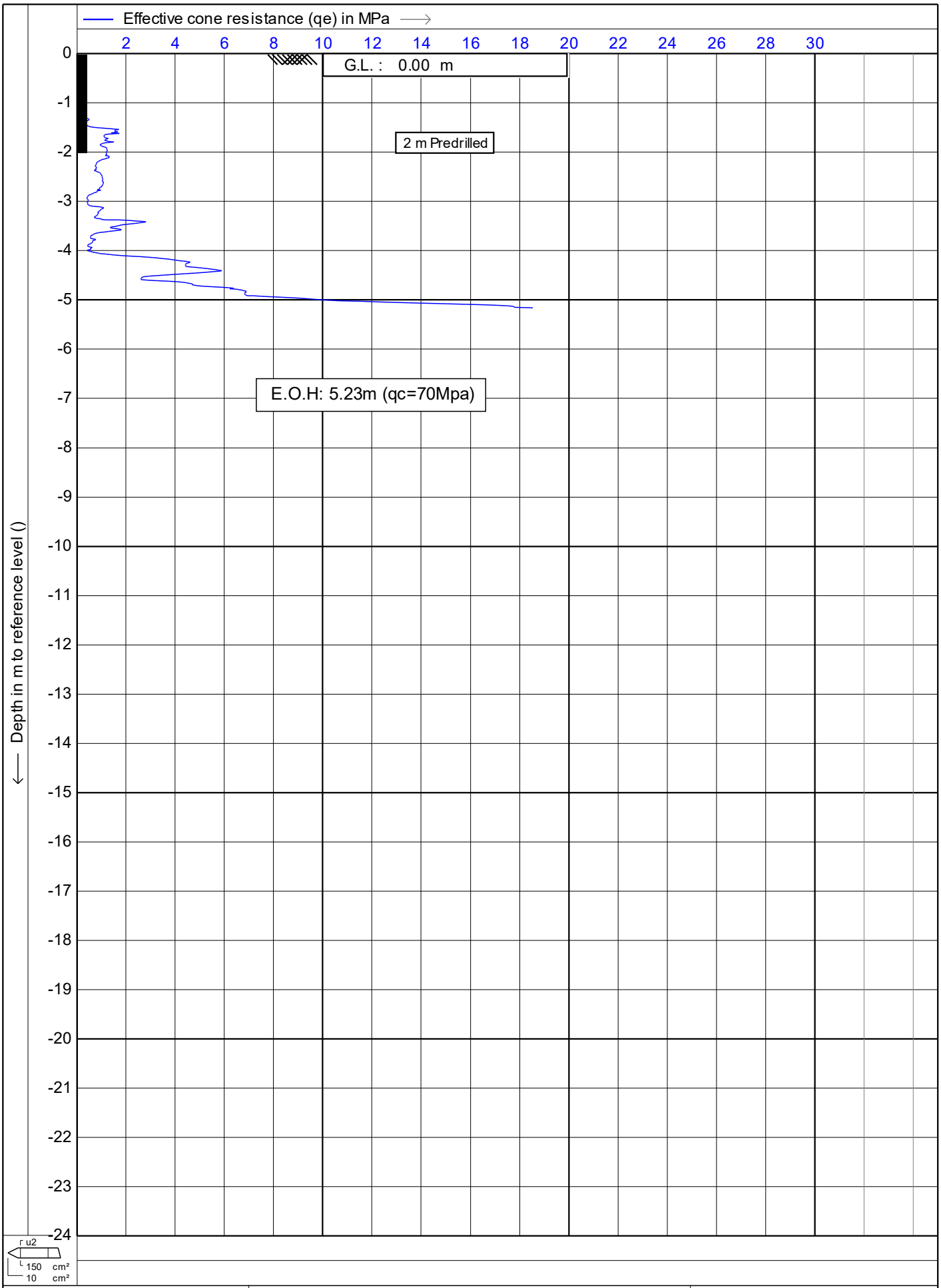
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

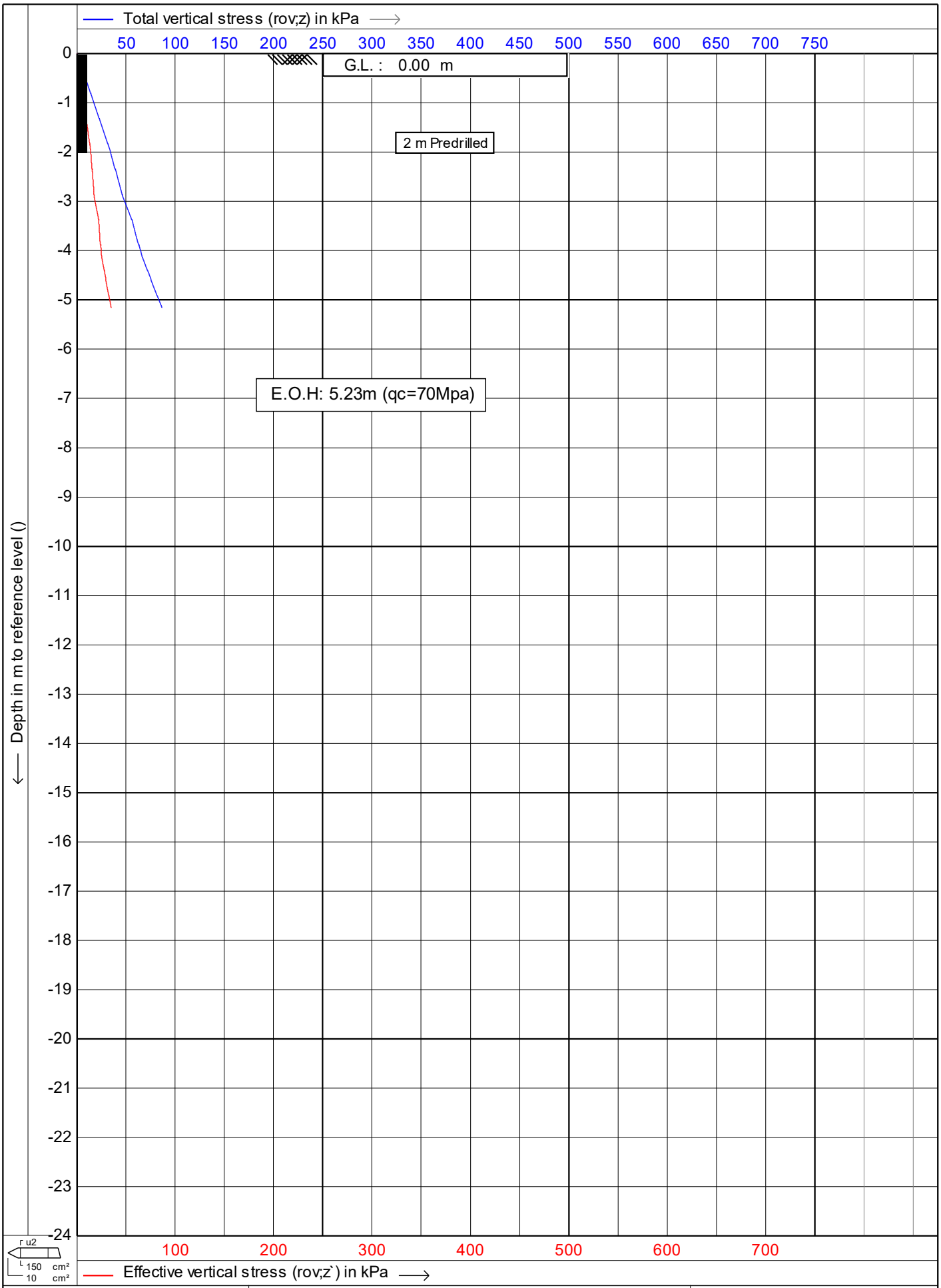
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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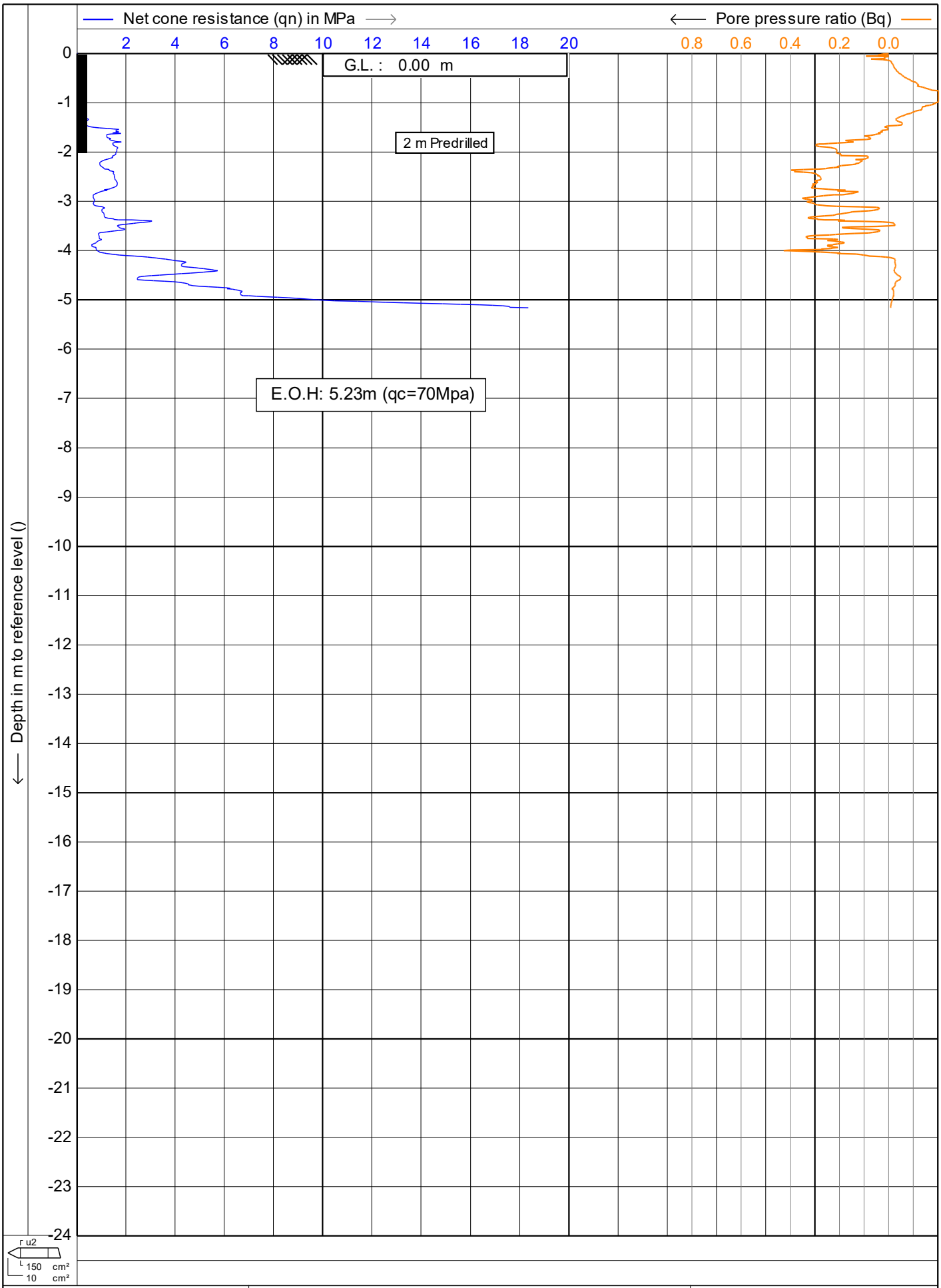
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

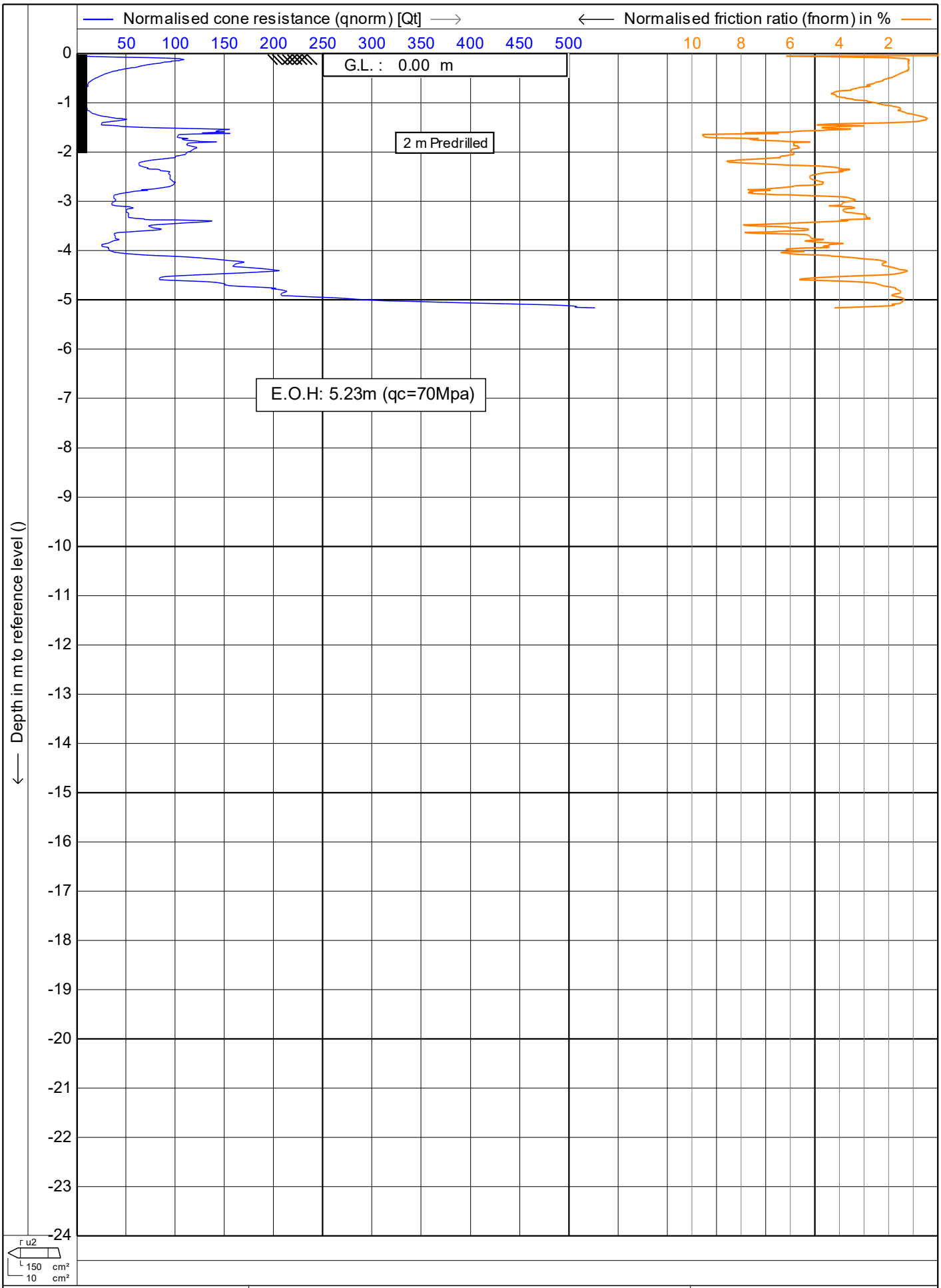
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** 7/15

1.47



DRILLFORCE
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Test according NEN 5140 class 1

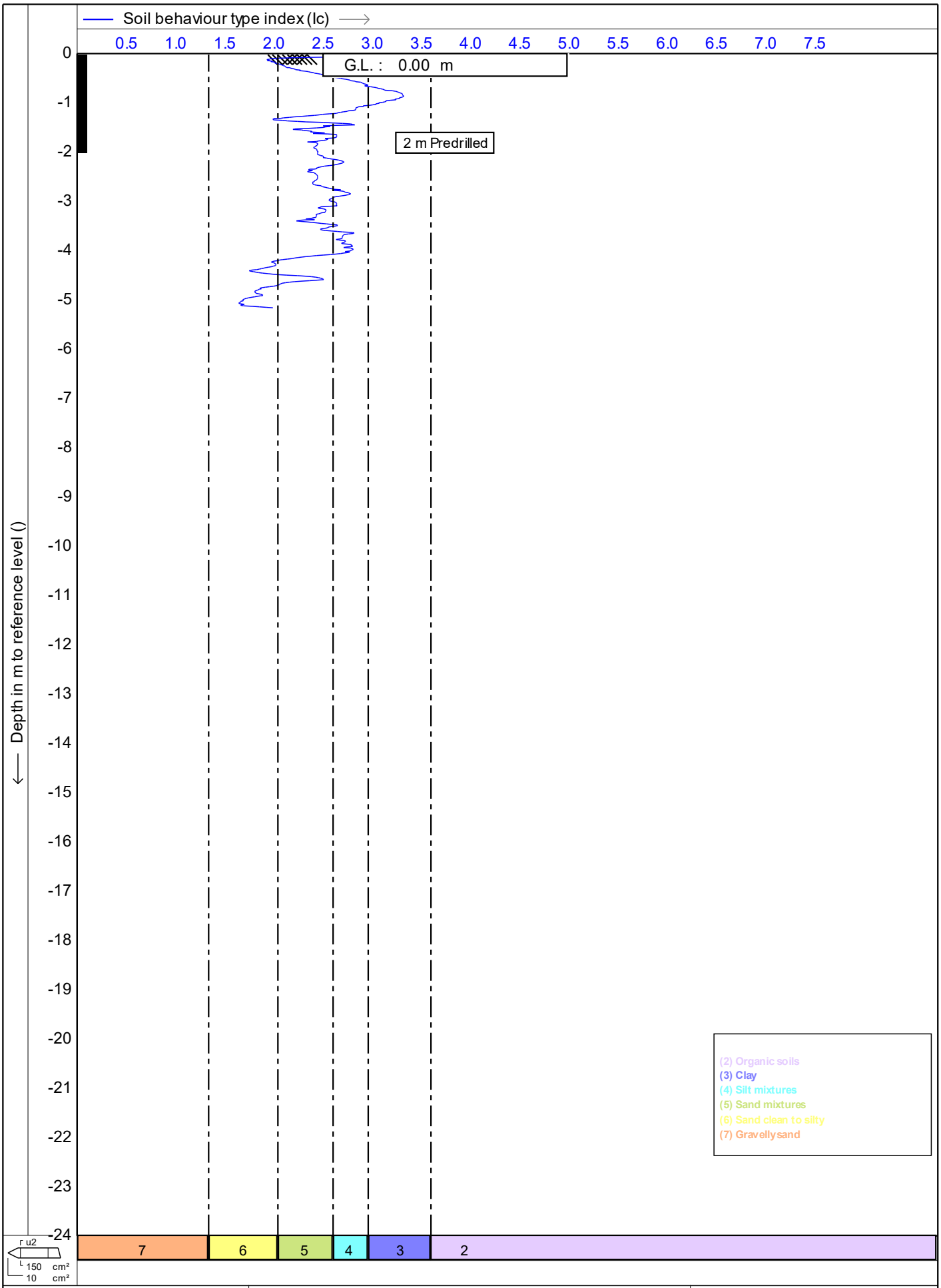
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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Location: **51 Brougham Street, New Plymouth**

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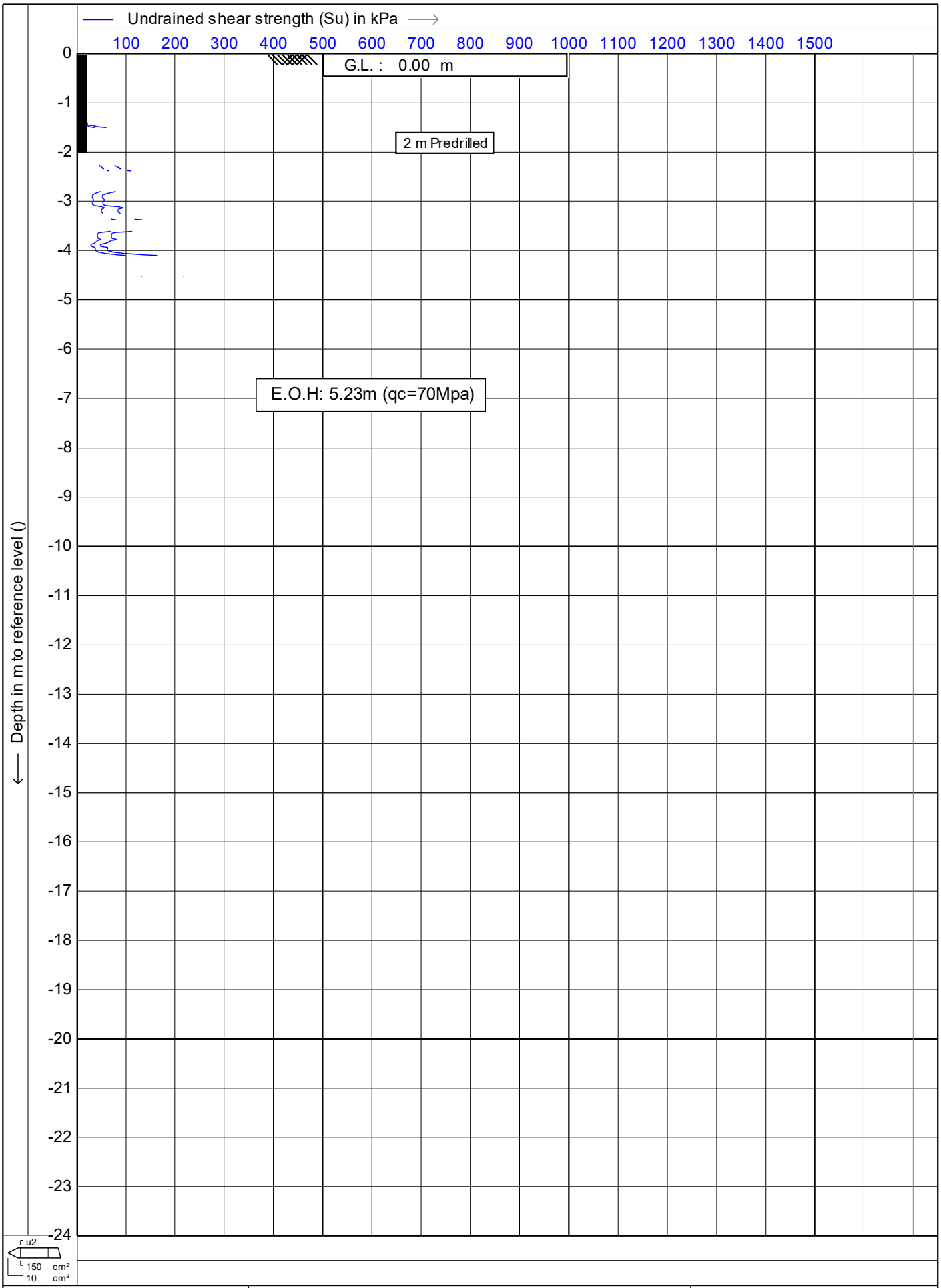
Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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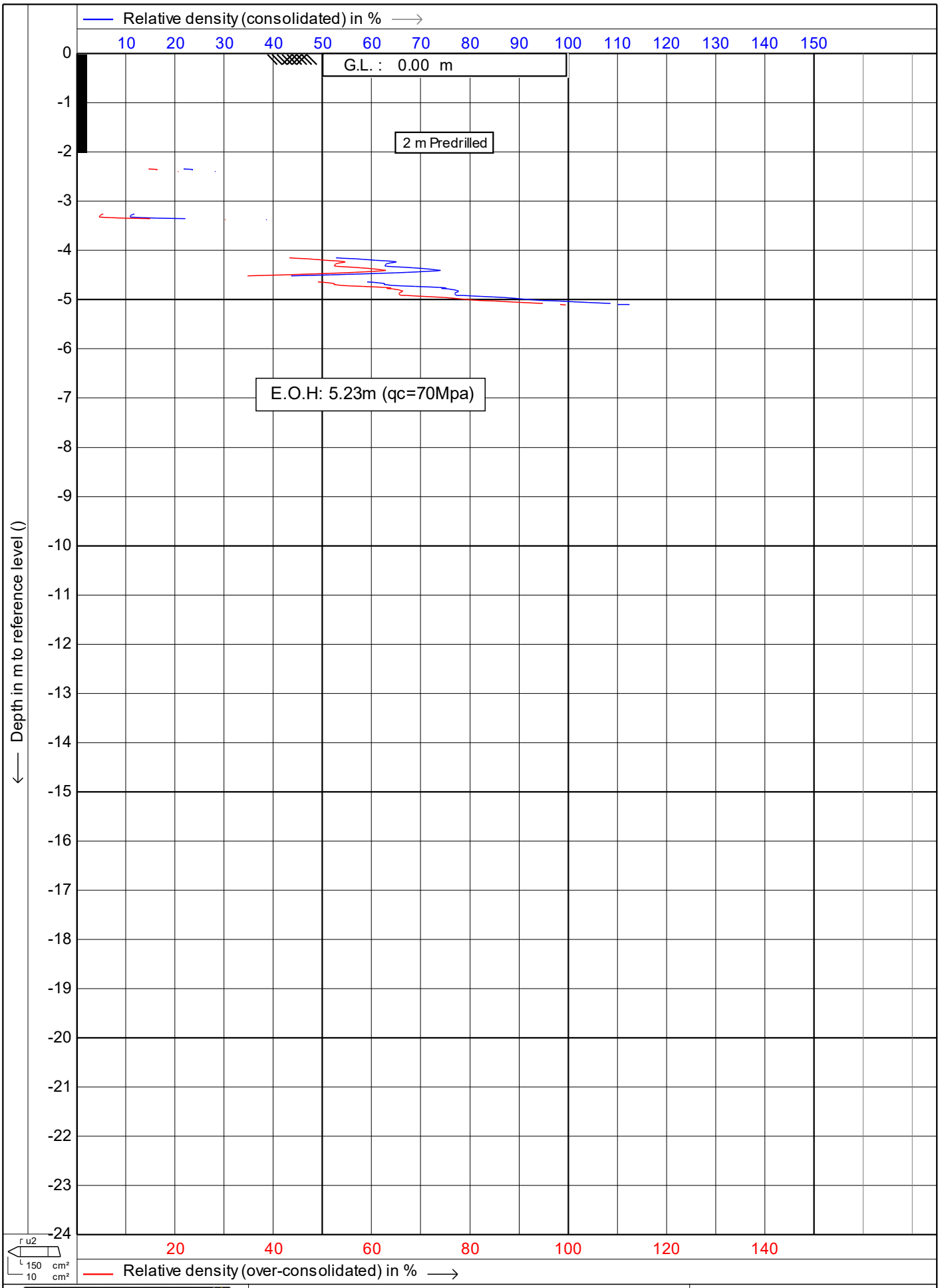
Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **10/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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Location: **51 Brougham Street, New Plymouth**

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Date	: **30/07/2019**
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Project no.	: **DF19GE160**
CPT no.	: **CPT_03**

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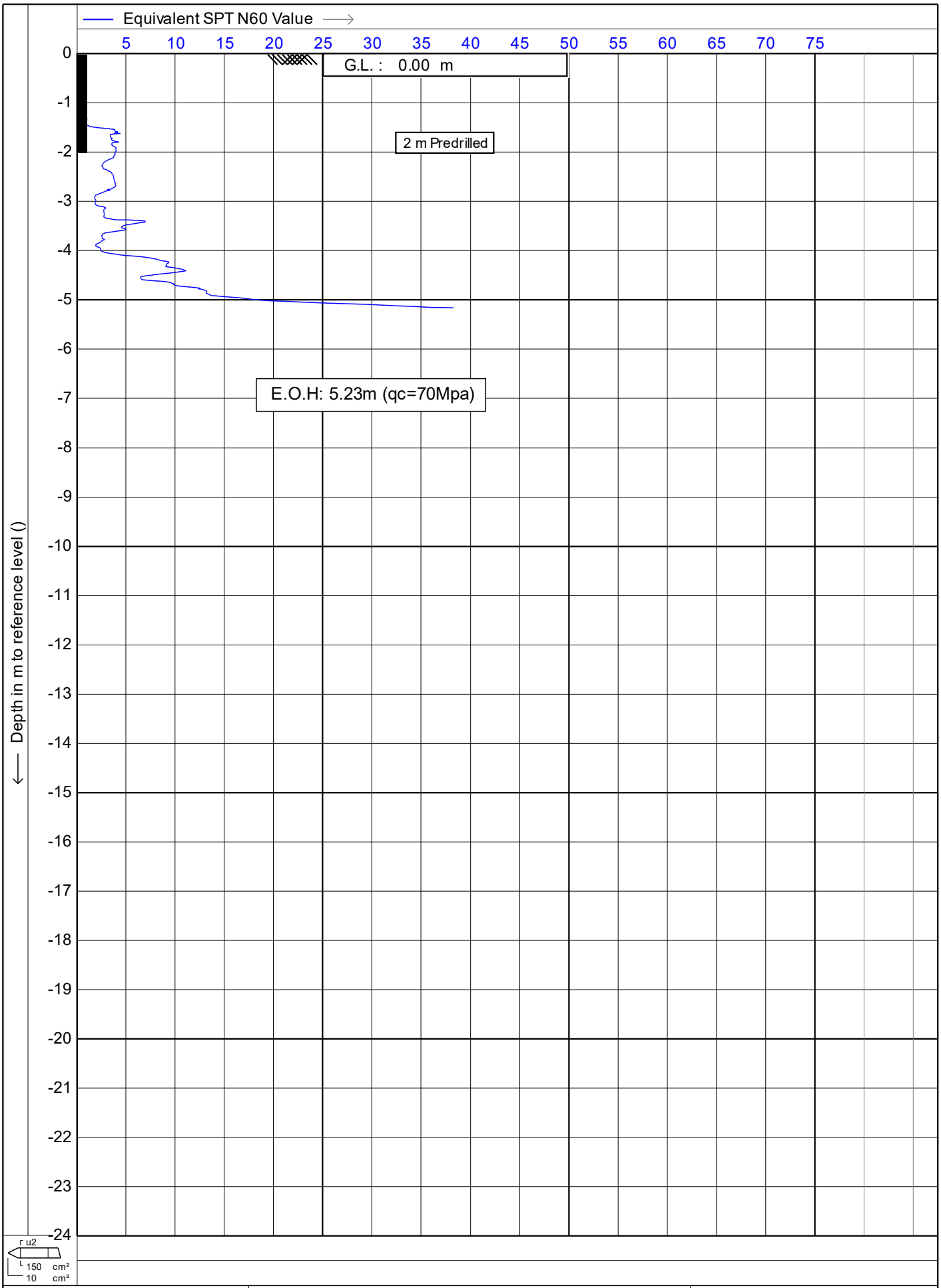


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

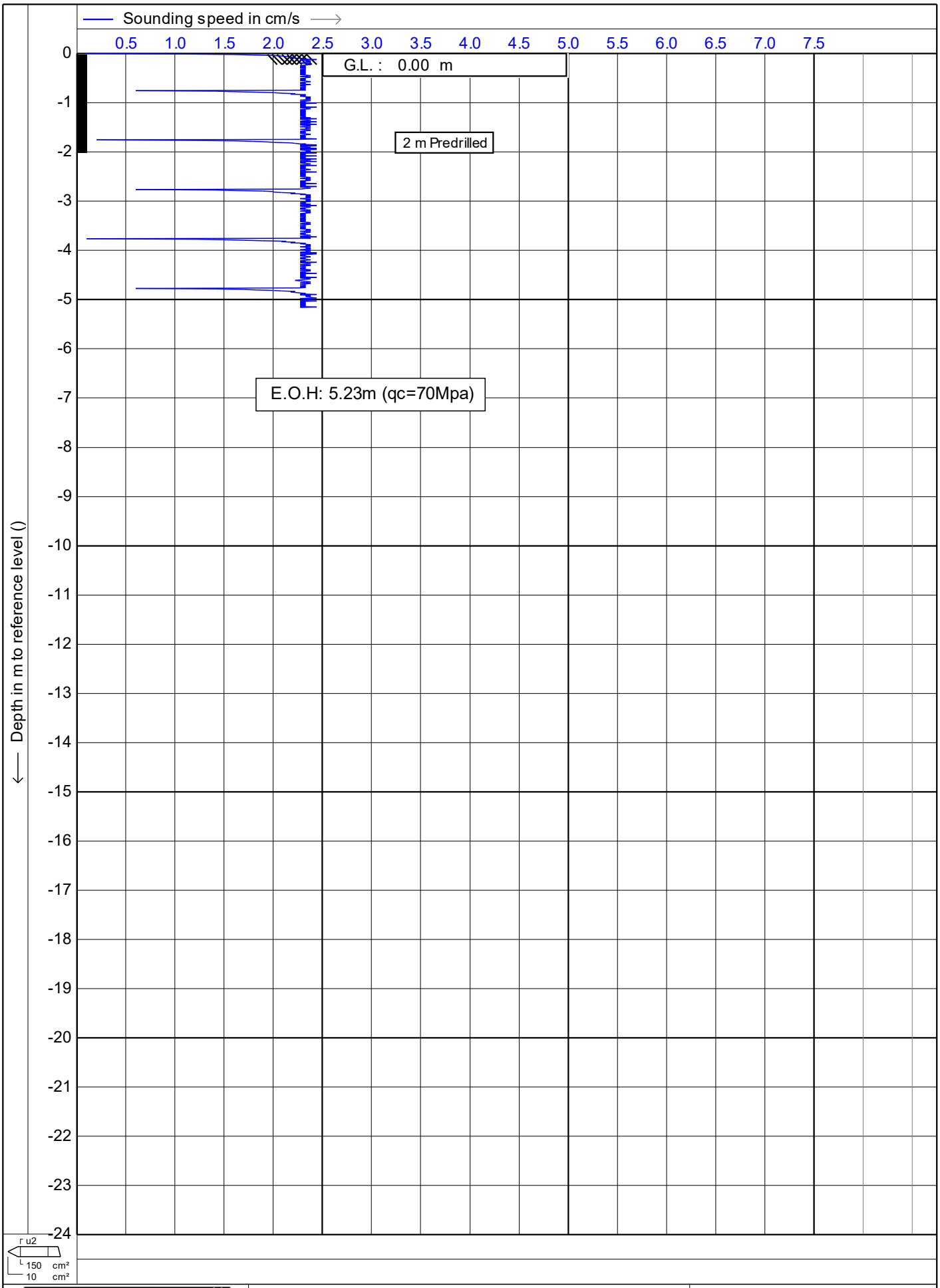
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** 12/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **30/07/2019**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **13/15**

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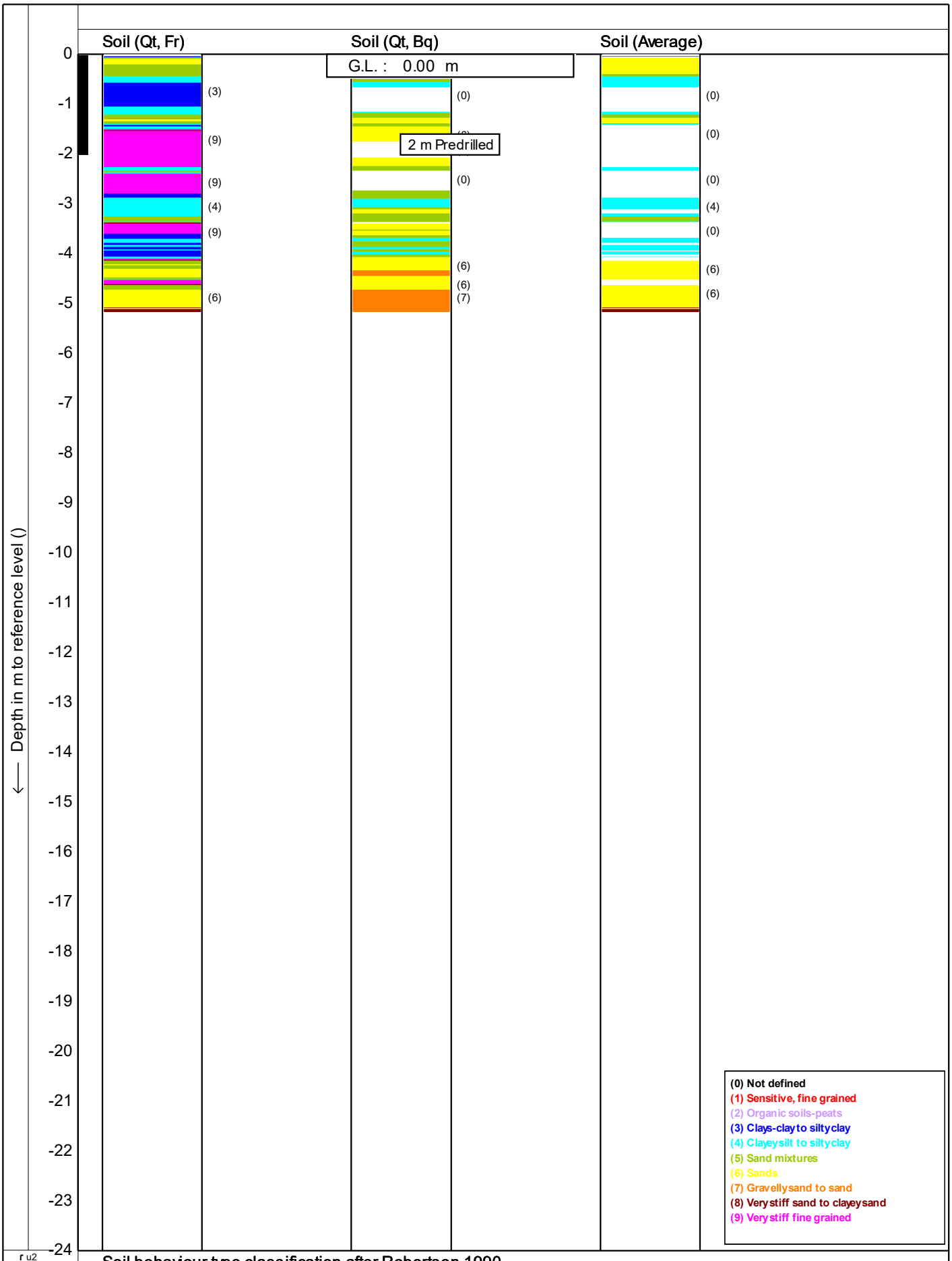

Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

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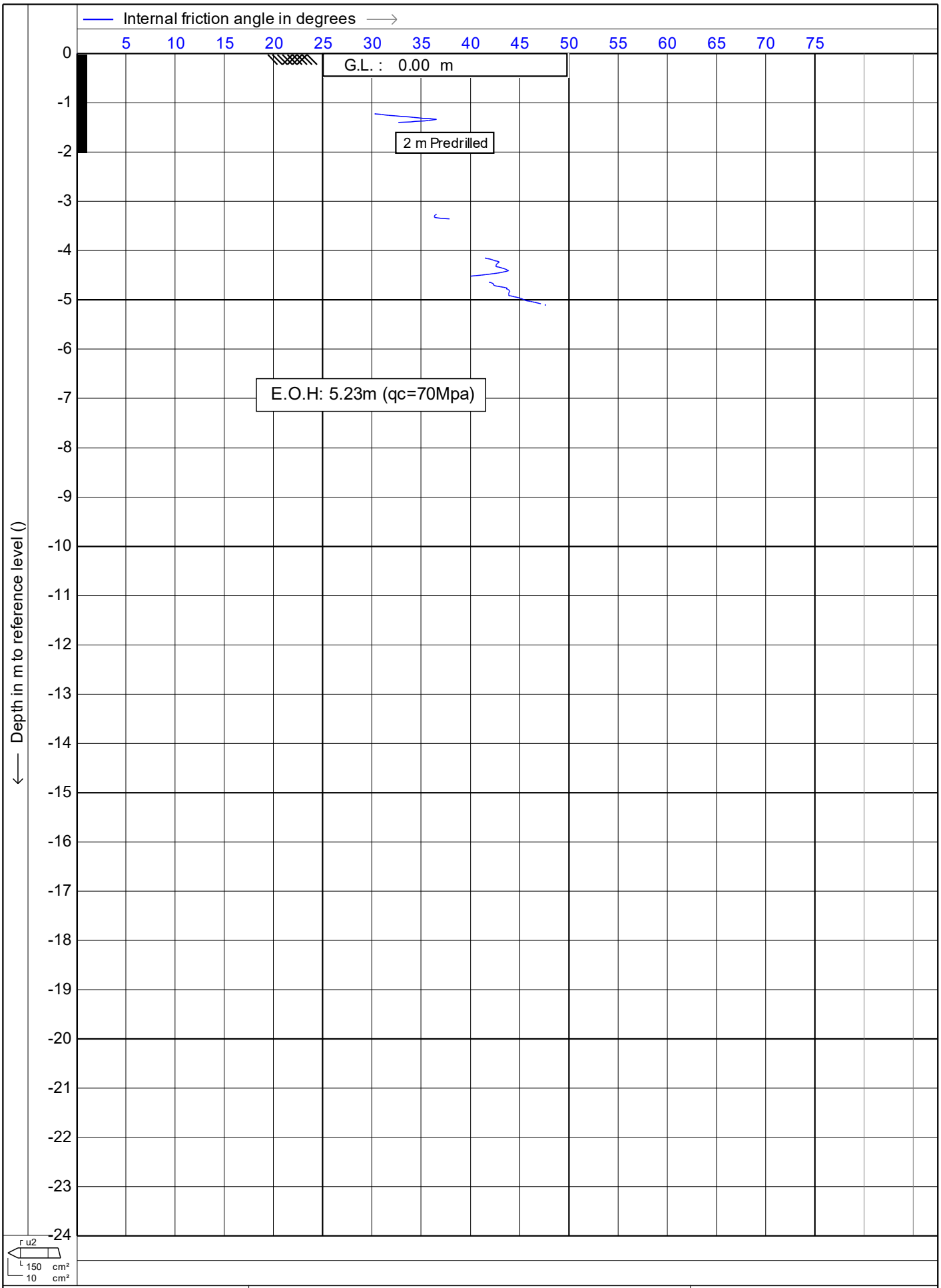
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **14/15**

1.47



DRILLFORCE
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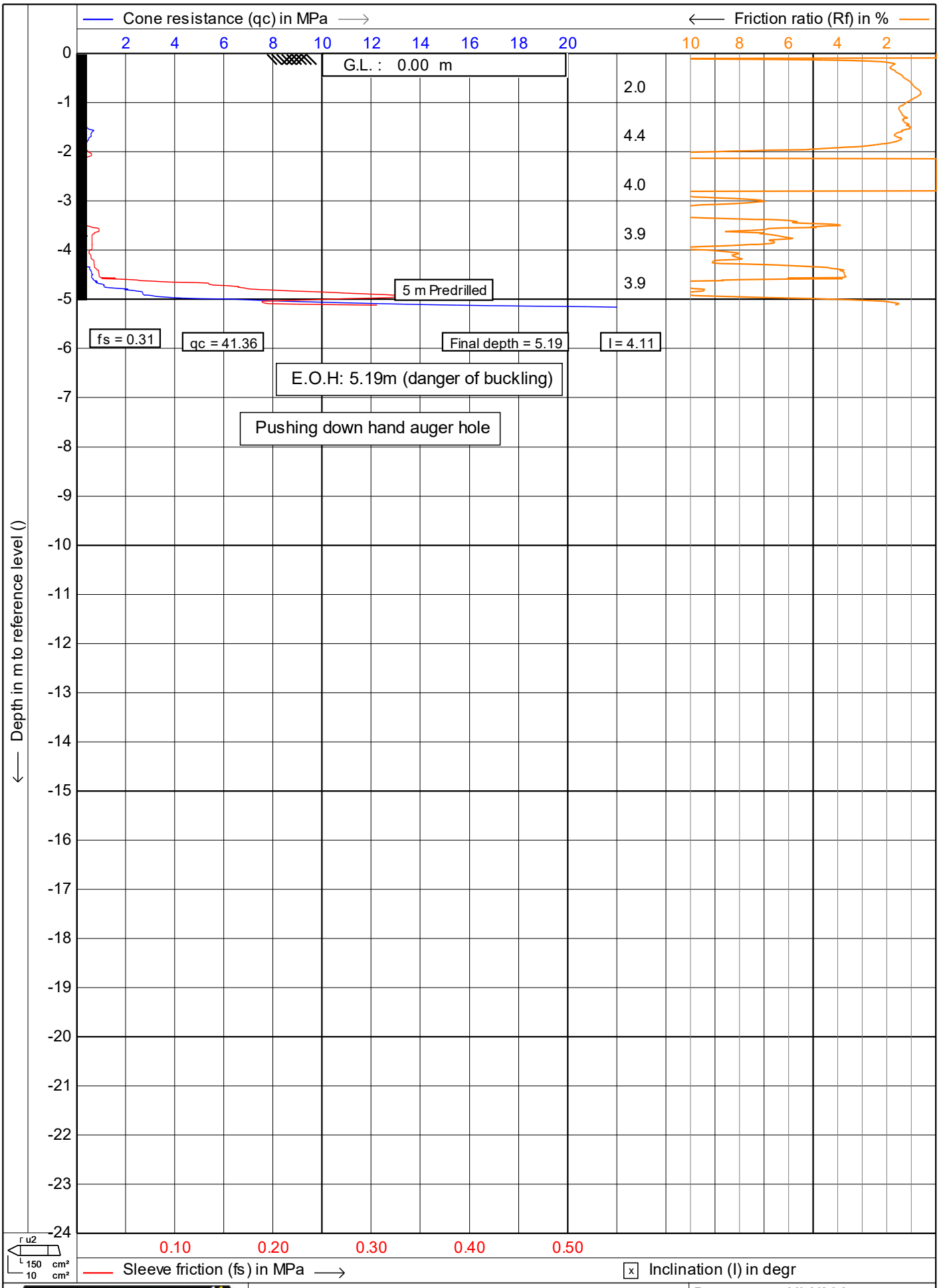
Project no.	: **DF19GE160**
CPT no.	: **CPT_03** **15/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

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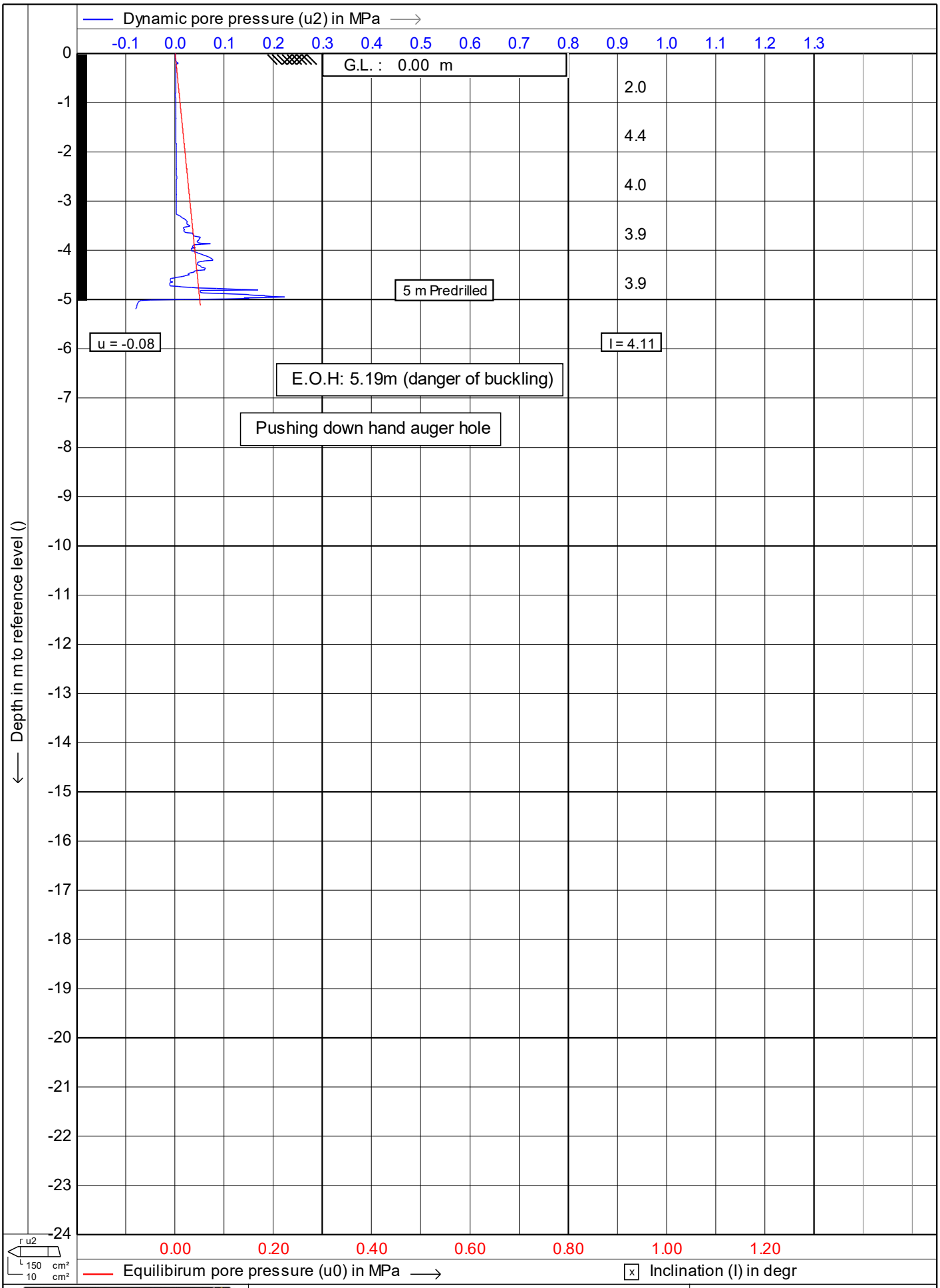
Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **1/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

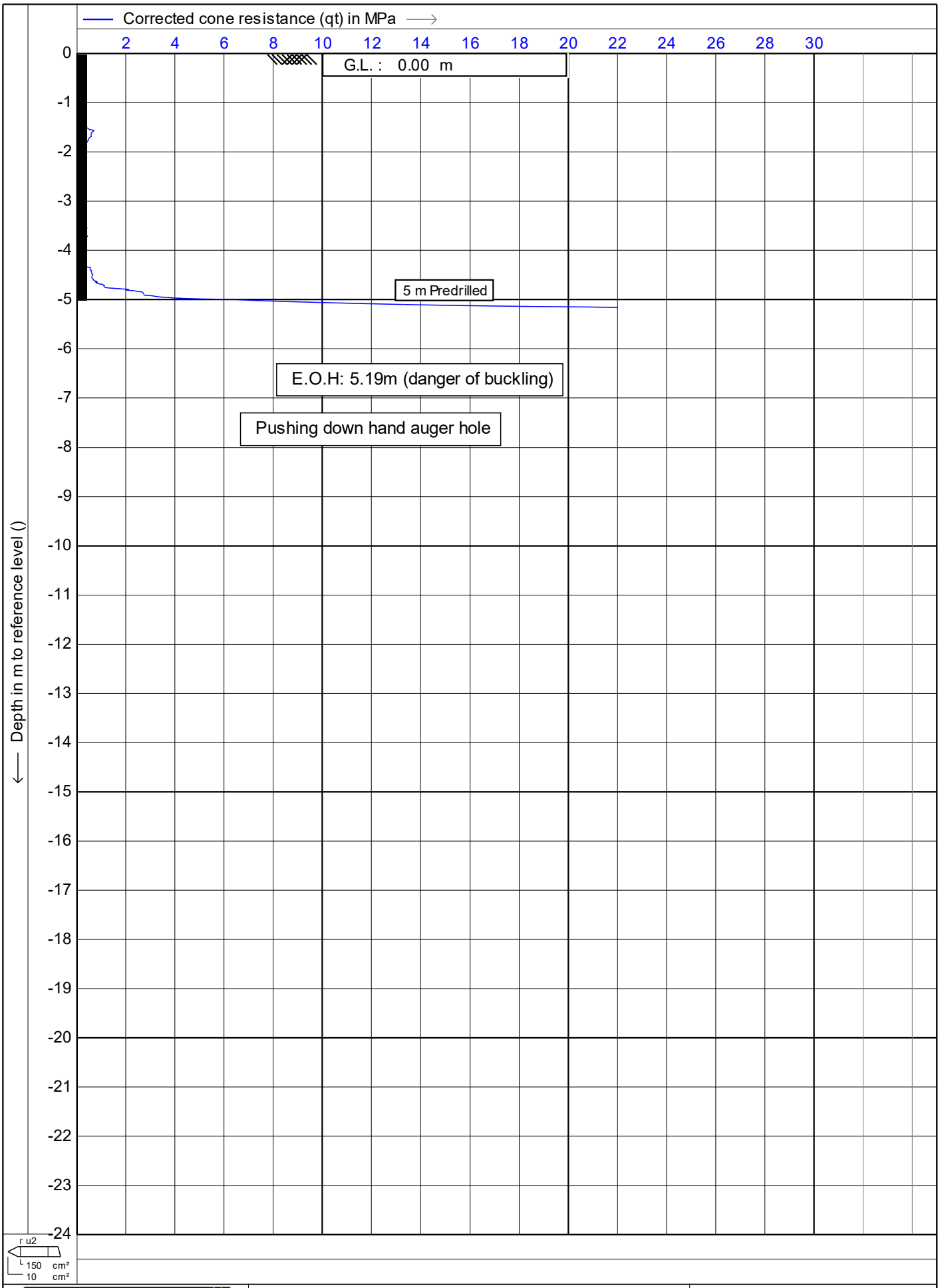
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **2/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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Project : **51 Brougham Street**

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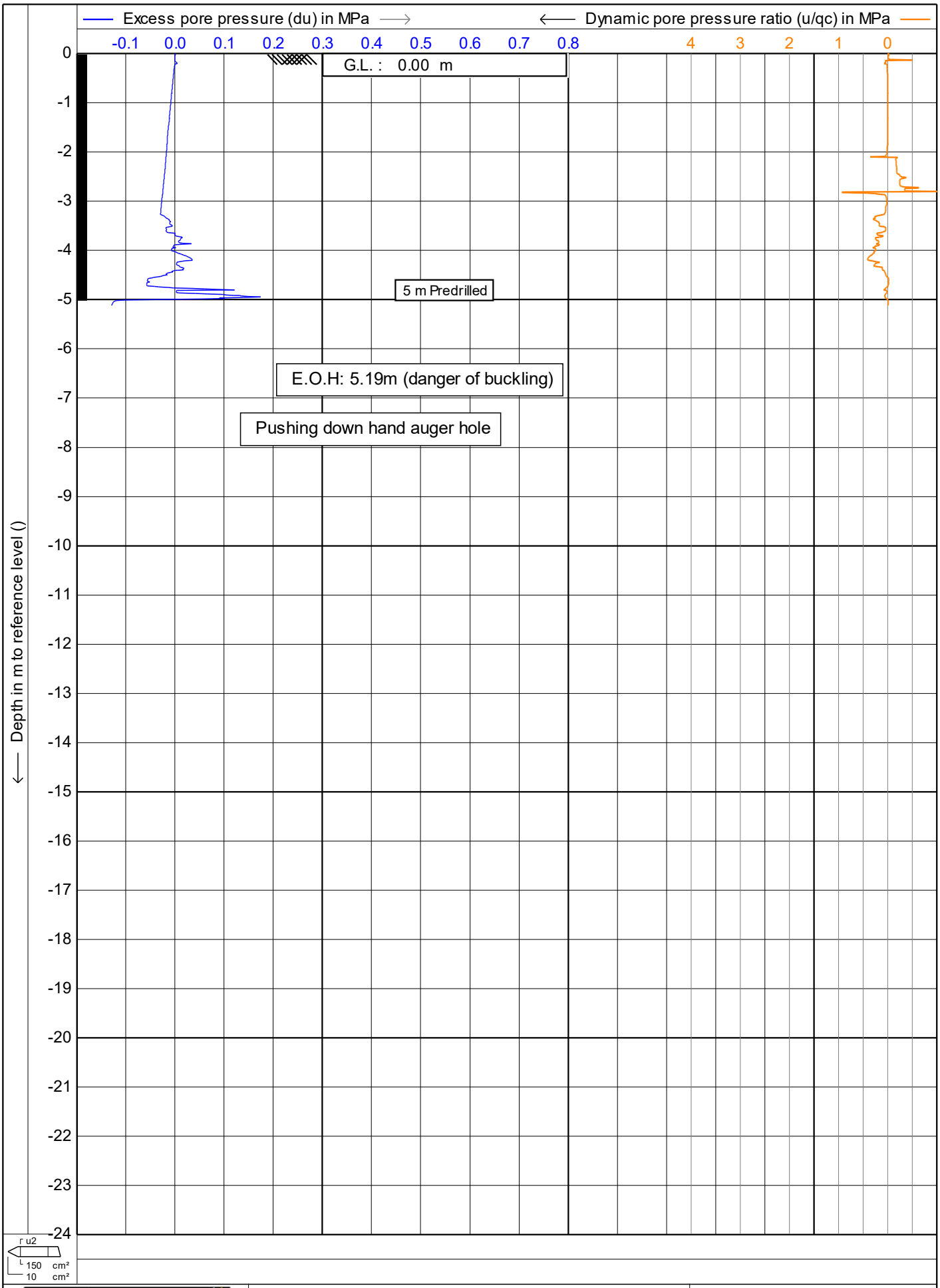
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **3/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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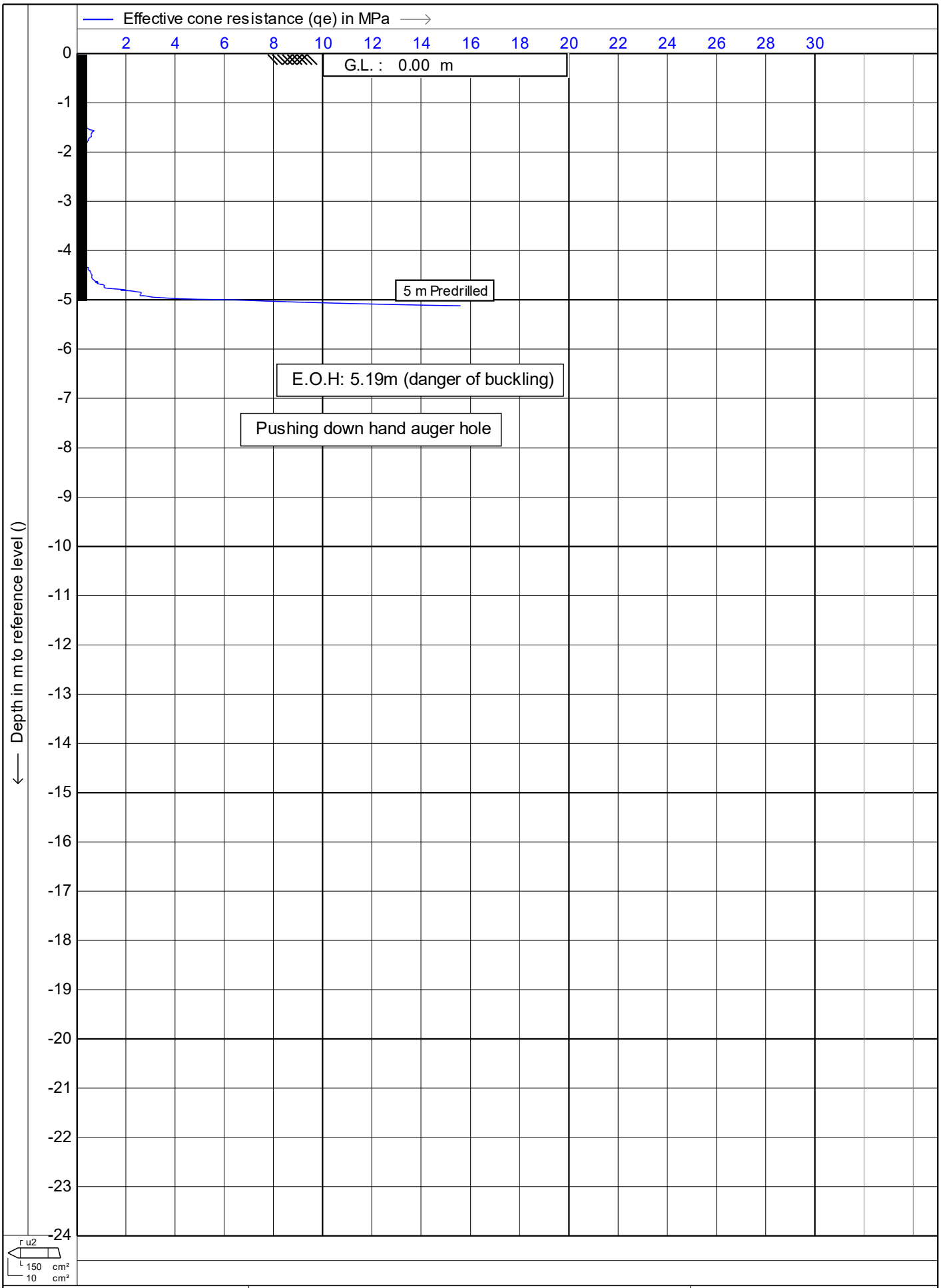
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

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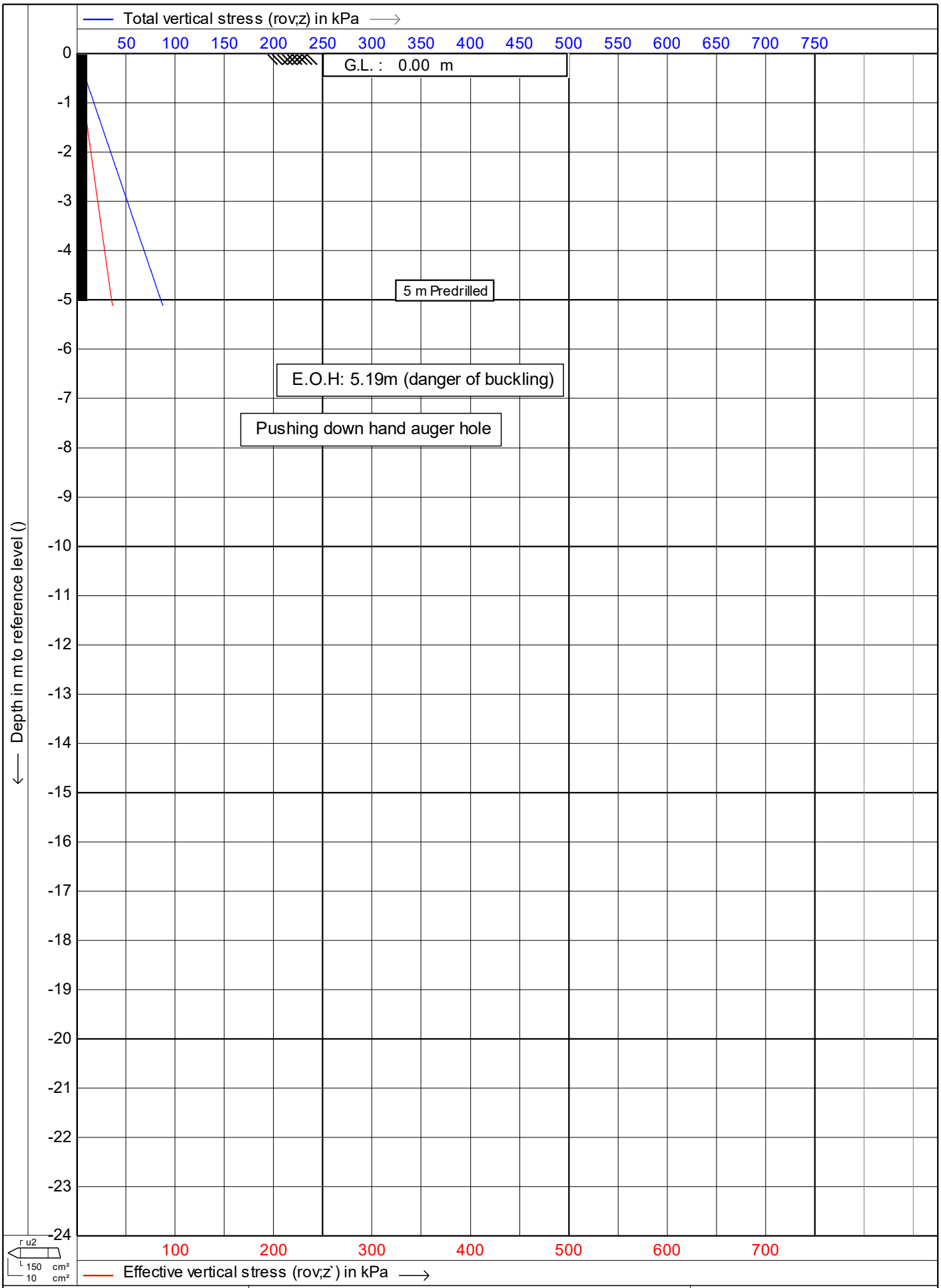
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

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Position: **174.073413, -39.058761 WGS 84**

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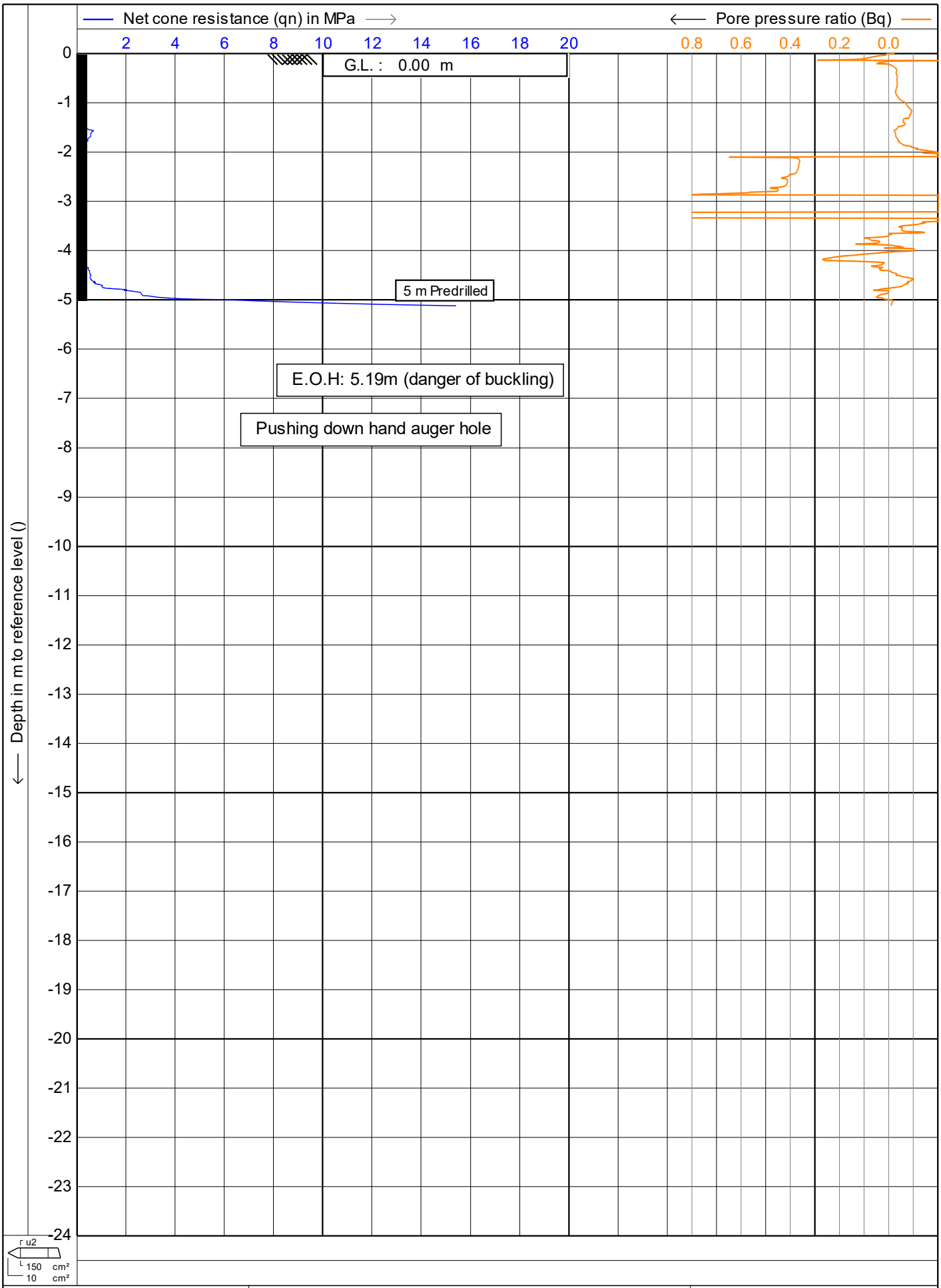
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

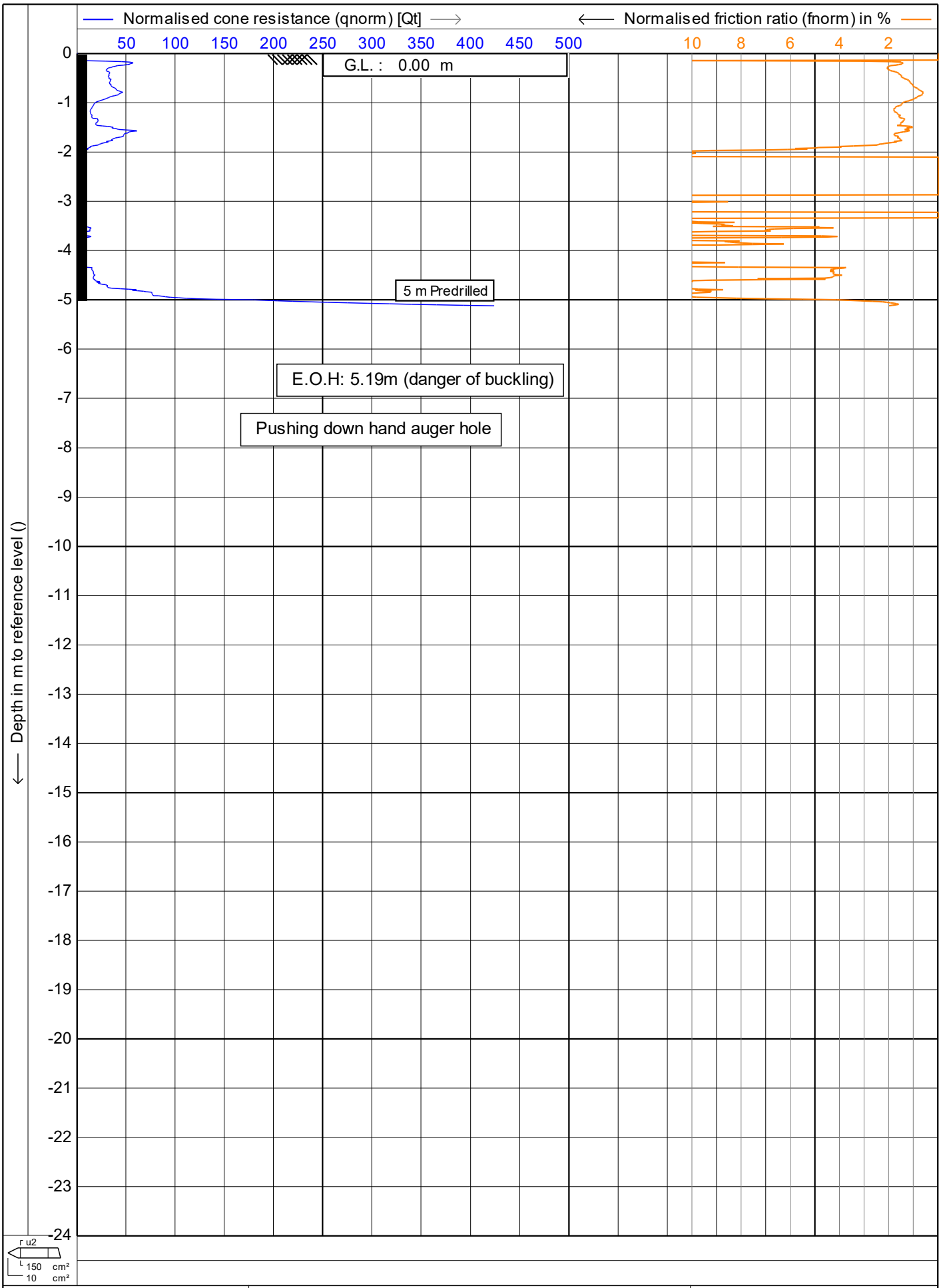
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **7/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

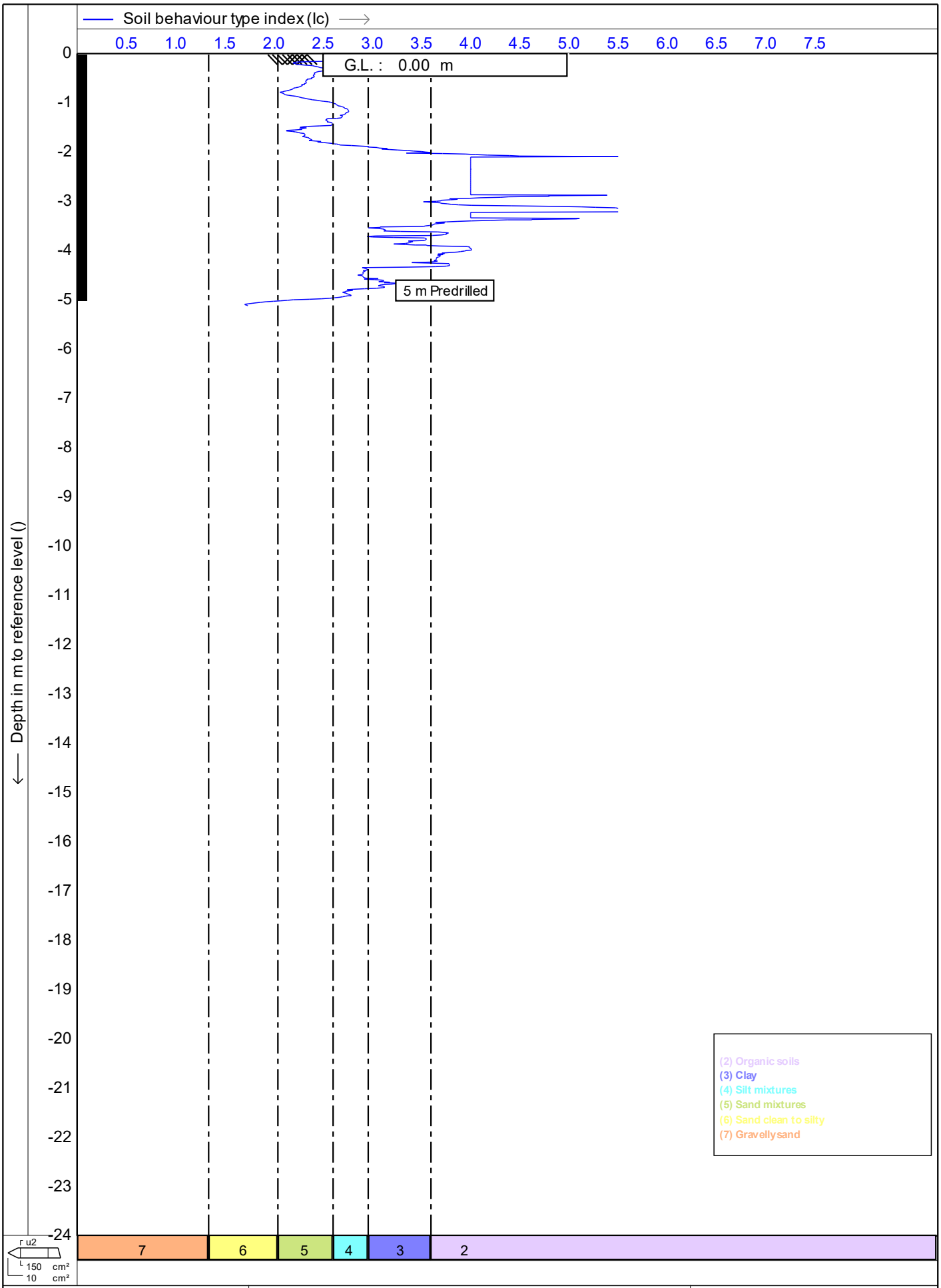
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

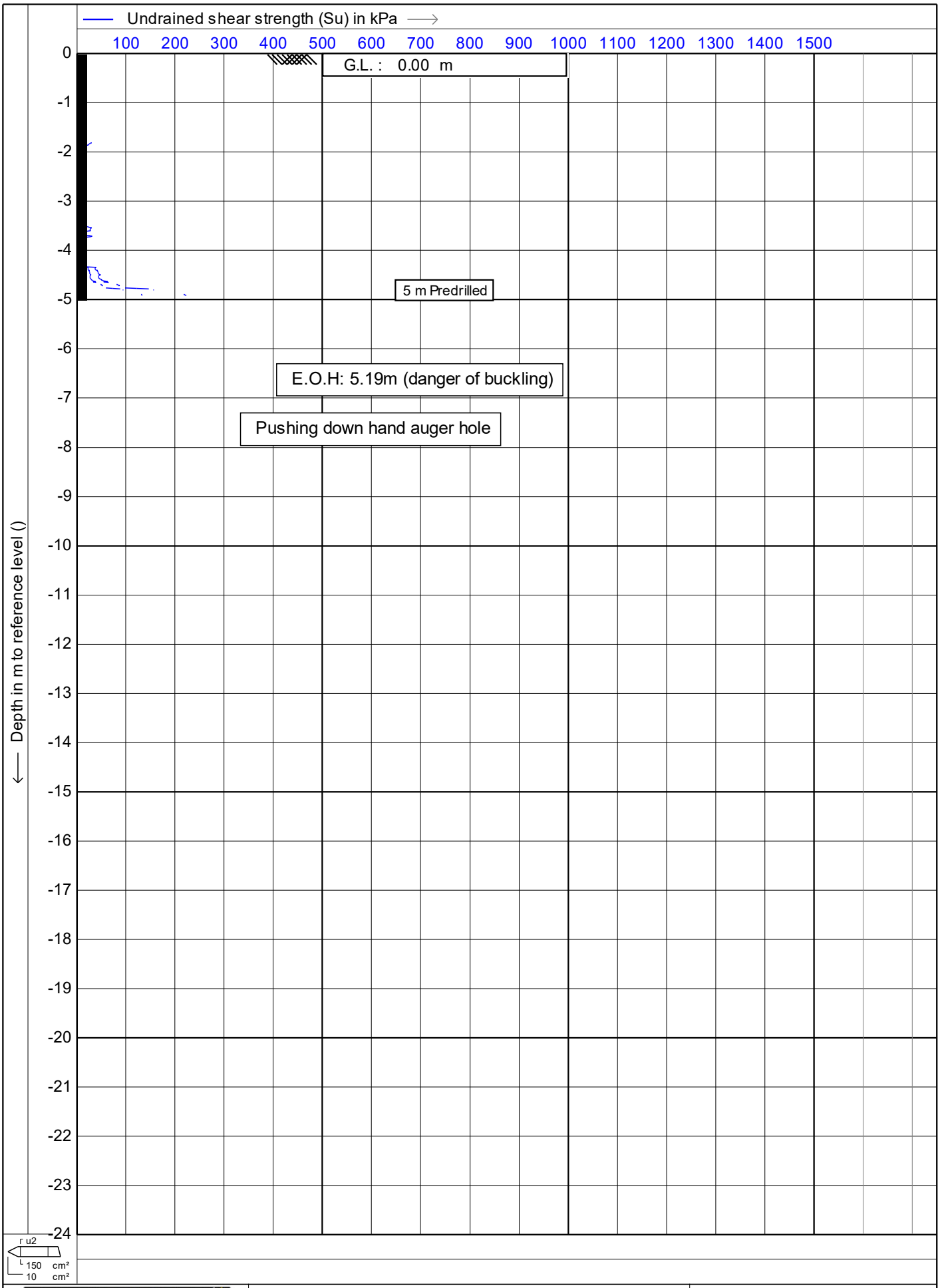
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

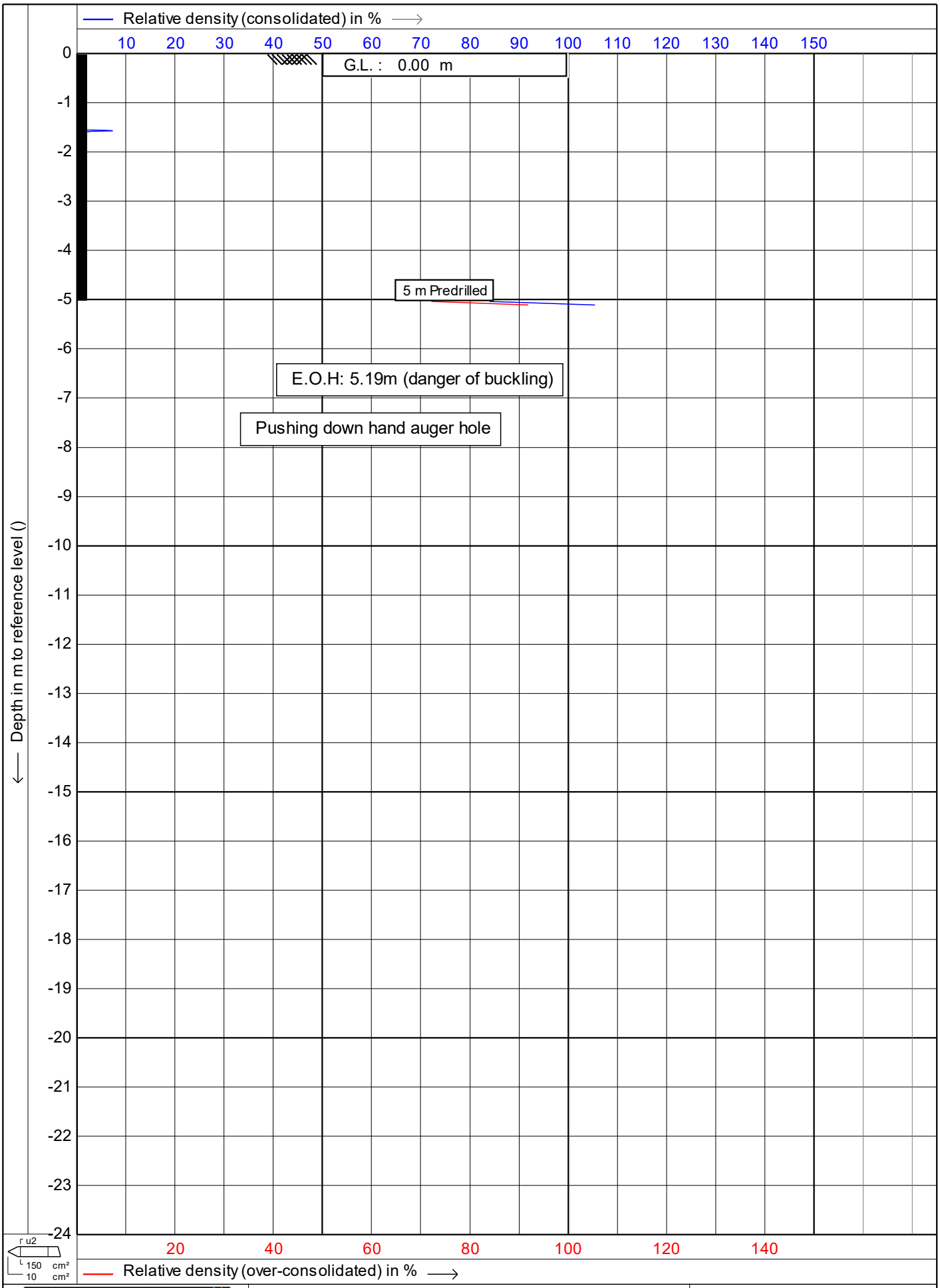
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **10/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

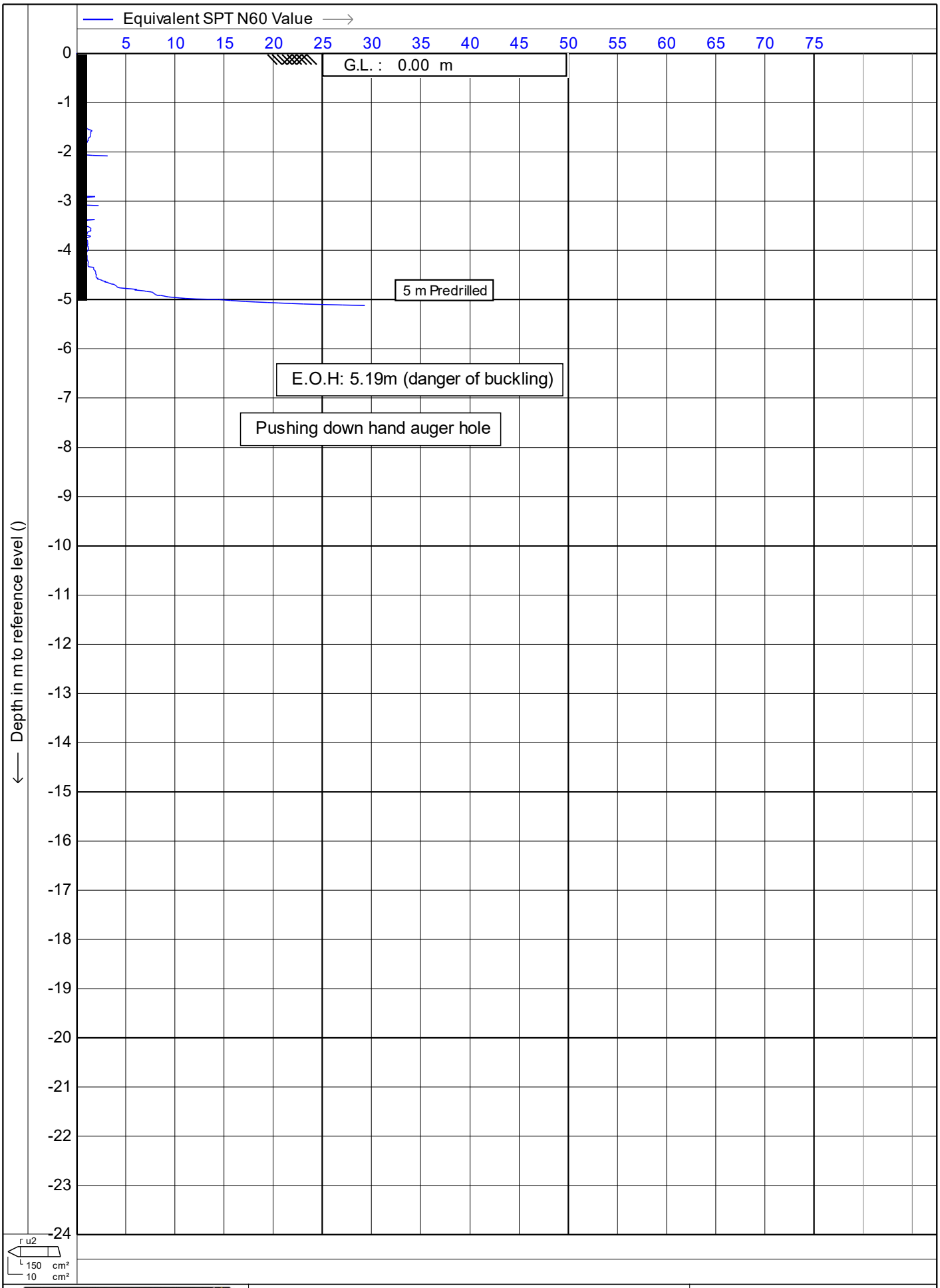
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **11/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

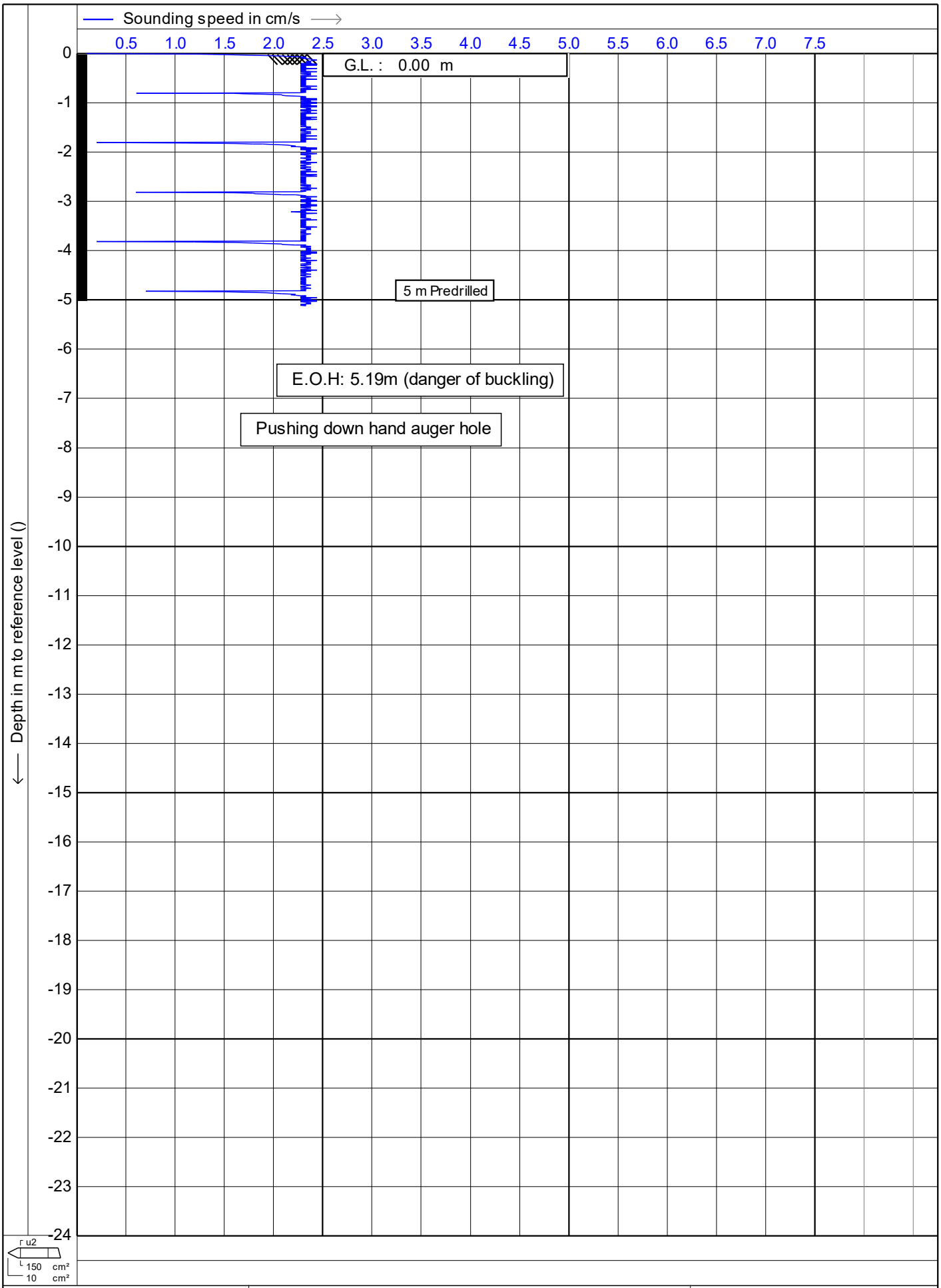
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **12/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

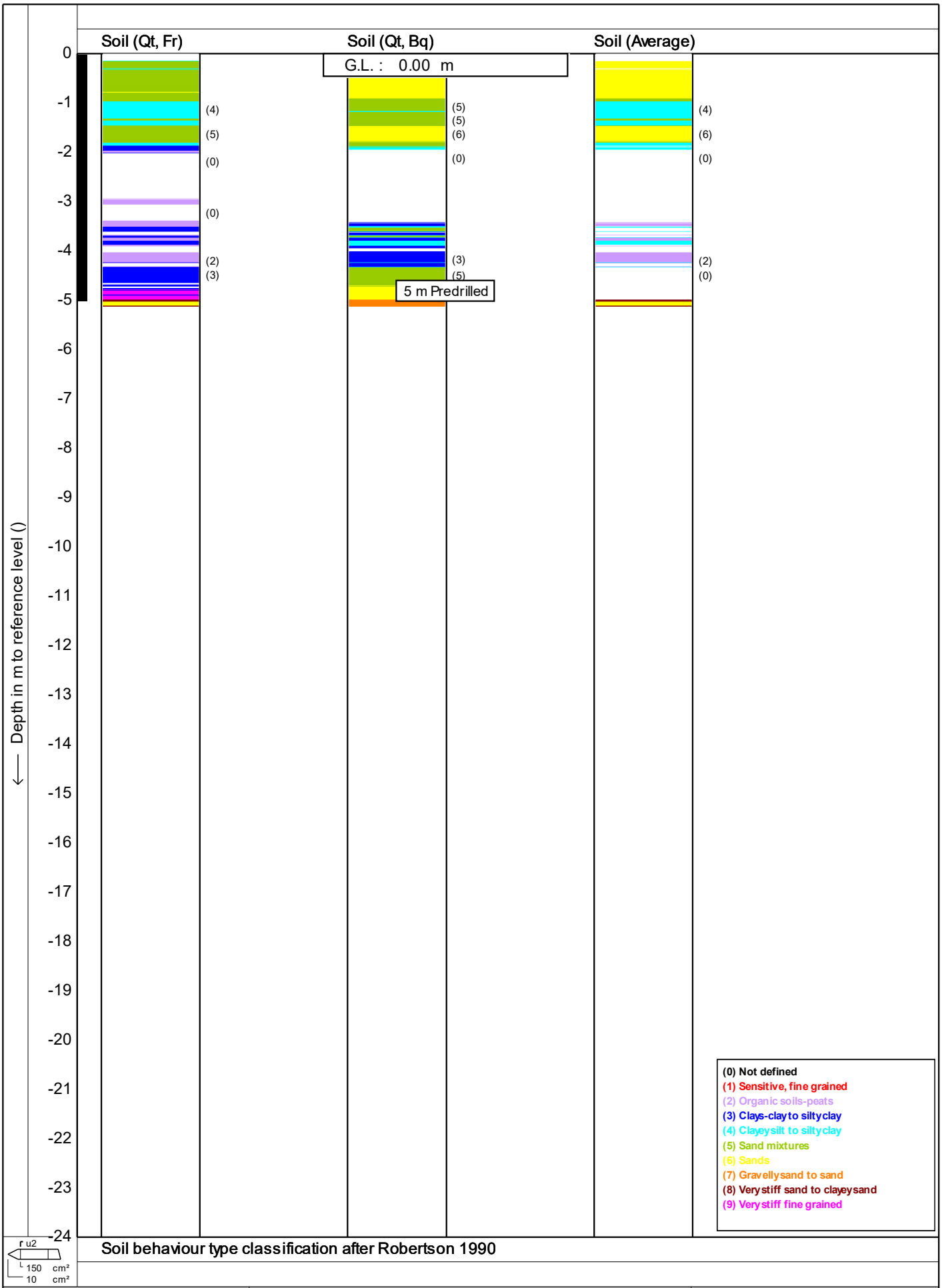
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A**

1.47



(0) Not defined
(2) Organic soils-peats
(3) Clays-clay to siltyclay
(4) Clayeysilt to siltyclay
(5) Sand mixtures
(6) Sands

Soil behaviour type classification after Robertson 1990

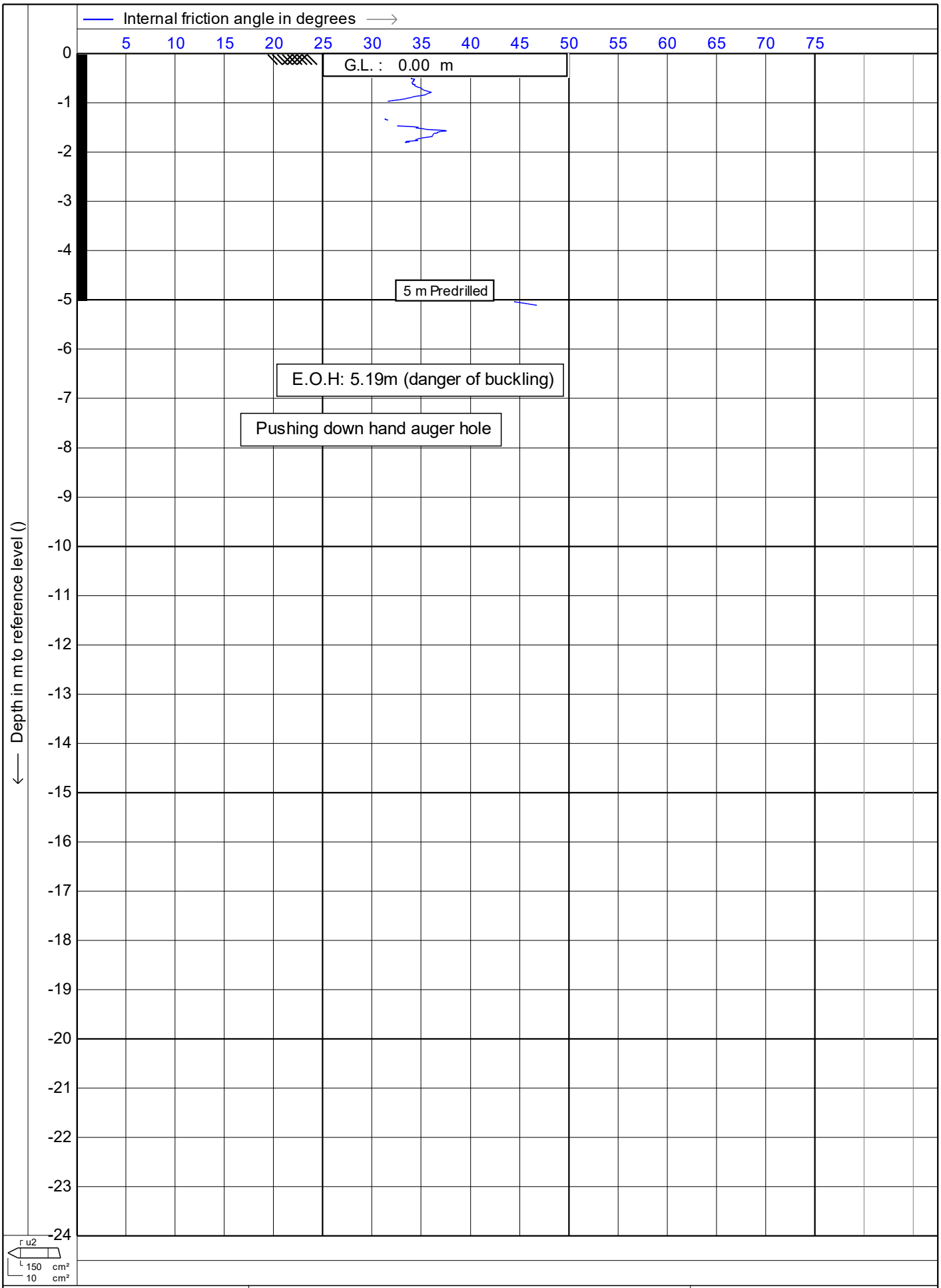
DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**
Location: **51 Brougham Street, New Plymouth**
Position: **174.073413, -39.058761 WGS 84**

Date : **1/01/2014**
Cone no. : **S10CFIIP.S15297**
Project no. : **DF19GE160**
CPT no. : **CPT_03A** **14/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

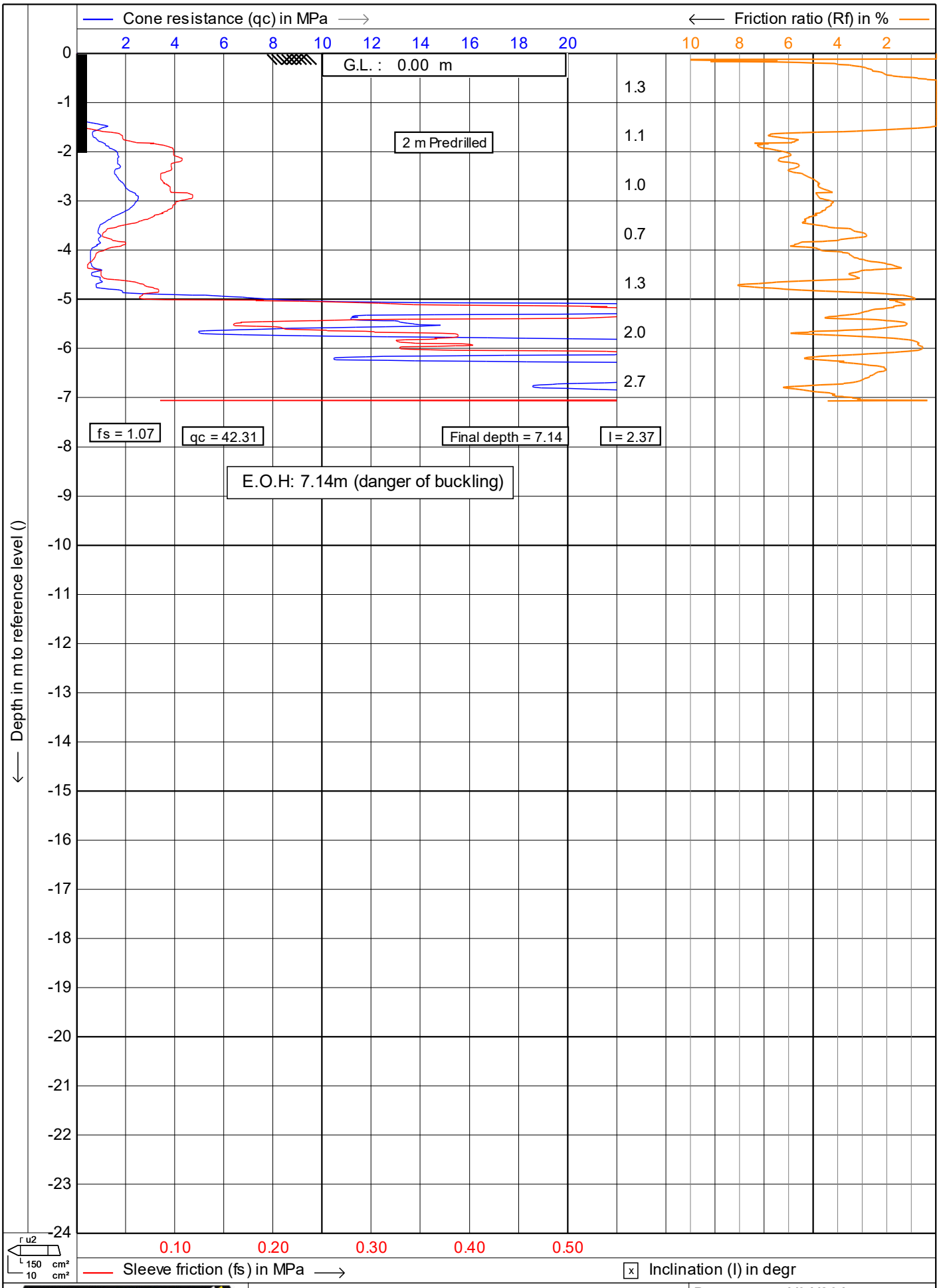
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073413, -39.058761 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_03A** **15/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

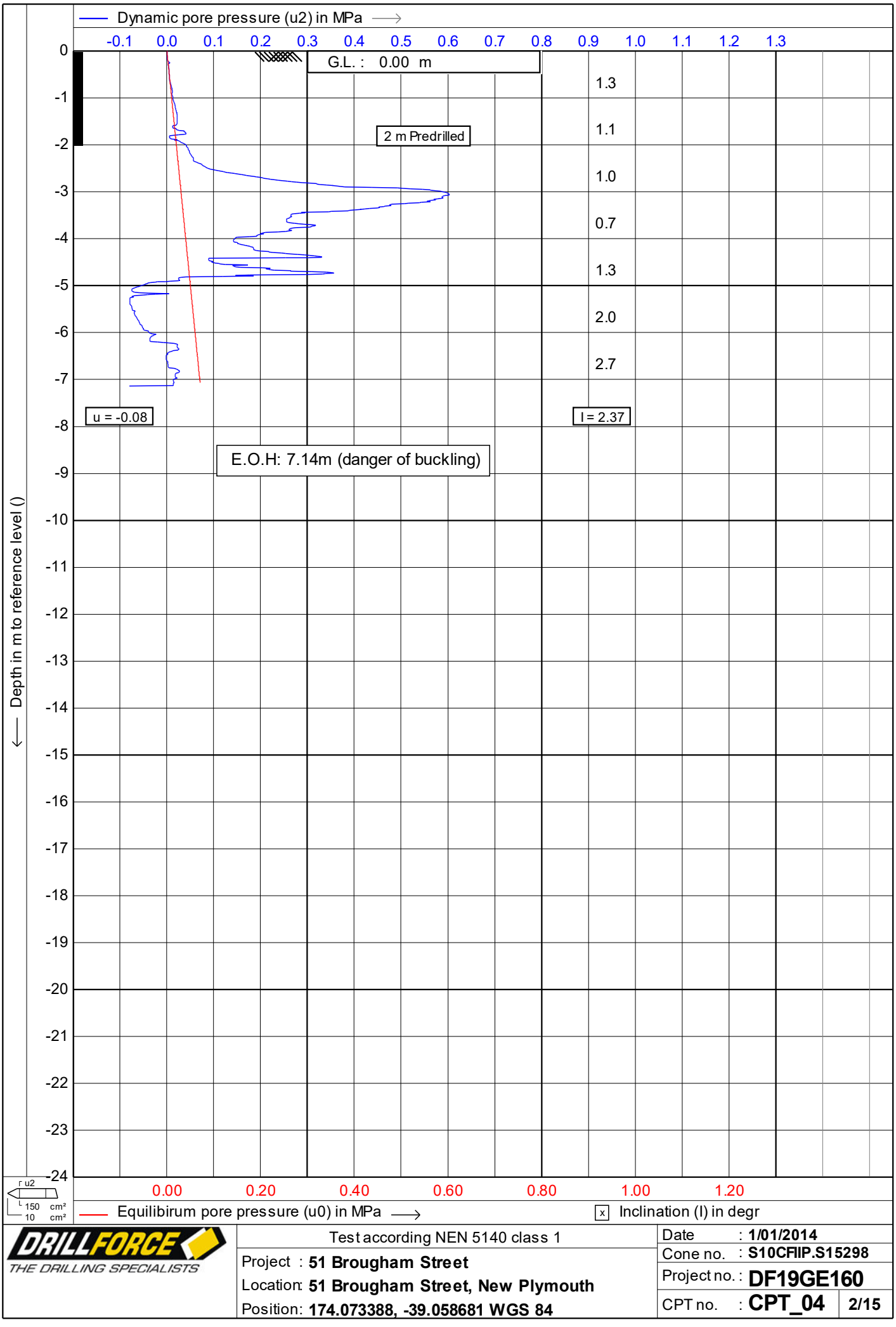
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** 1/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

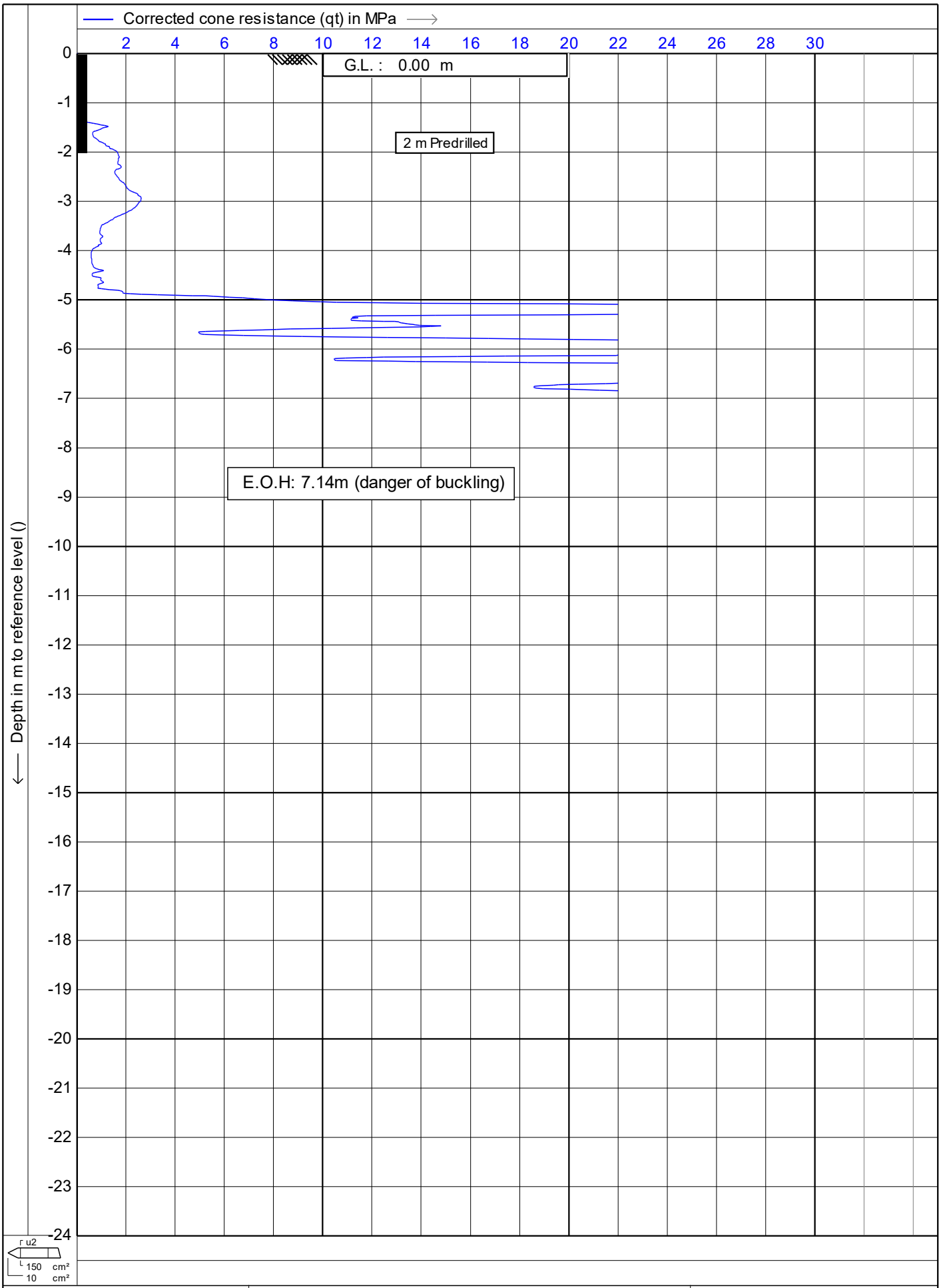
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **2/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

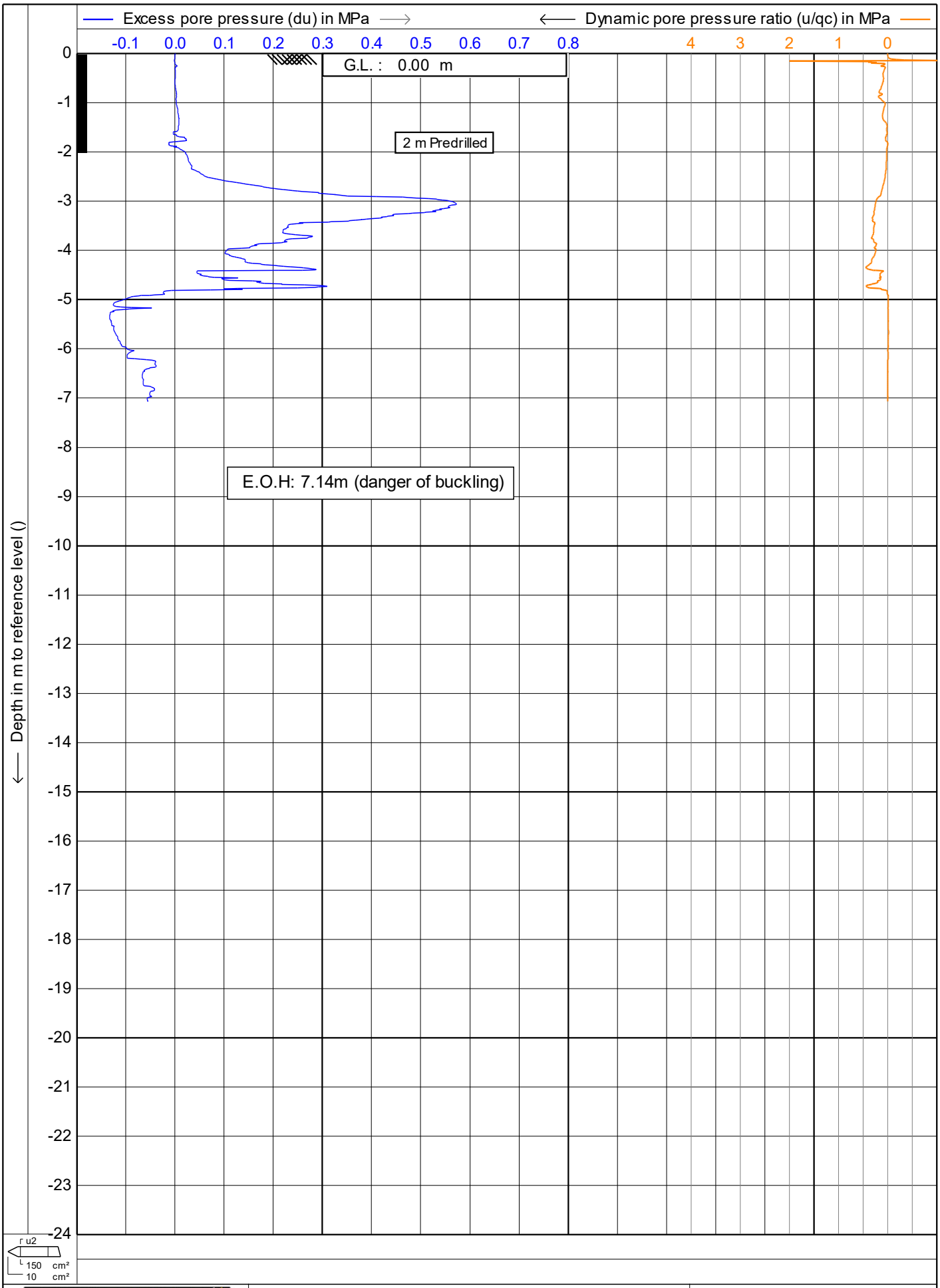
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **3/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

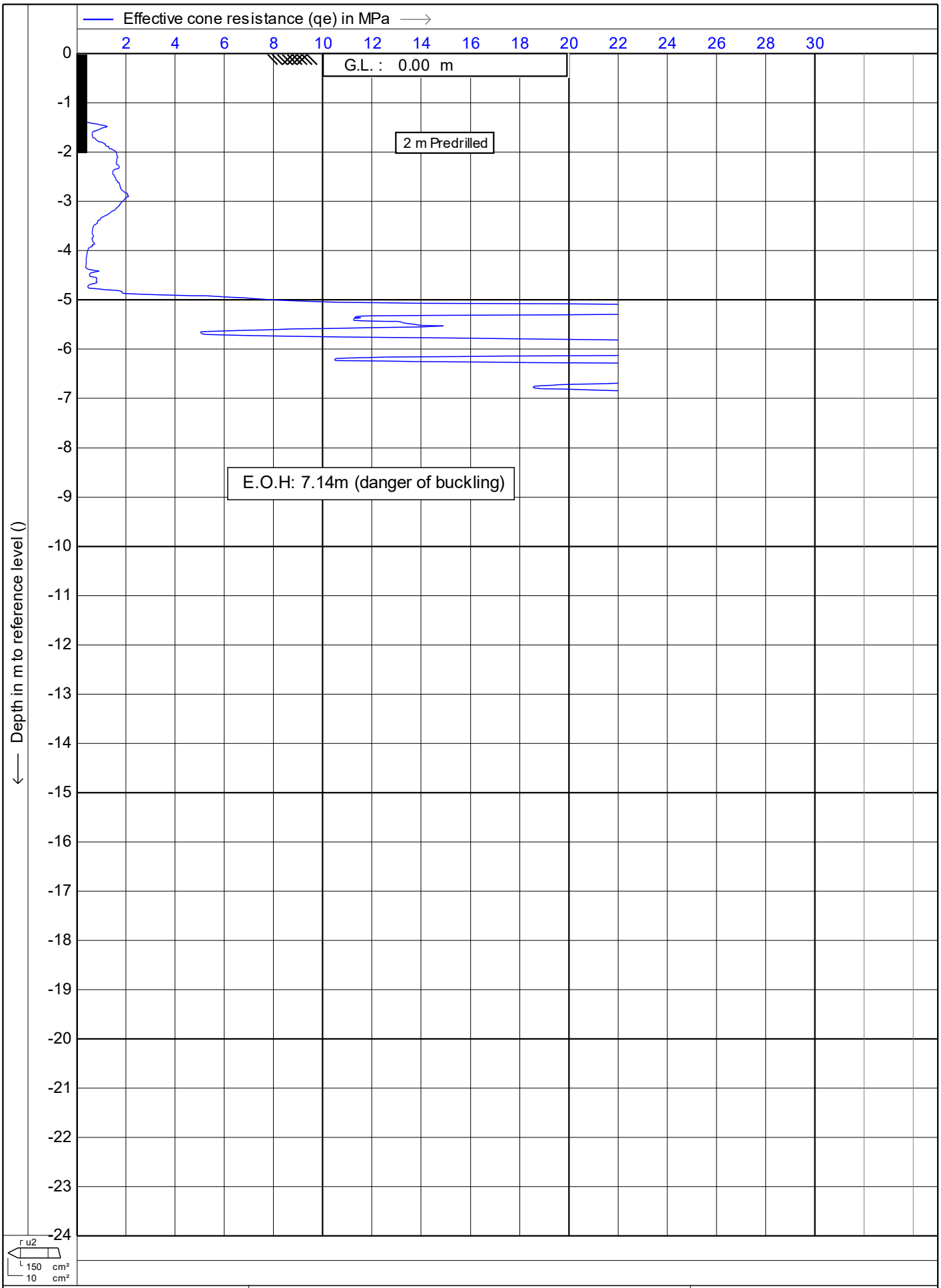
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

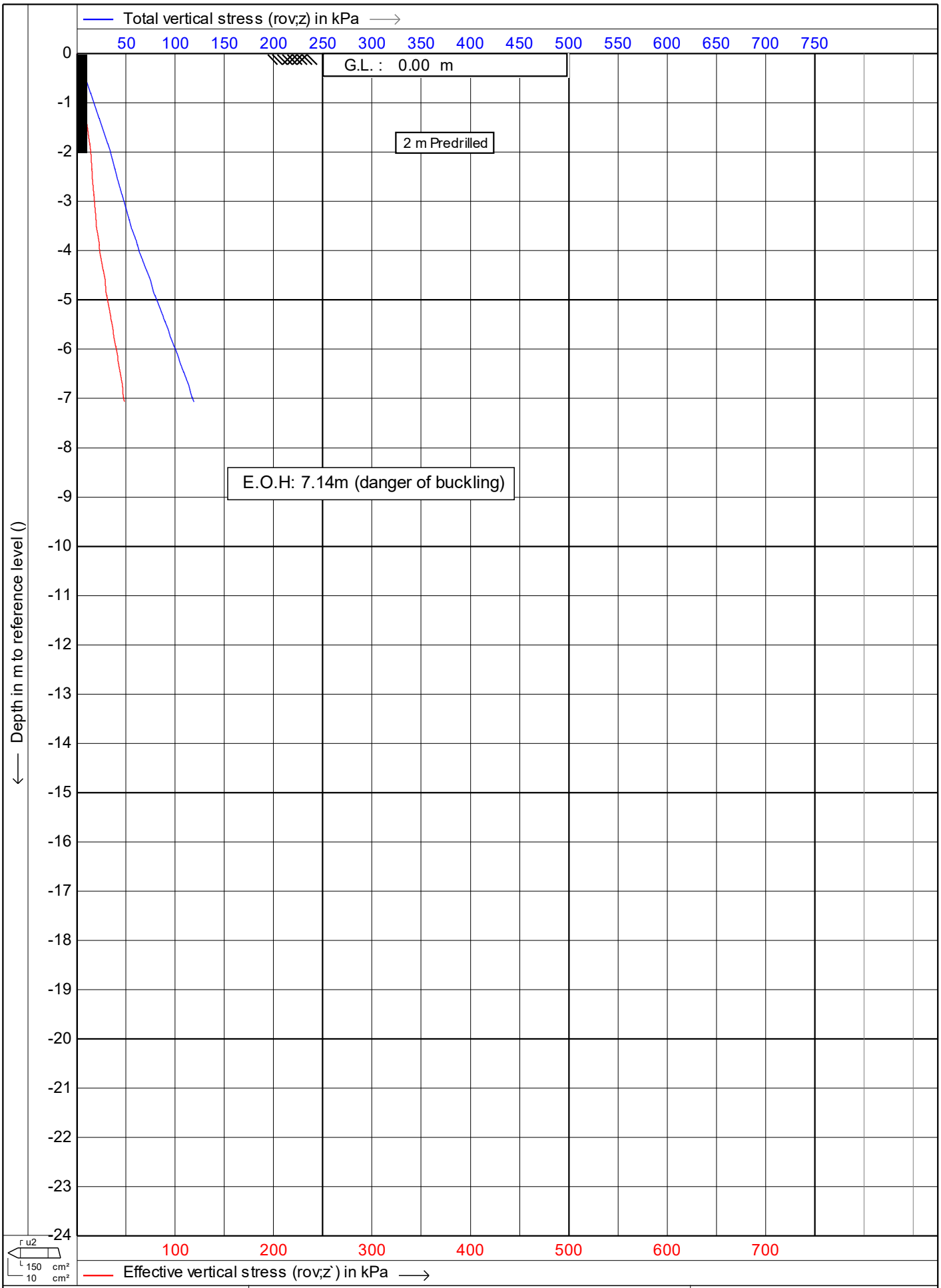
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

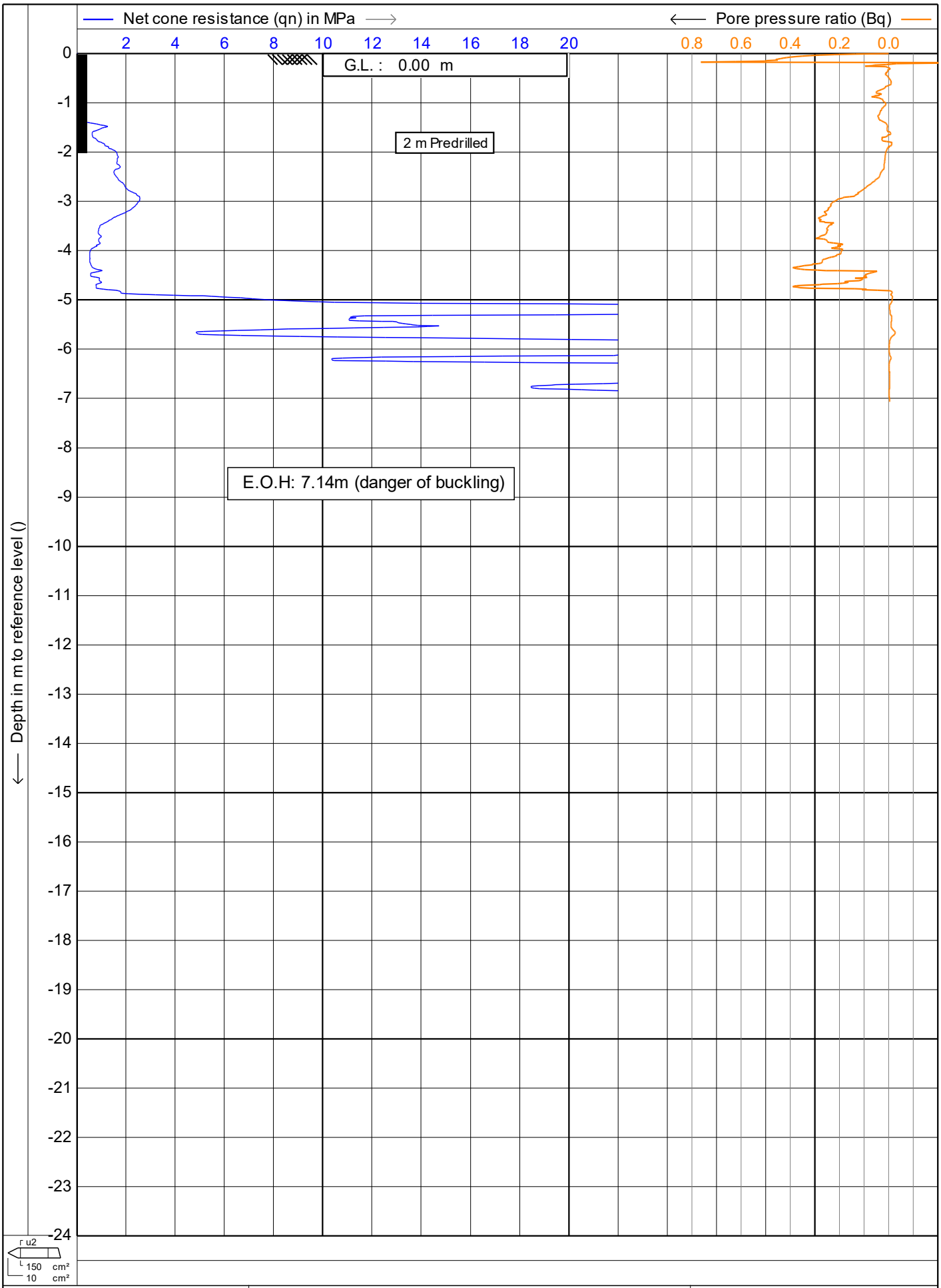
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

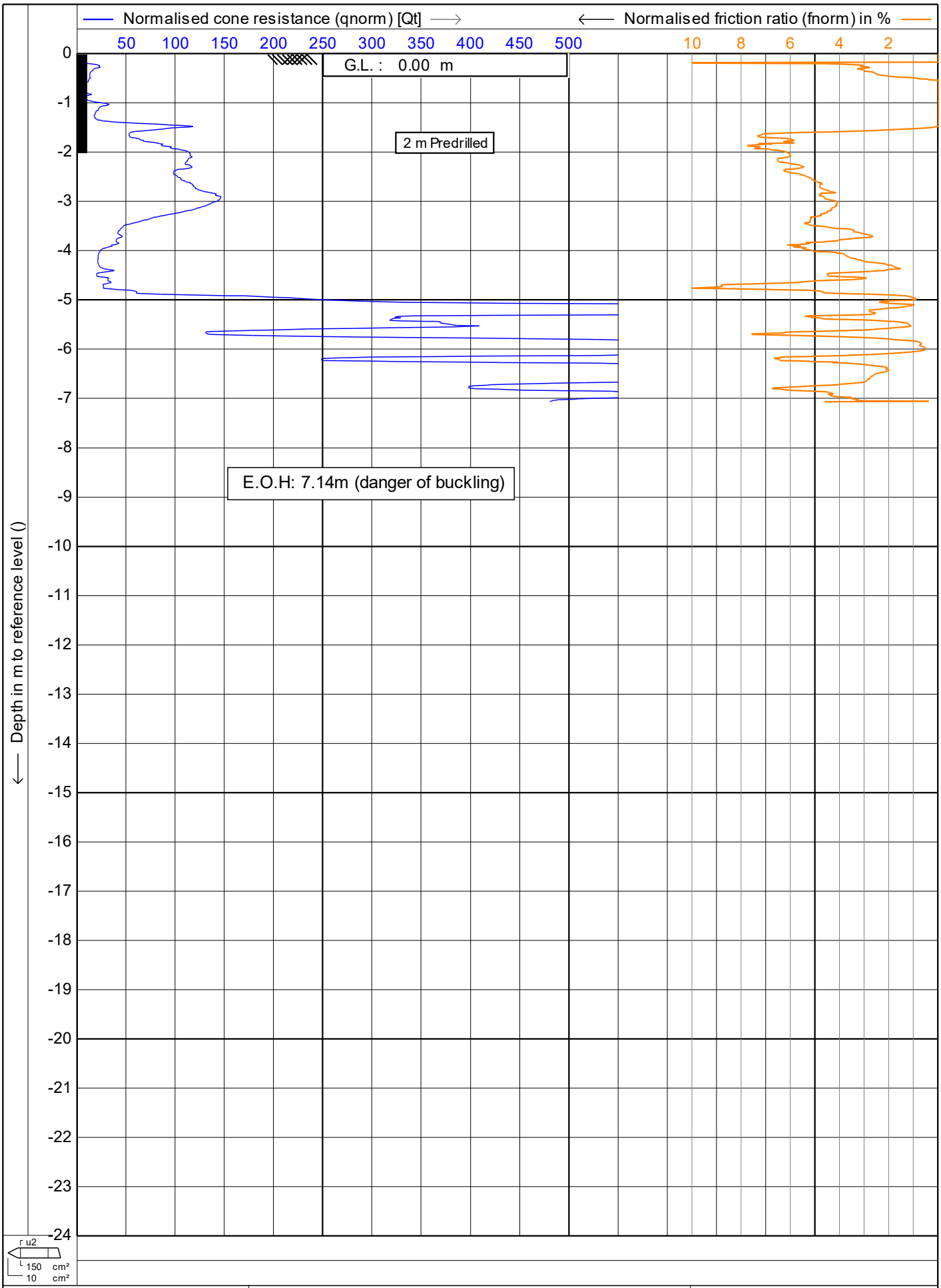
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **7/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

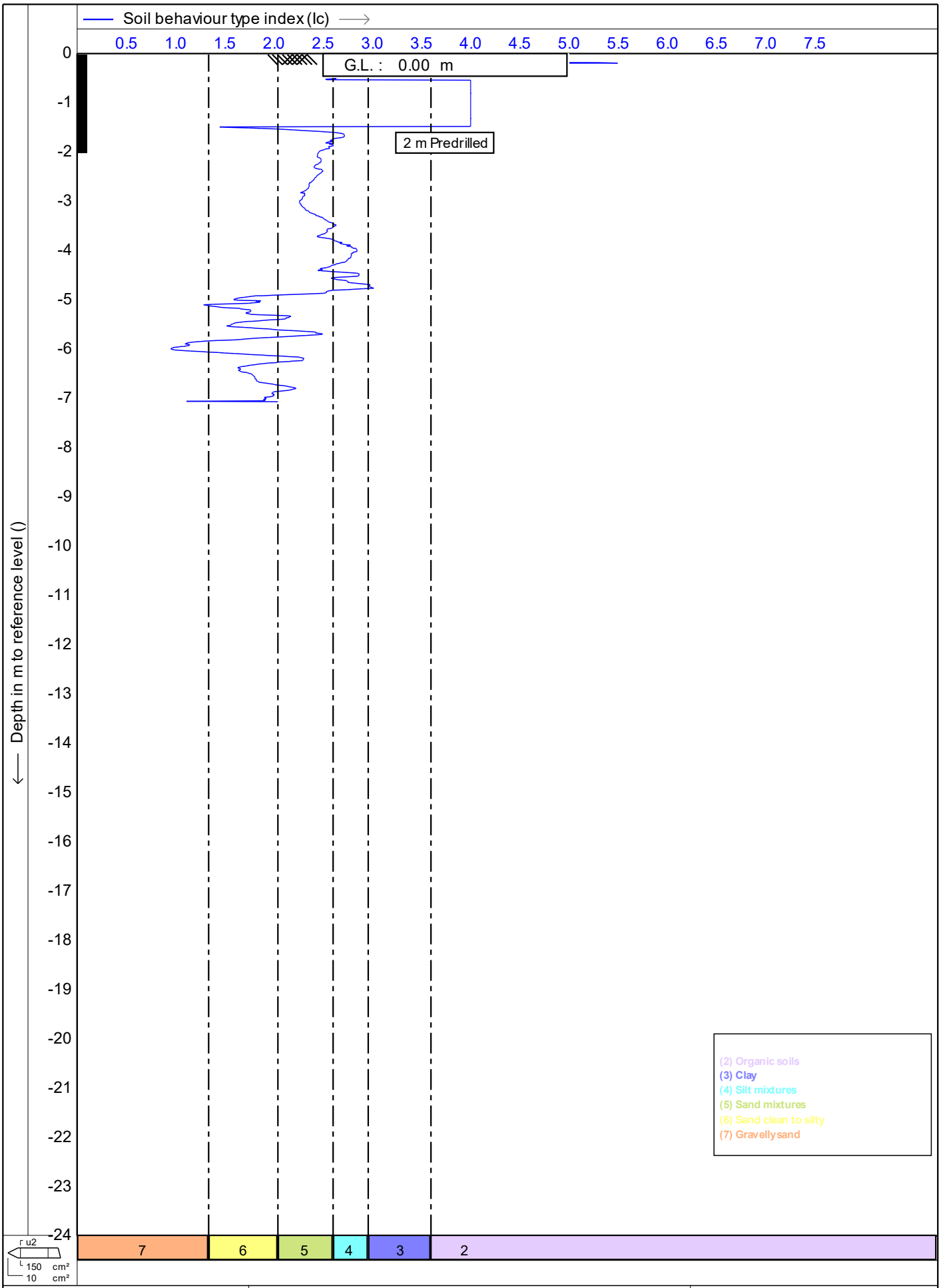
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

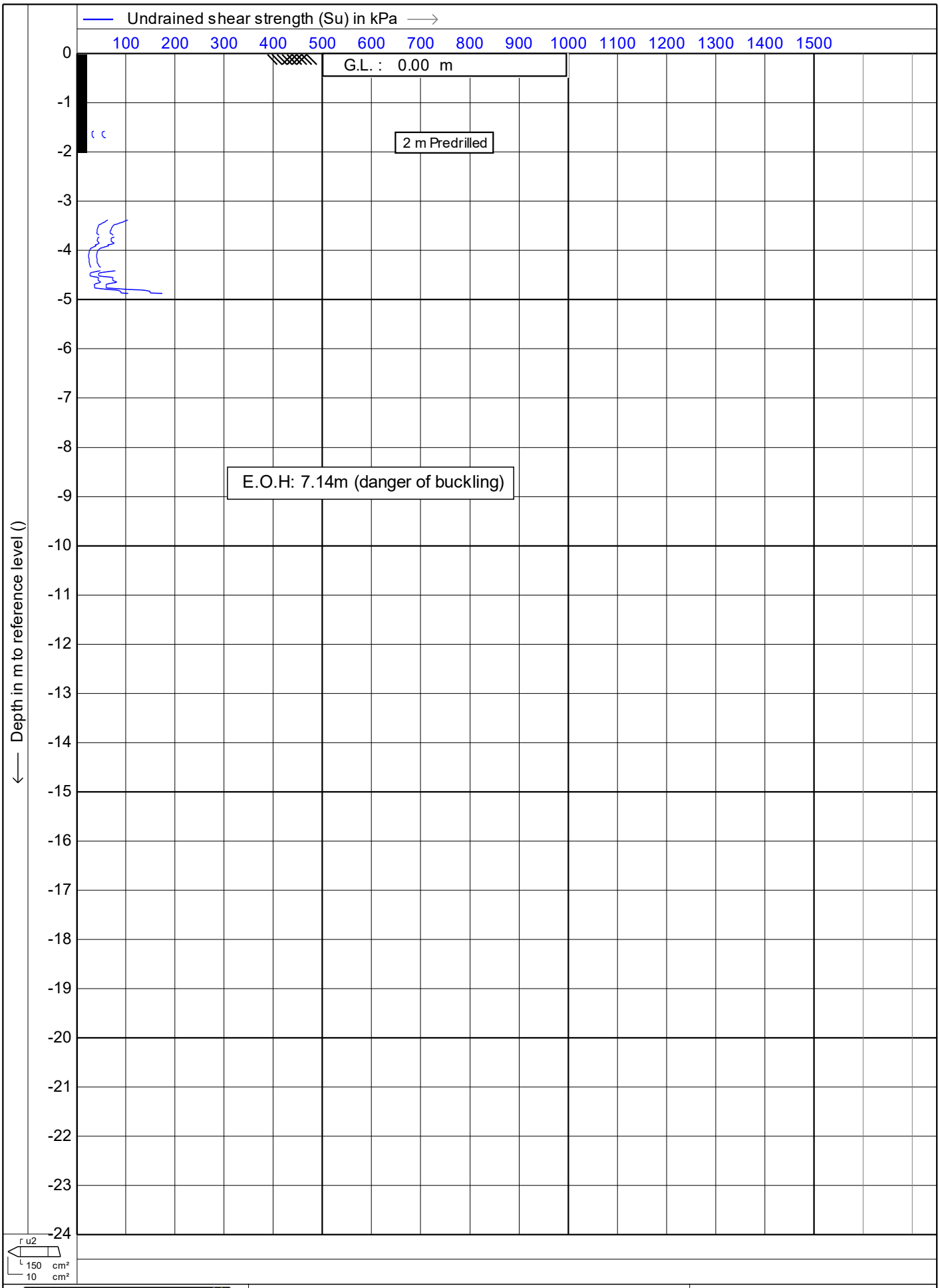
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

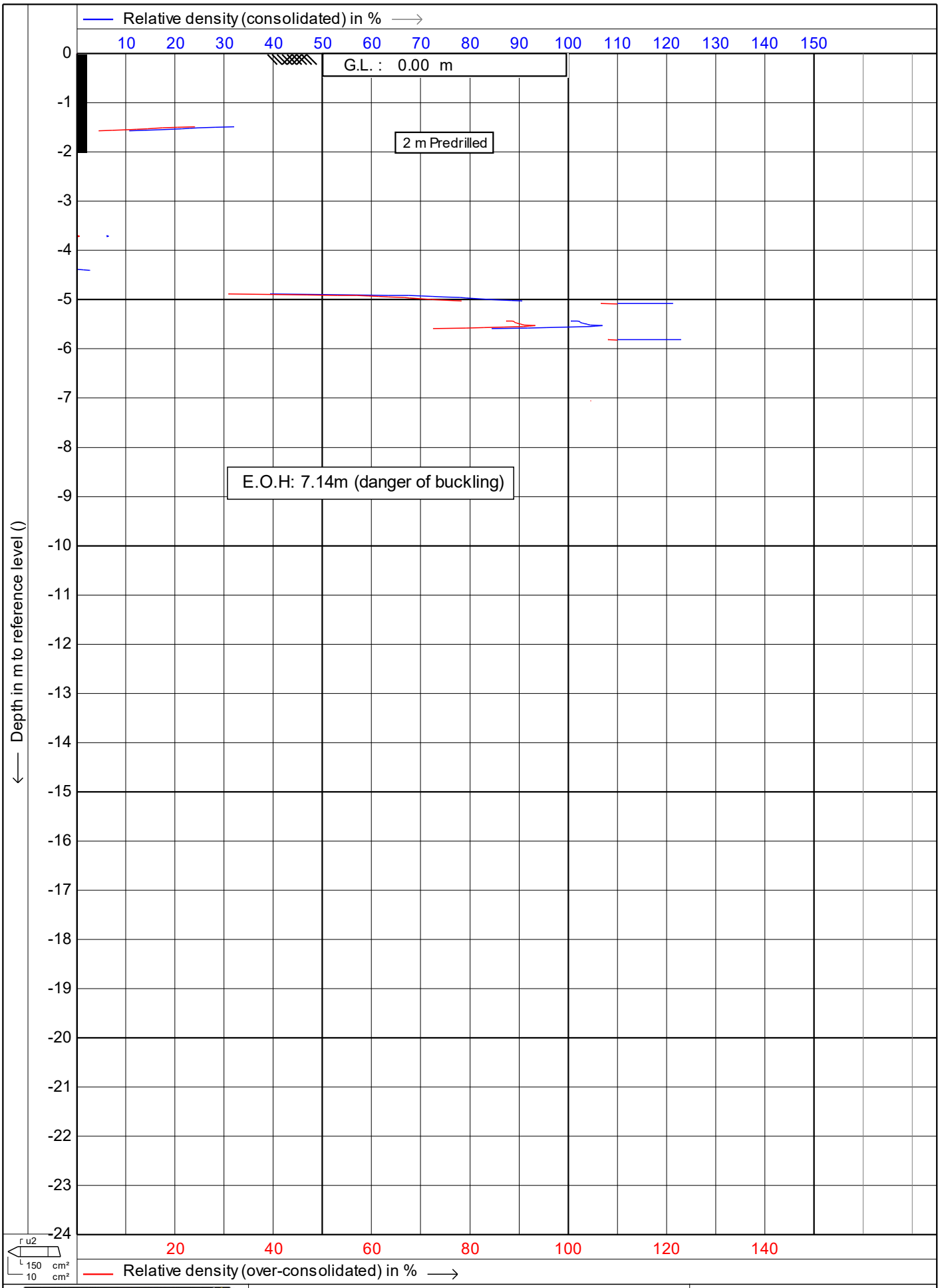
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **10/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

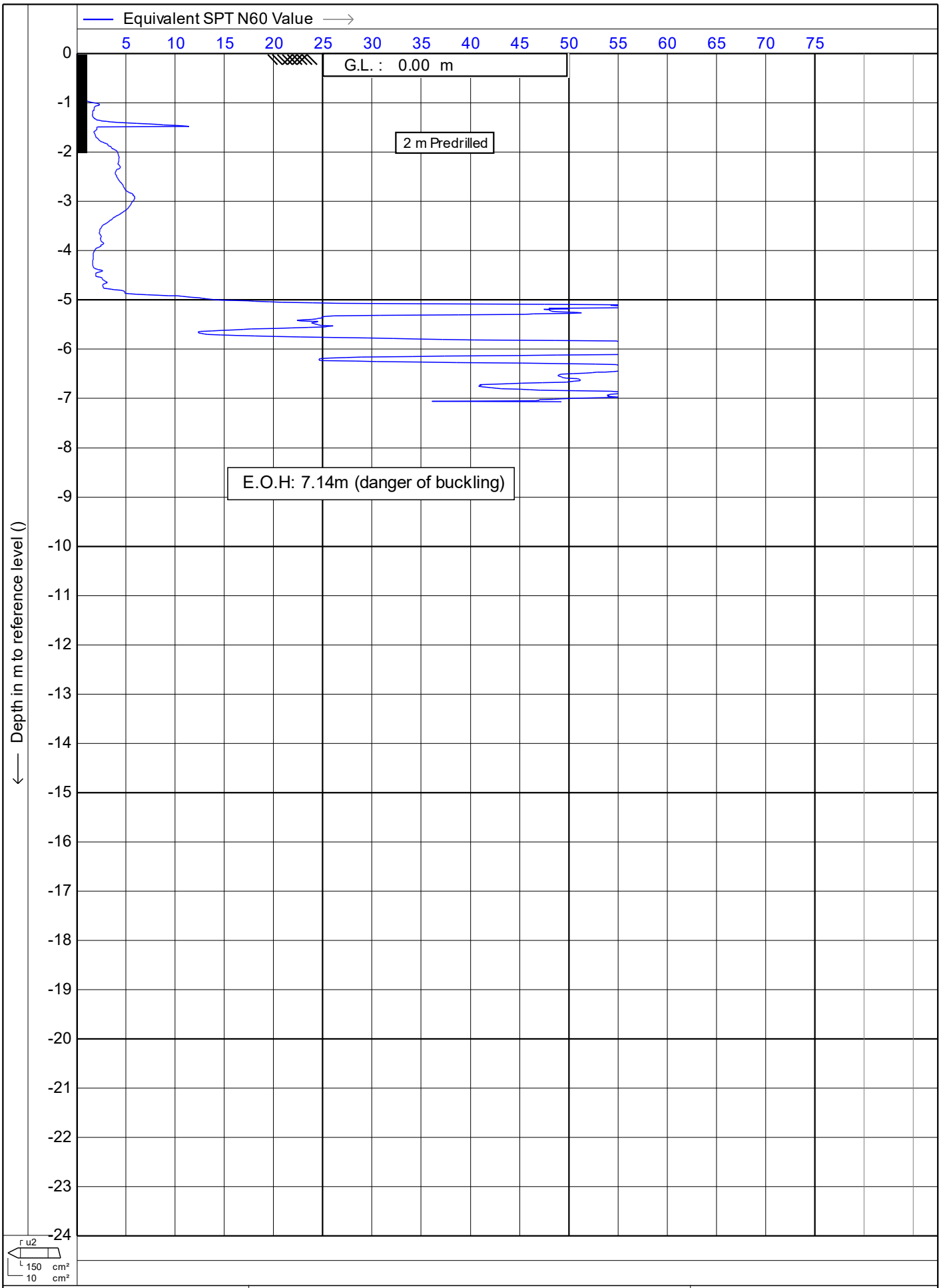
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **11/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04**

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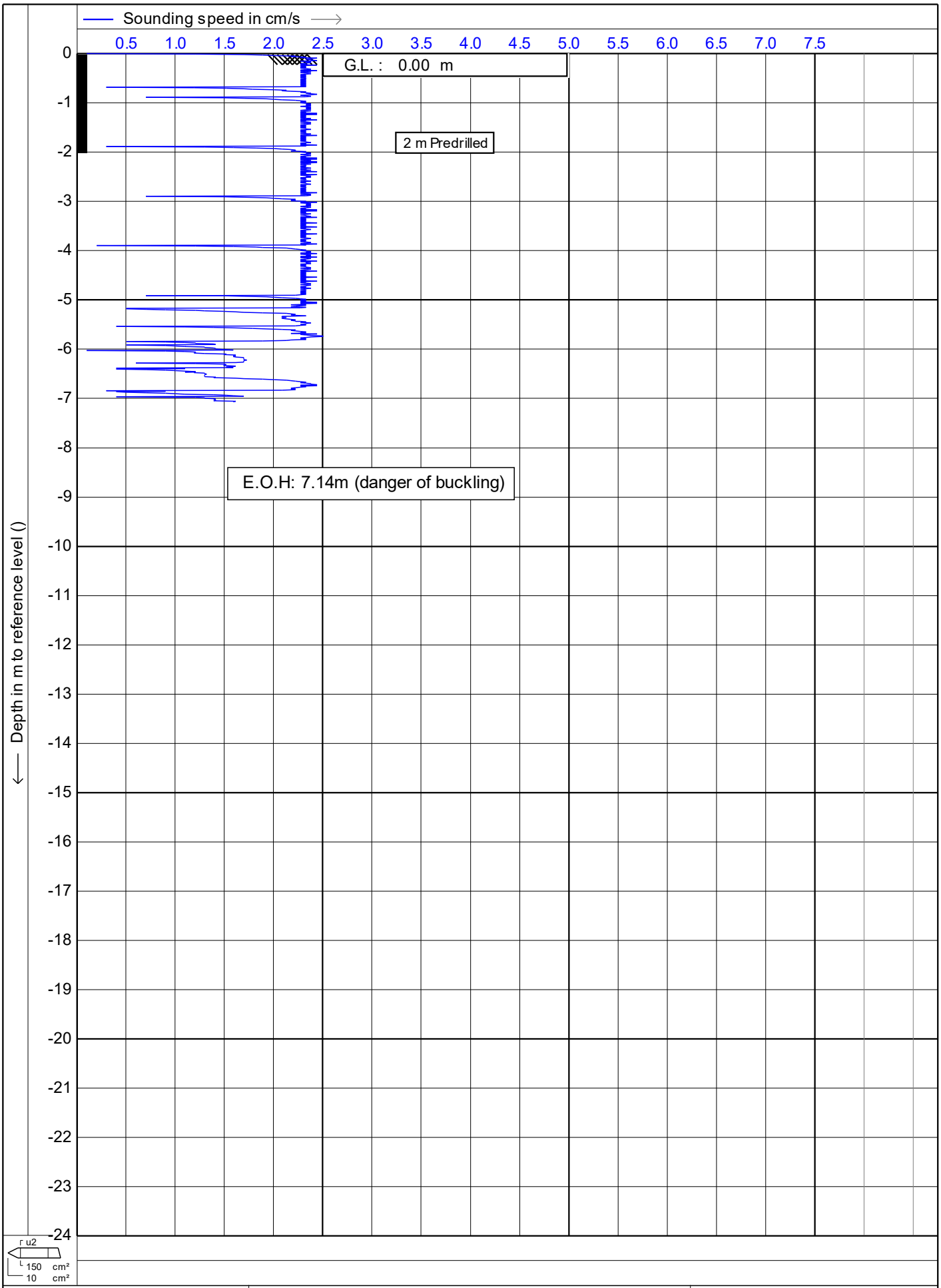


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

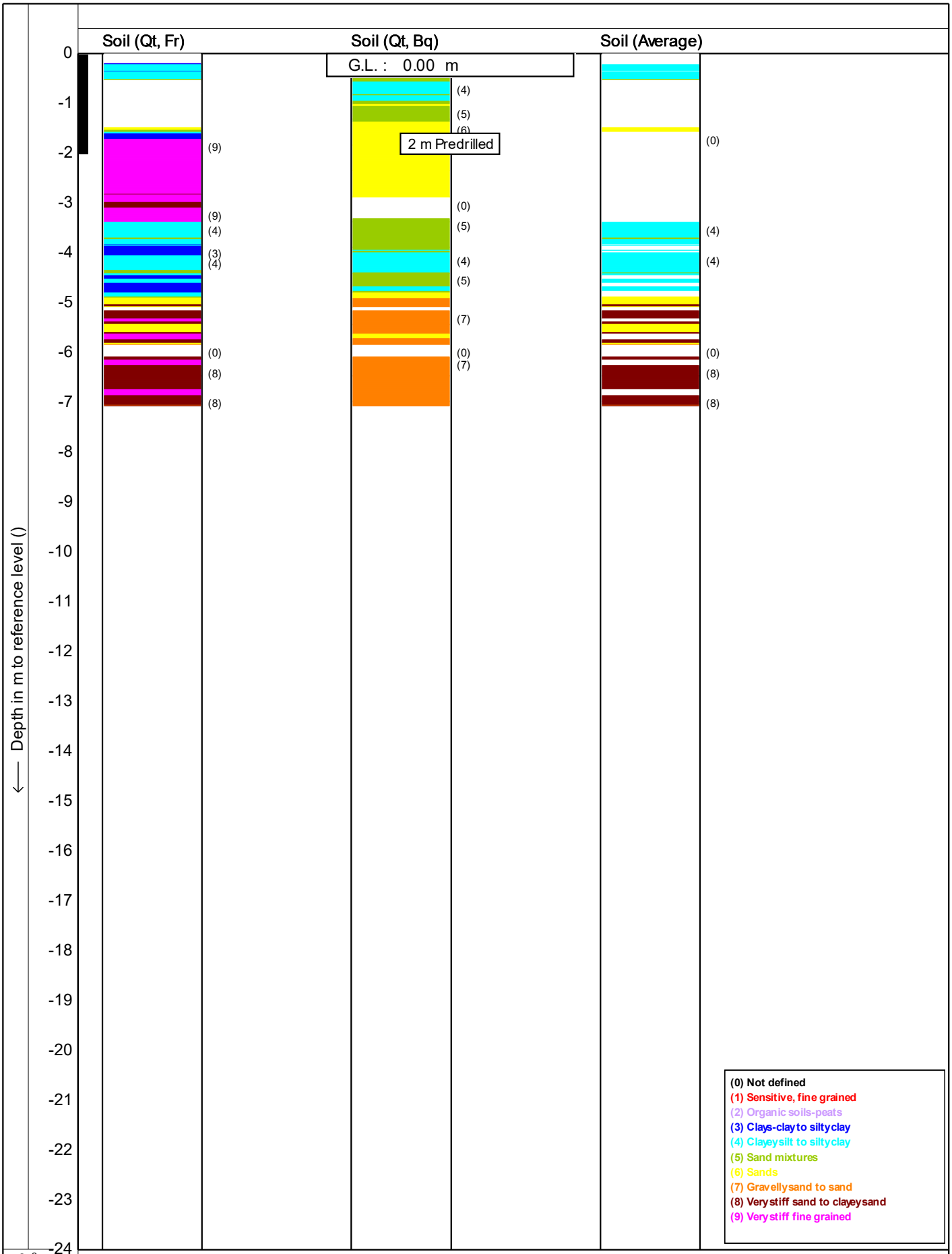
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **13/15**

1.47



Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

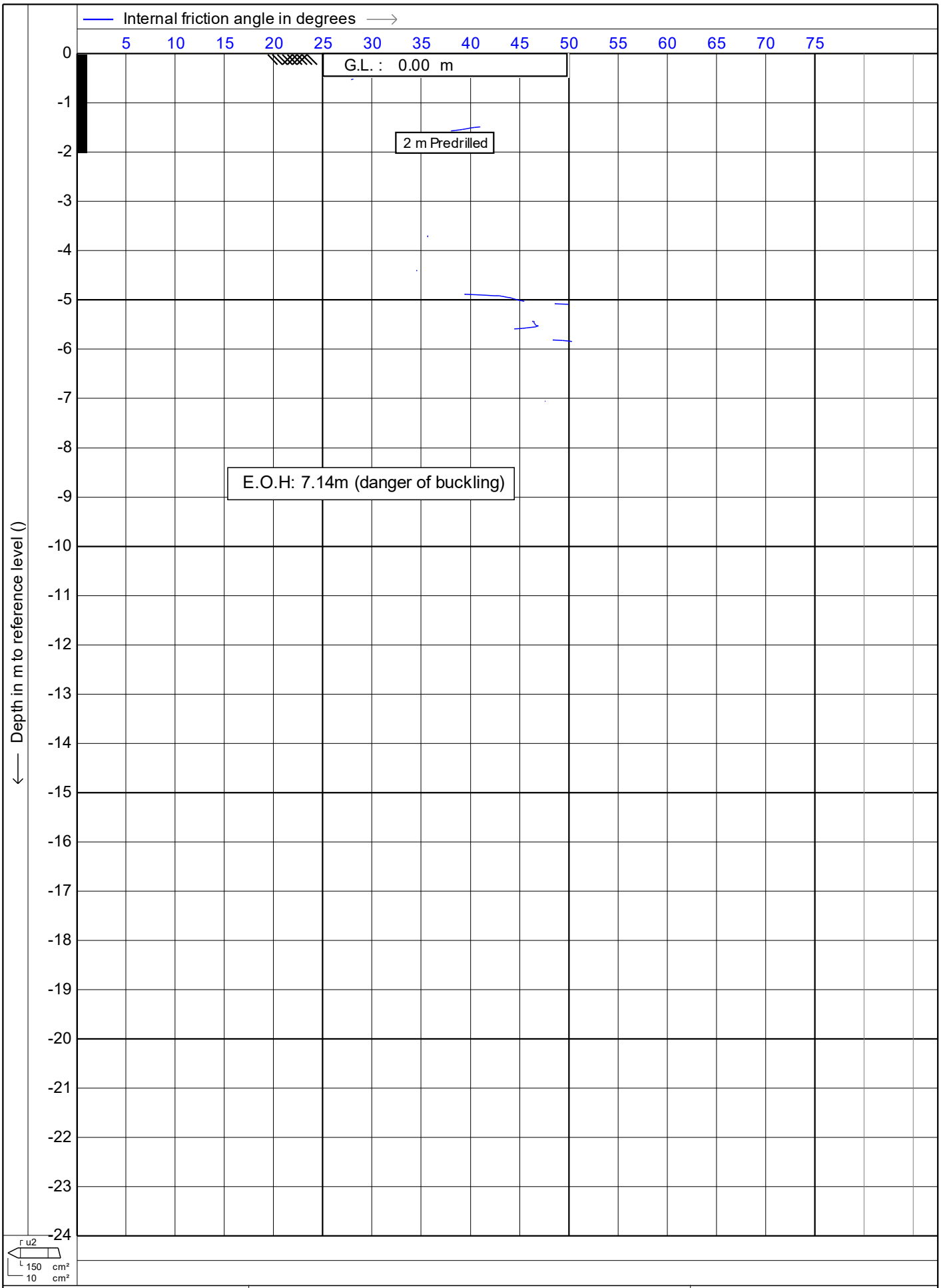
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

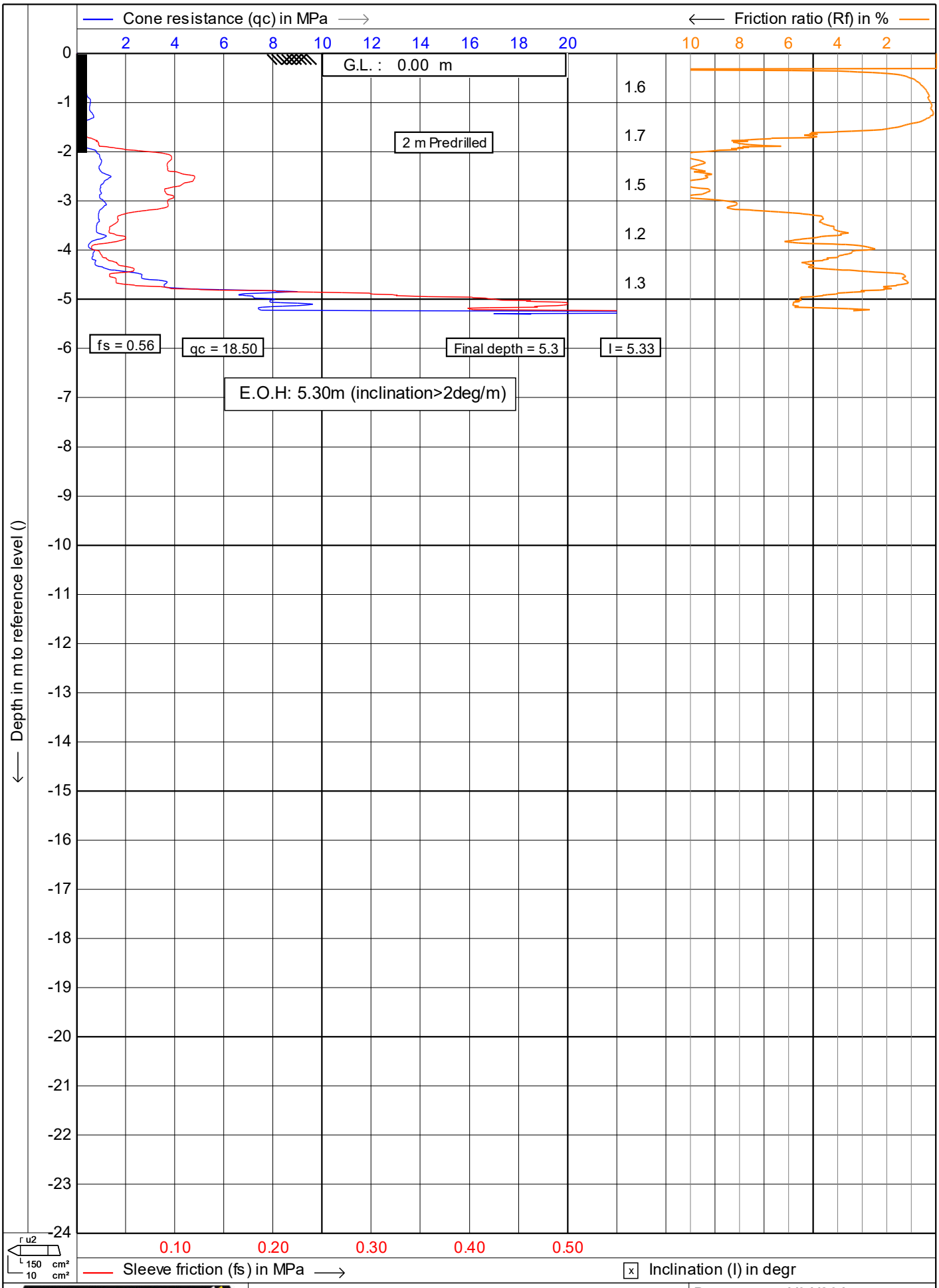
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073388, -39.058681 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15298**
Project no.	: **DF19GE160**
CPT no.	: **CPT_04** **15/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

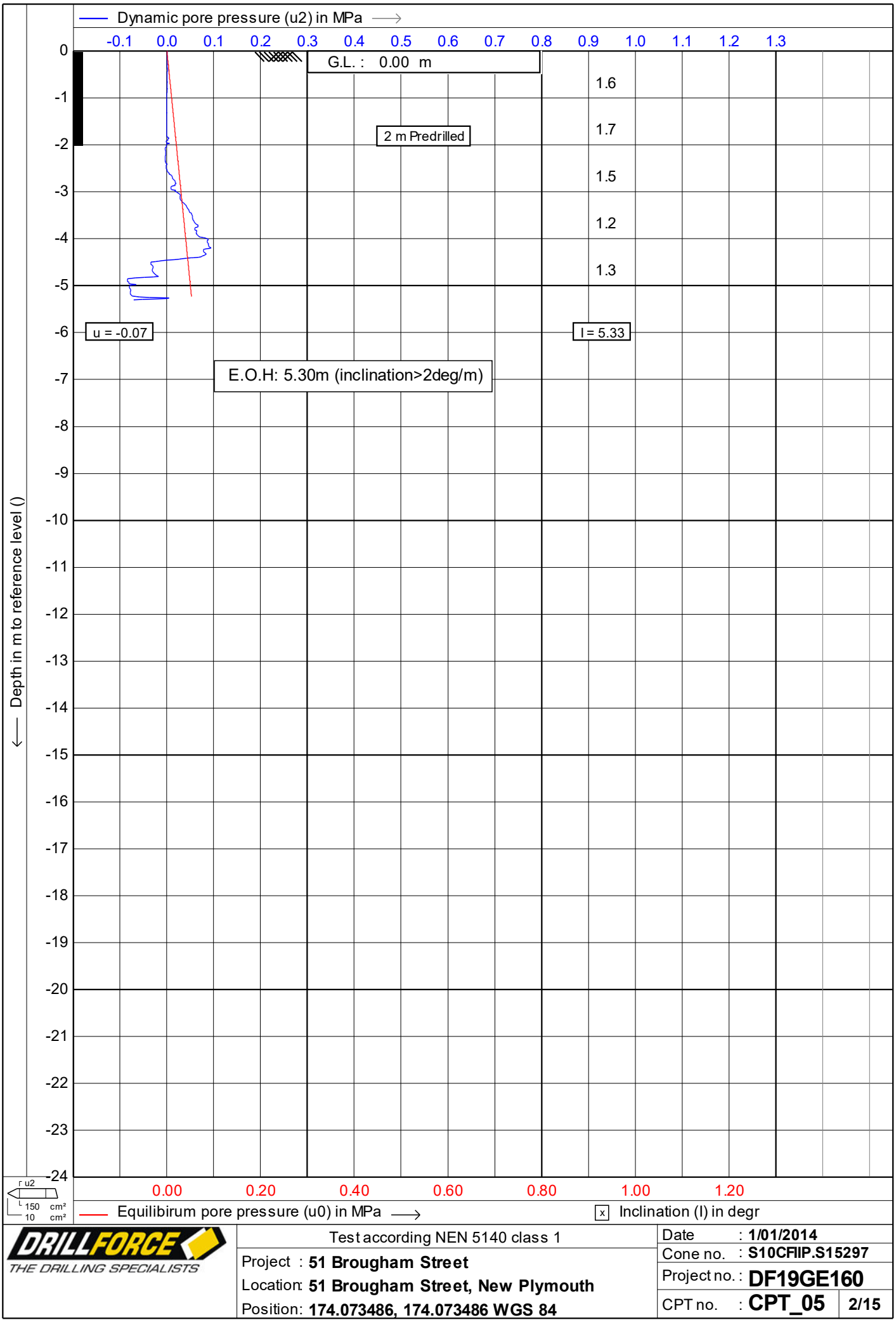
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** 1/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

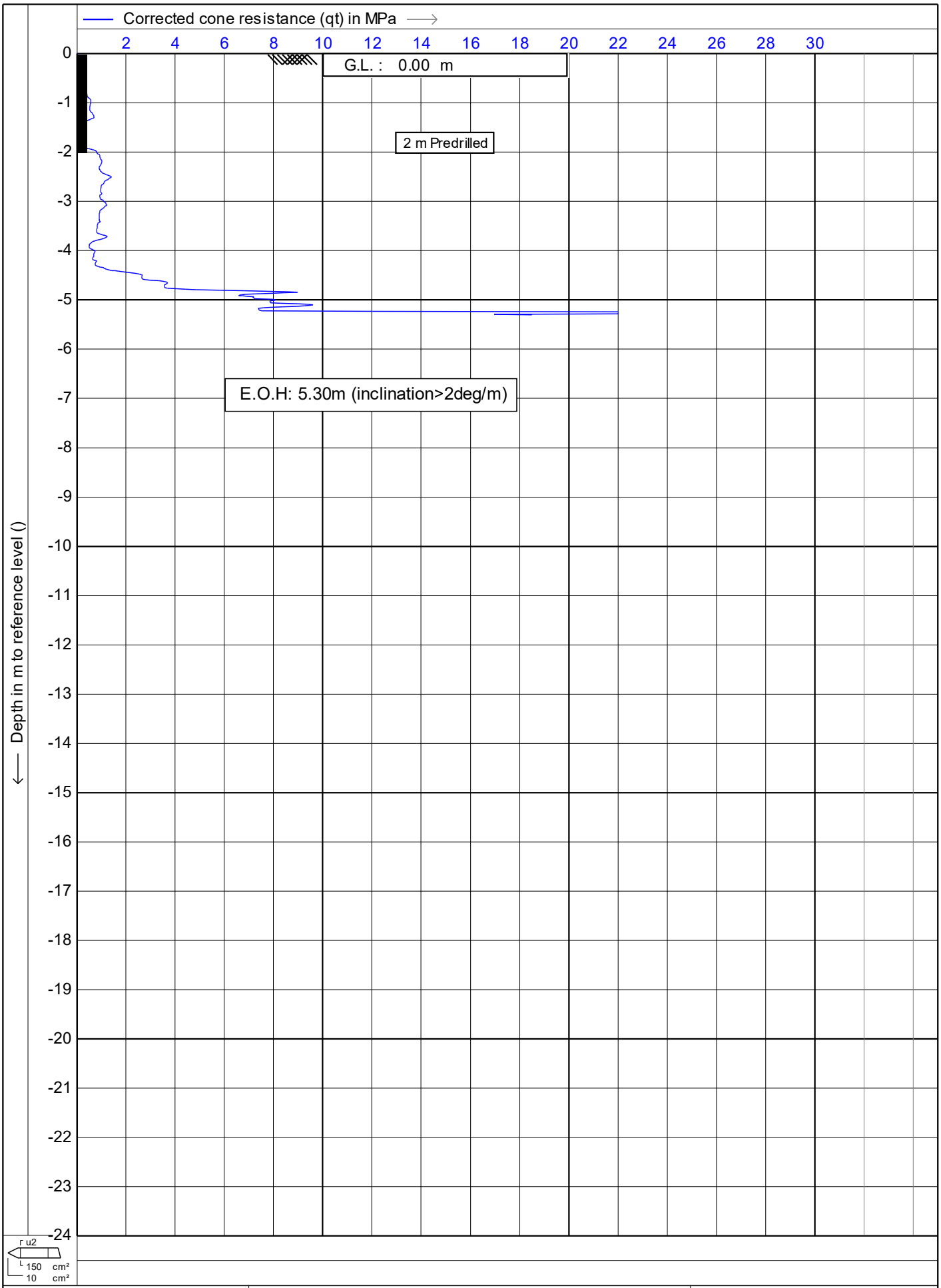
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

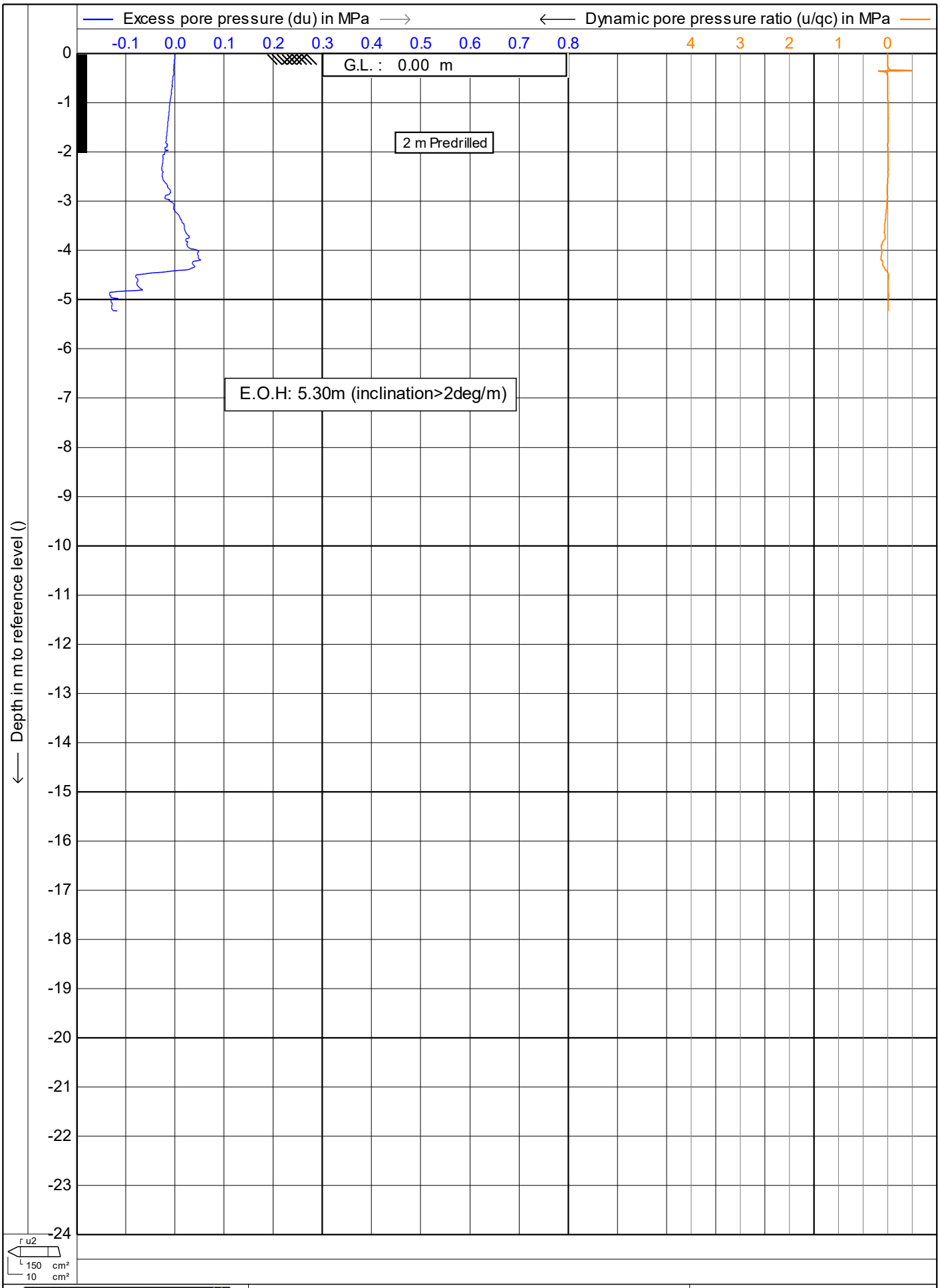
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** 3/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

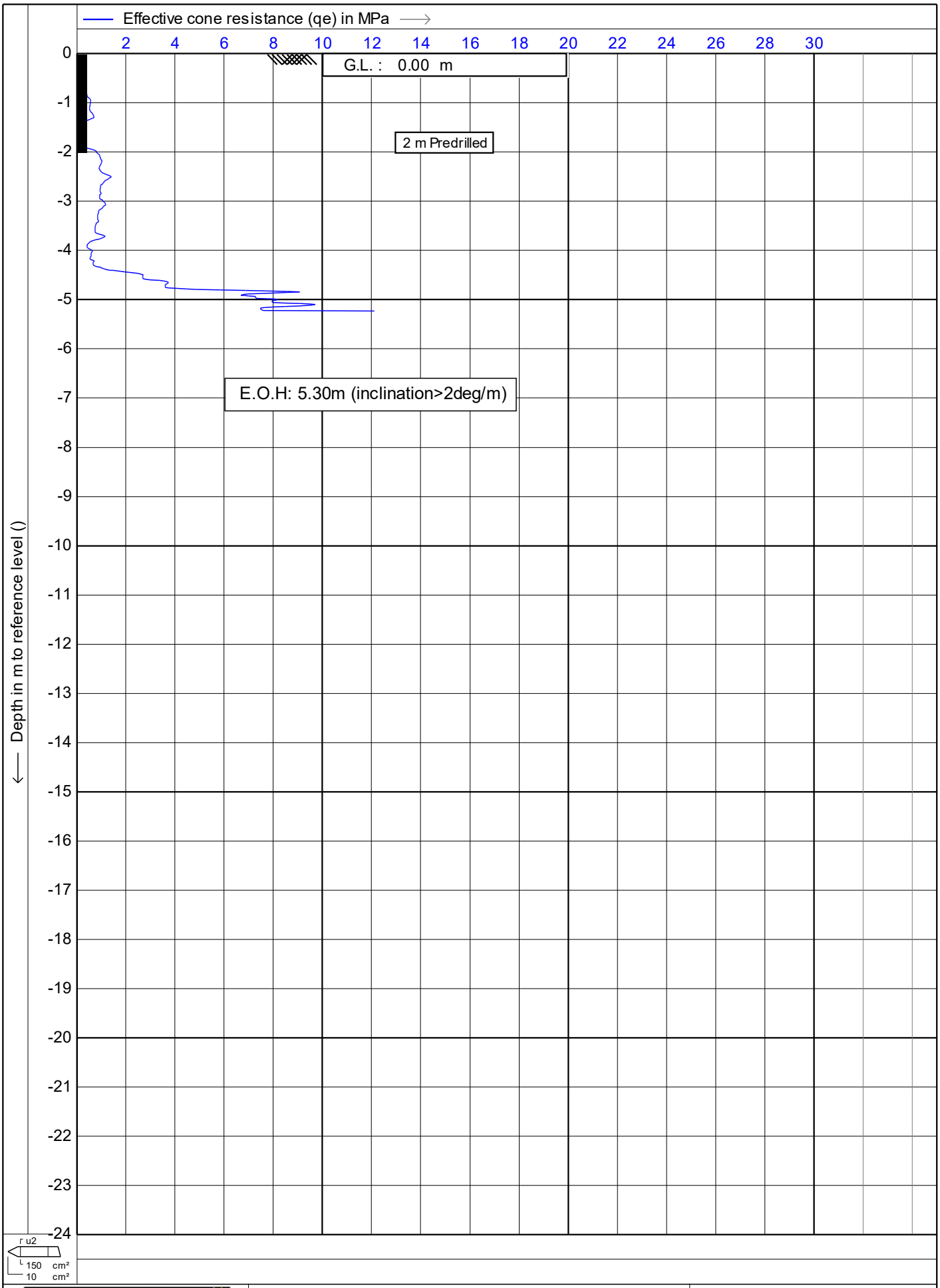
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **4/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

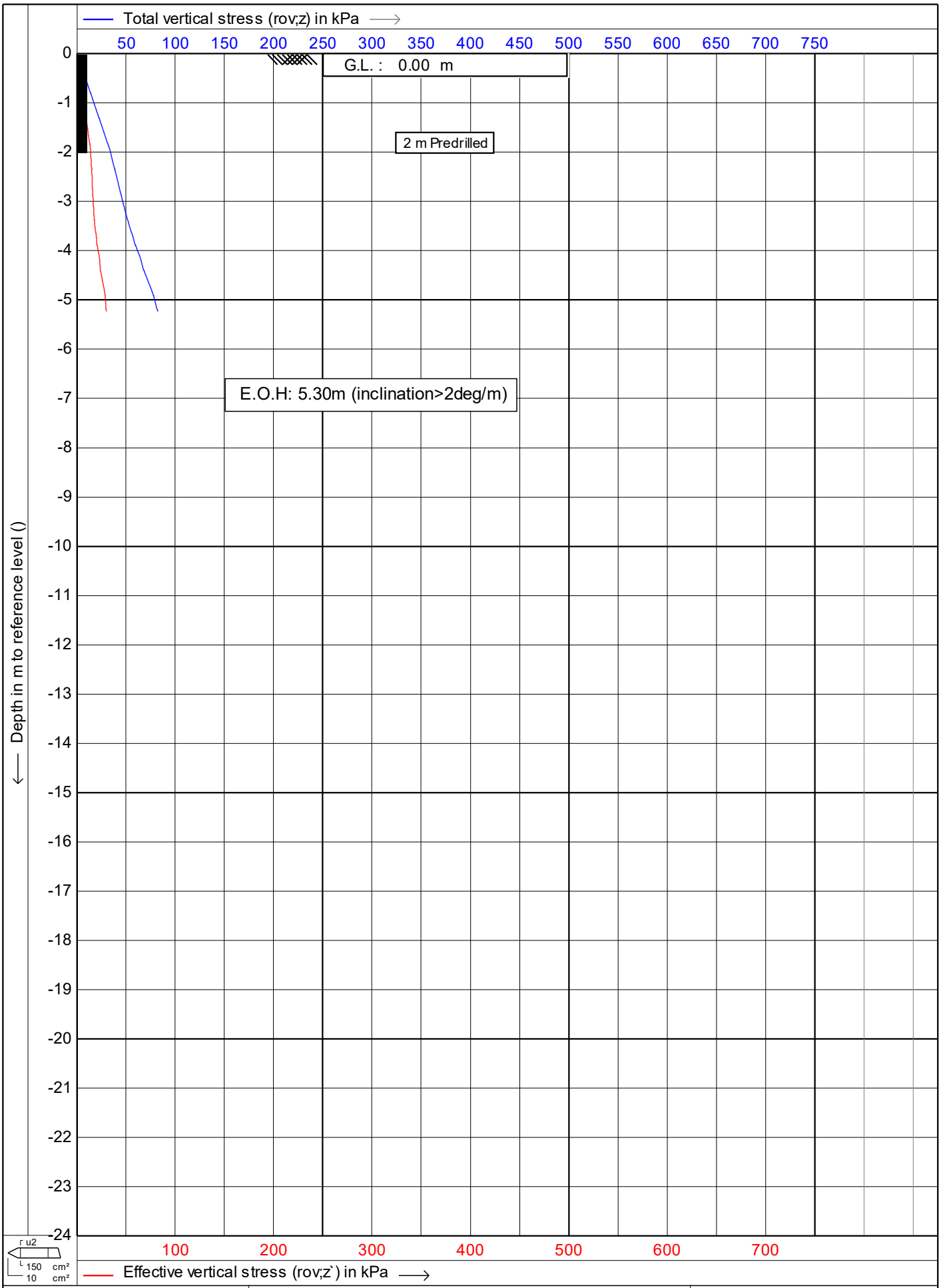
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **5/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

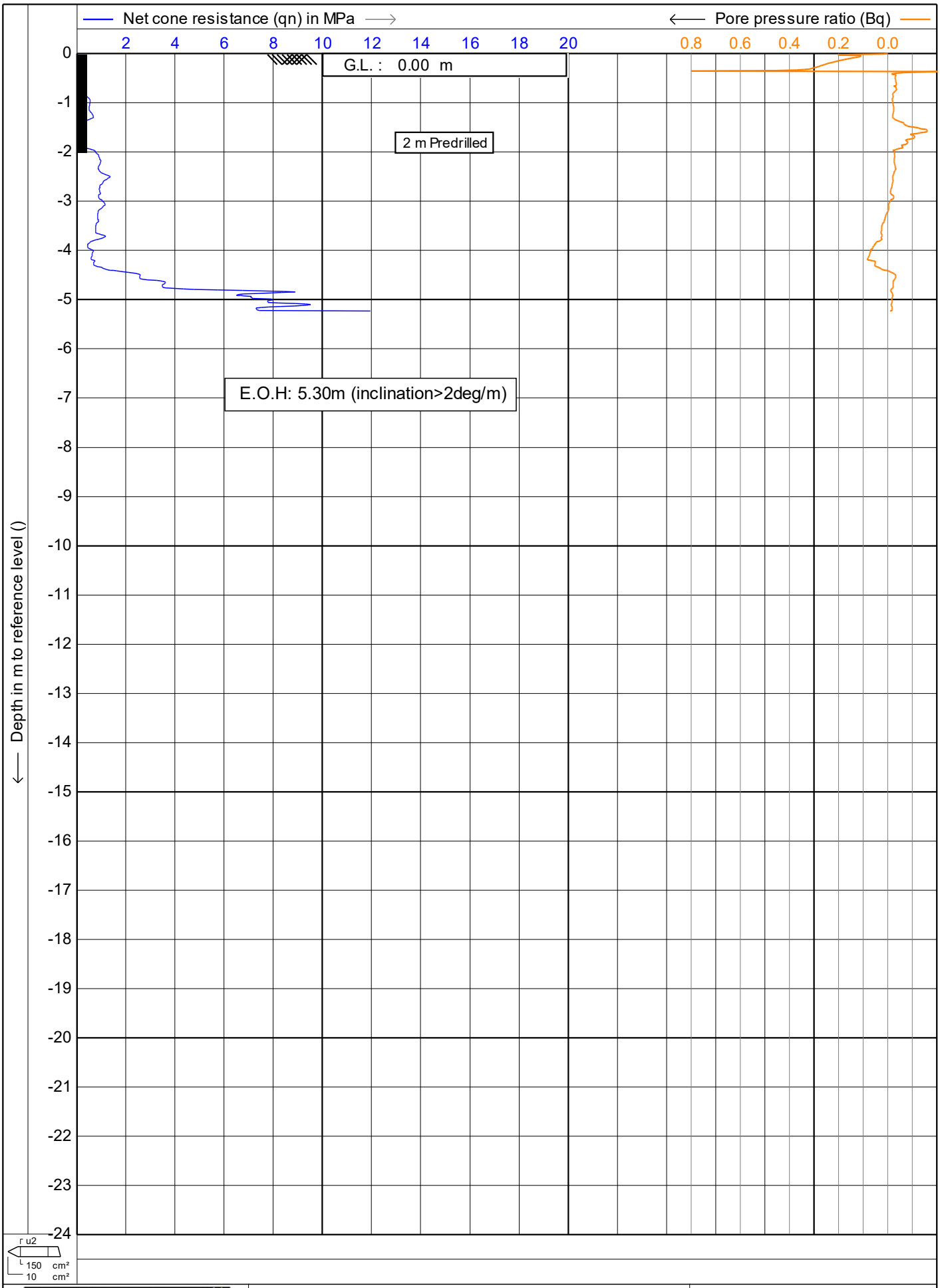
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **6/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

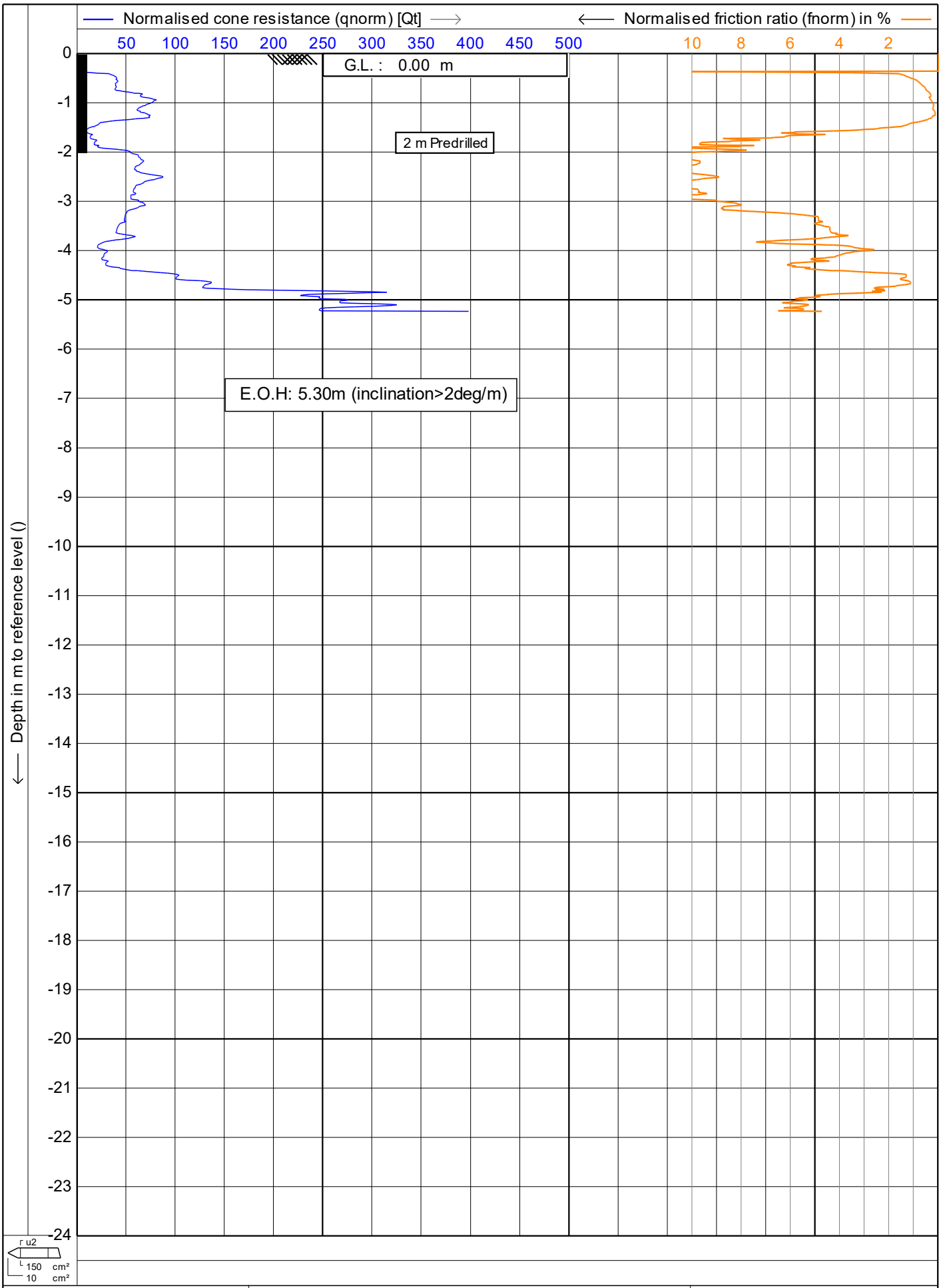
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** 7/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

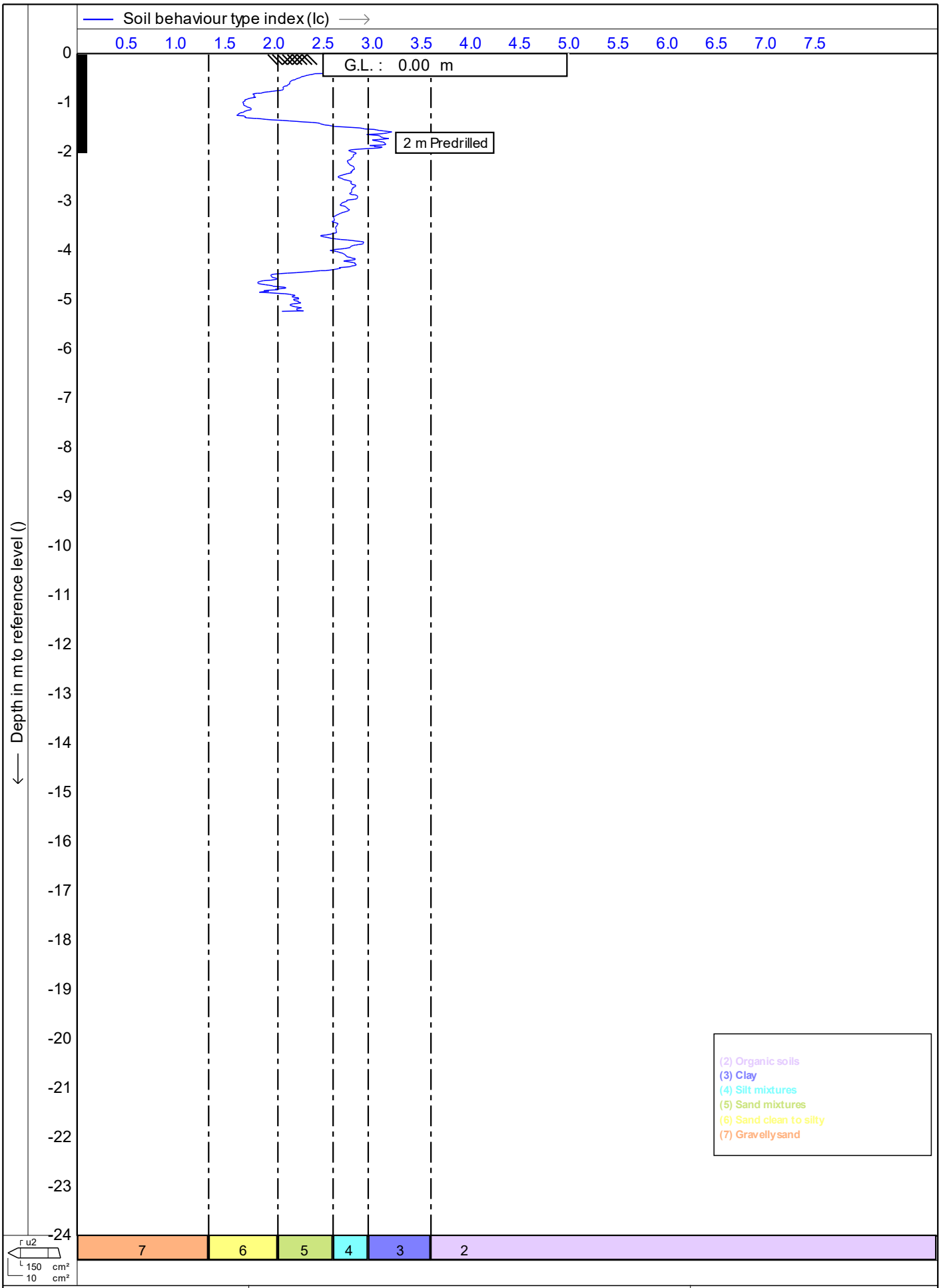
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **8/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

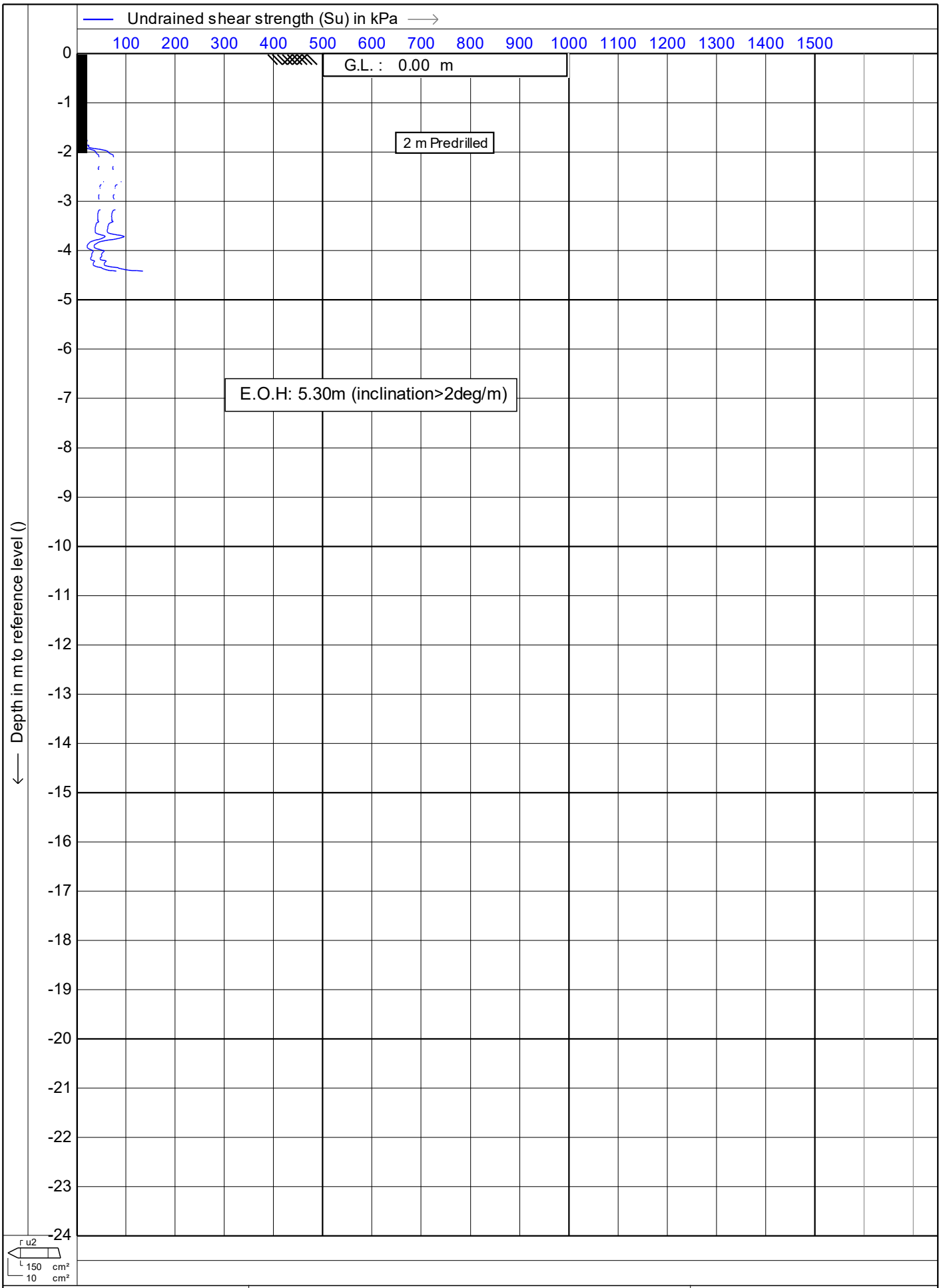
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **9/15**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **10/15**

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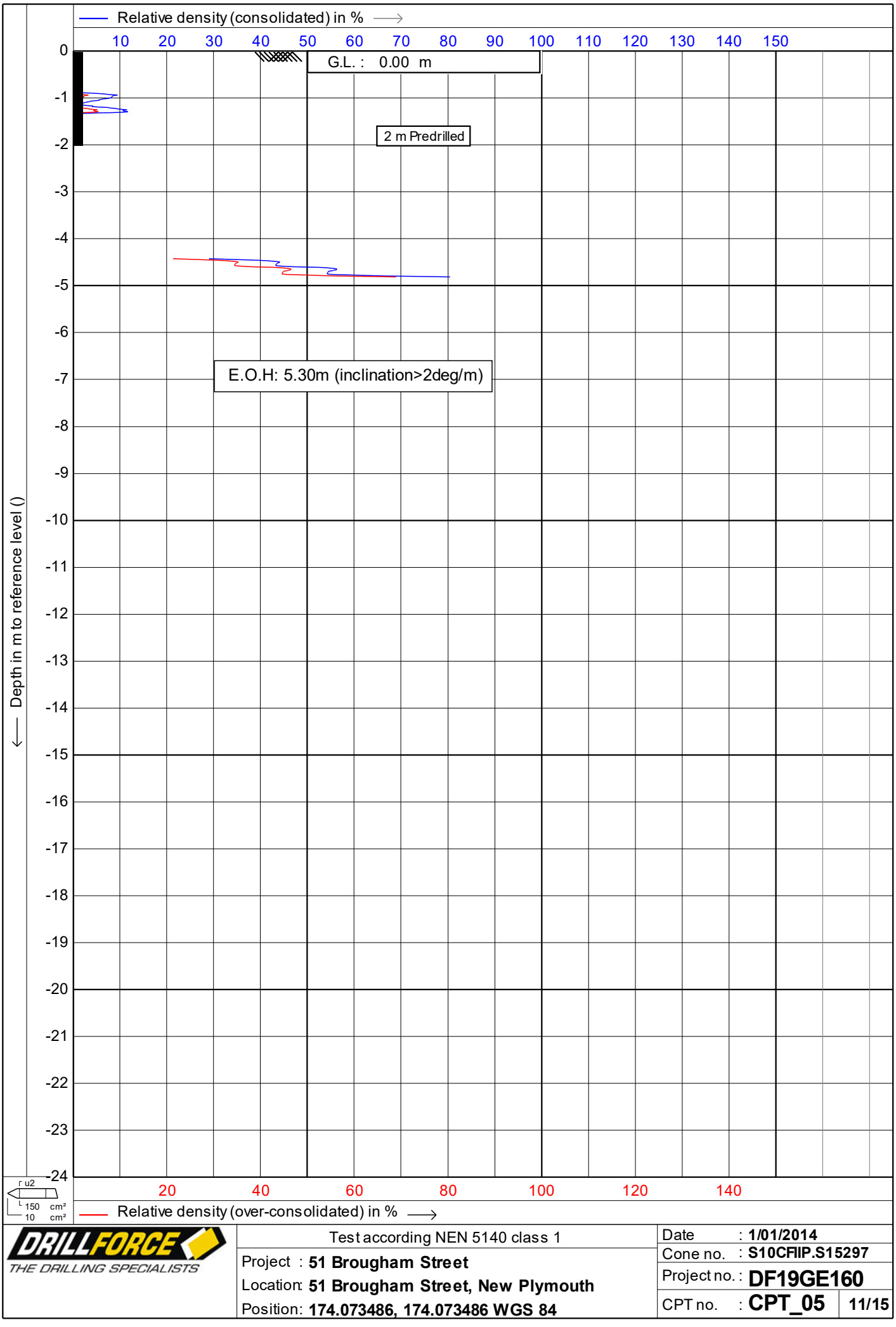


DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

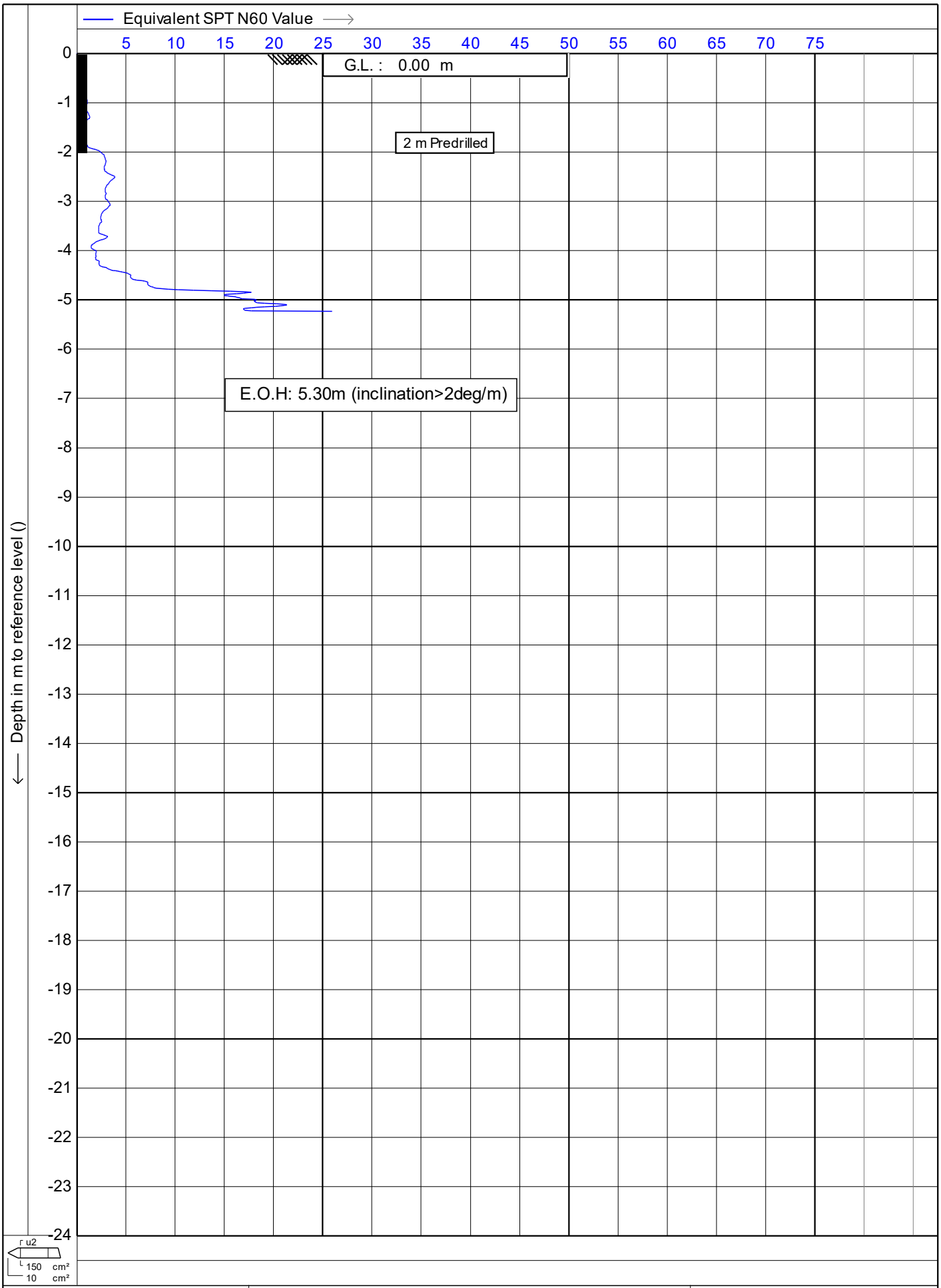
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** 11/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

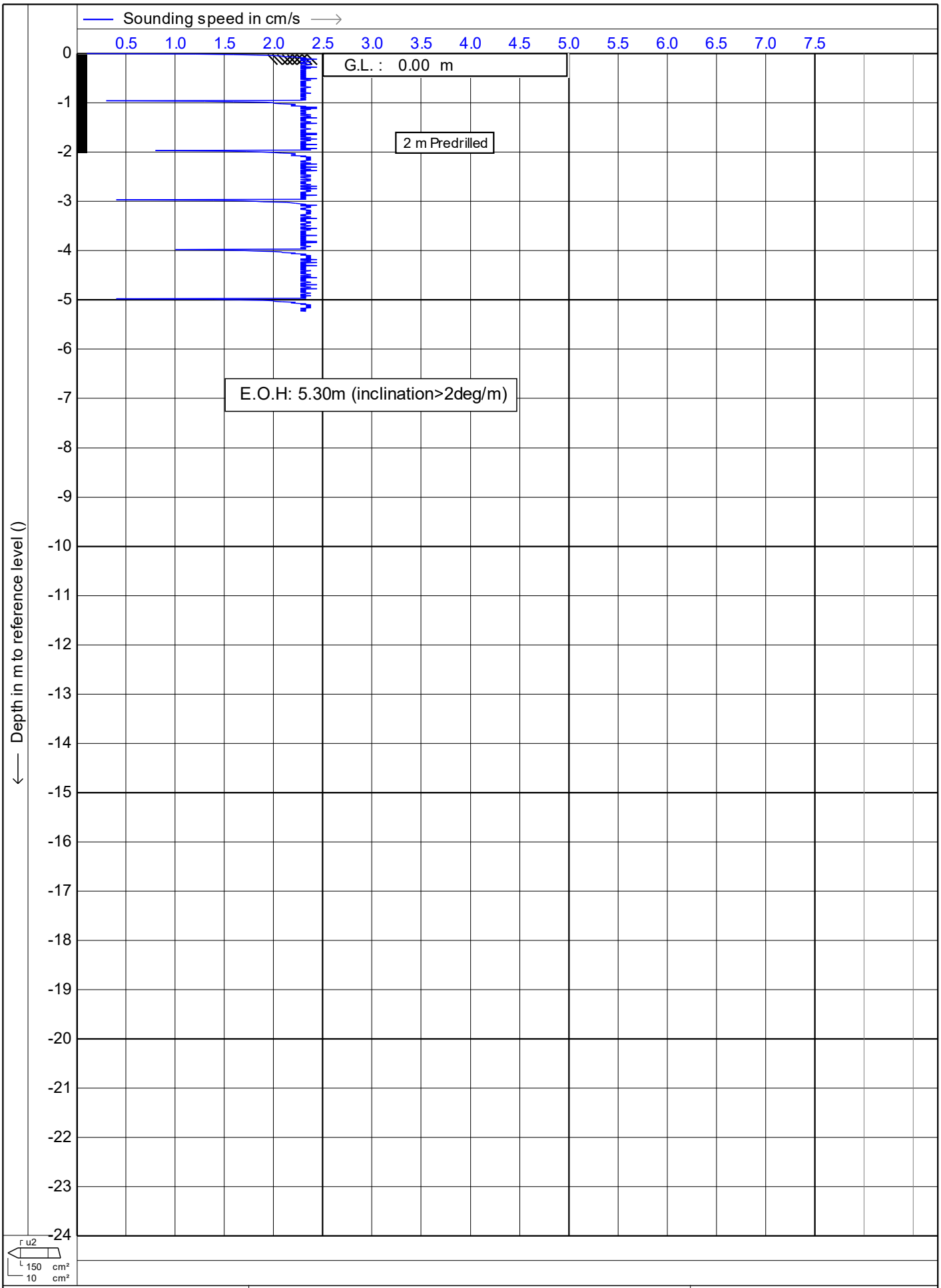
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** 12/15

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

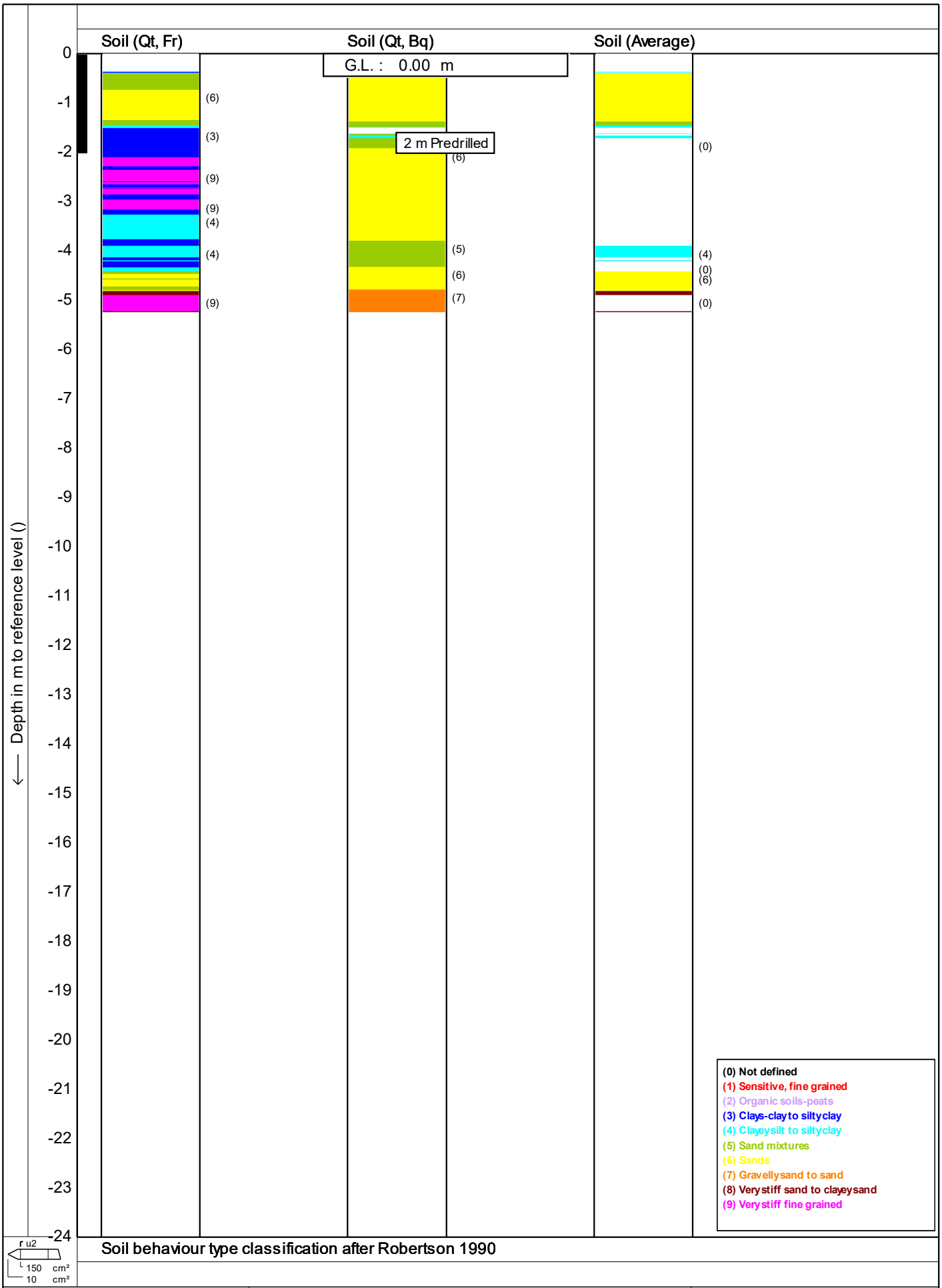
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05**

1.47



Soil behaviour type classification after Robertson 1990

DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

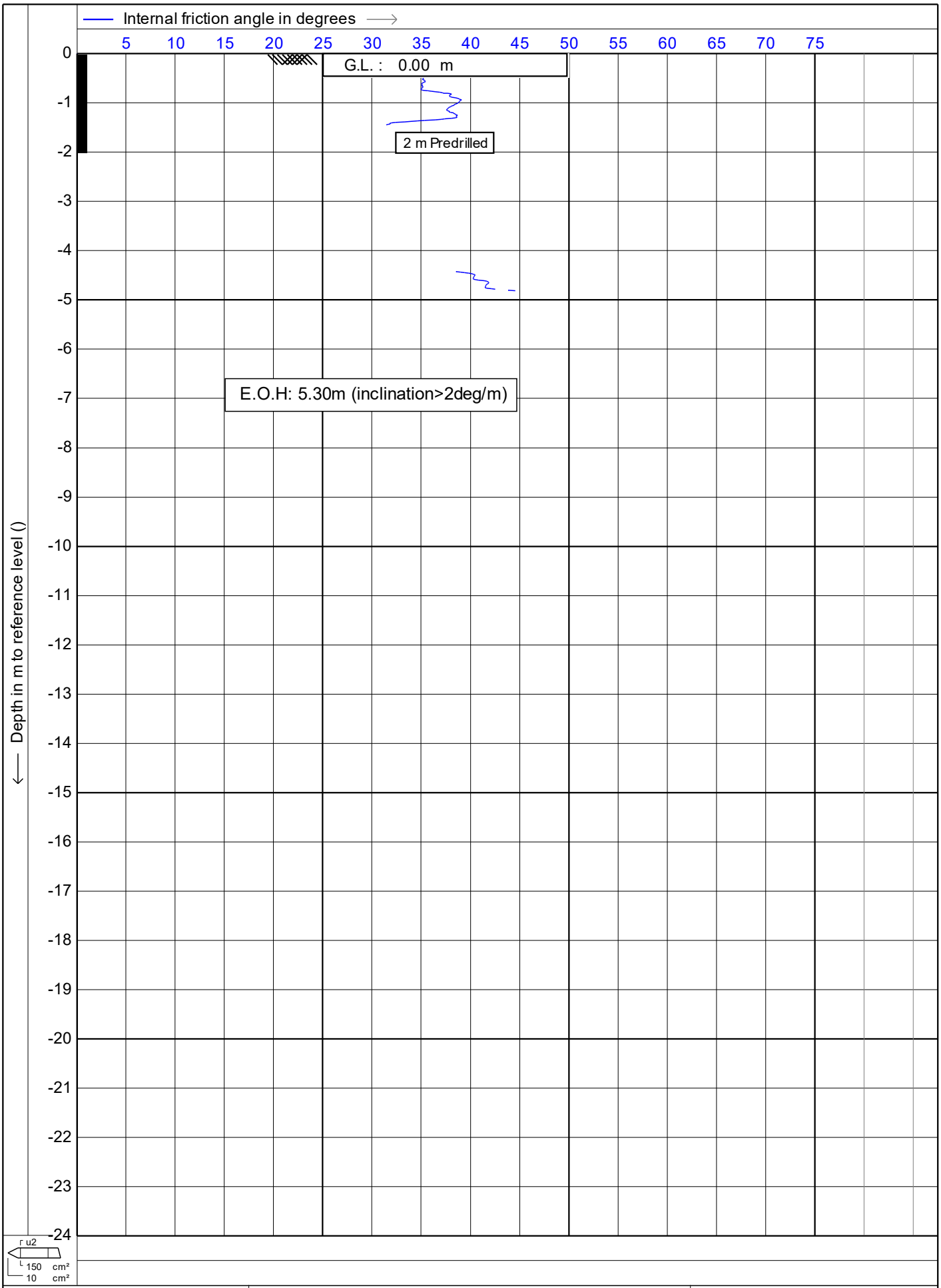
Project : **51 Brougham Street**

Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05**

1.47



DRILLFORCE
THE DRILLING SPECIALISTS

Test according NEN 5140 class 1

Project : **51 Brougham Street**

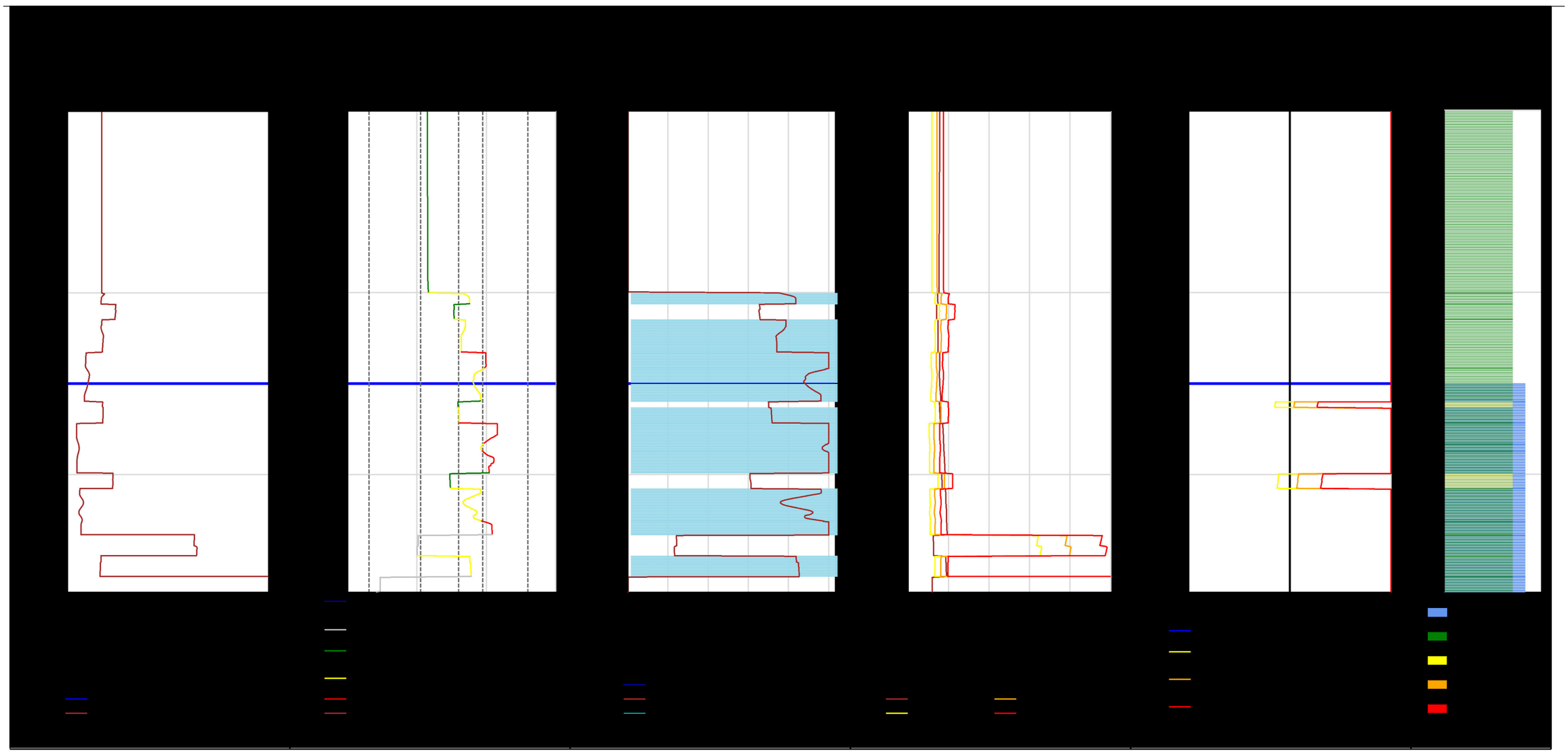
Location: **51 Brougham Street, New Plymouth**

Position: **174.073486, 174.073486 WGS 84**

Date	: **1/01/2014**
Cone no.	: **S10CFIIP.S15297**
Project no.	: **DF19GE160**
CPT no.	: **CPT_05** **15/15**

1.47

Appendix D: Liquefaction assessment



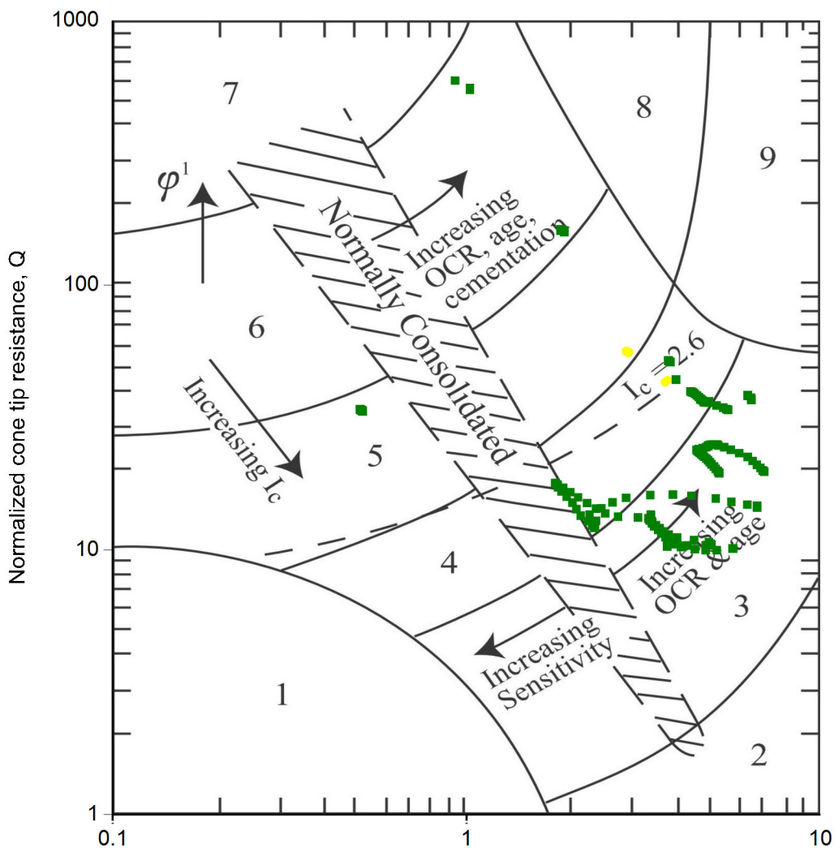
Note: Inverse filtered Qc/Fs data (10 cm²) used.

	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	γ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT01	140508	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	

	PL	SV1D (mm)	CTL (m)	LPI	LSN	CT (m)	LPIish
OUTPUT	15%	4	0.2	0	1	4	0
	50%	2	0	0	0	5.3	0
	85%	1	0	0	0	5.3	0

Reviewed by:

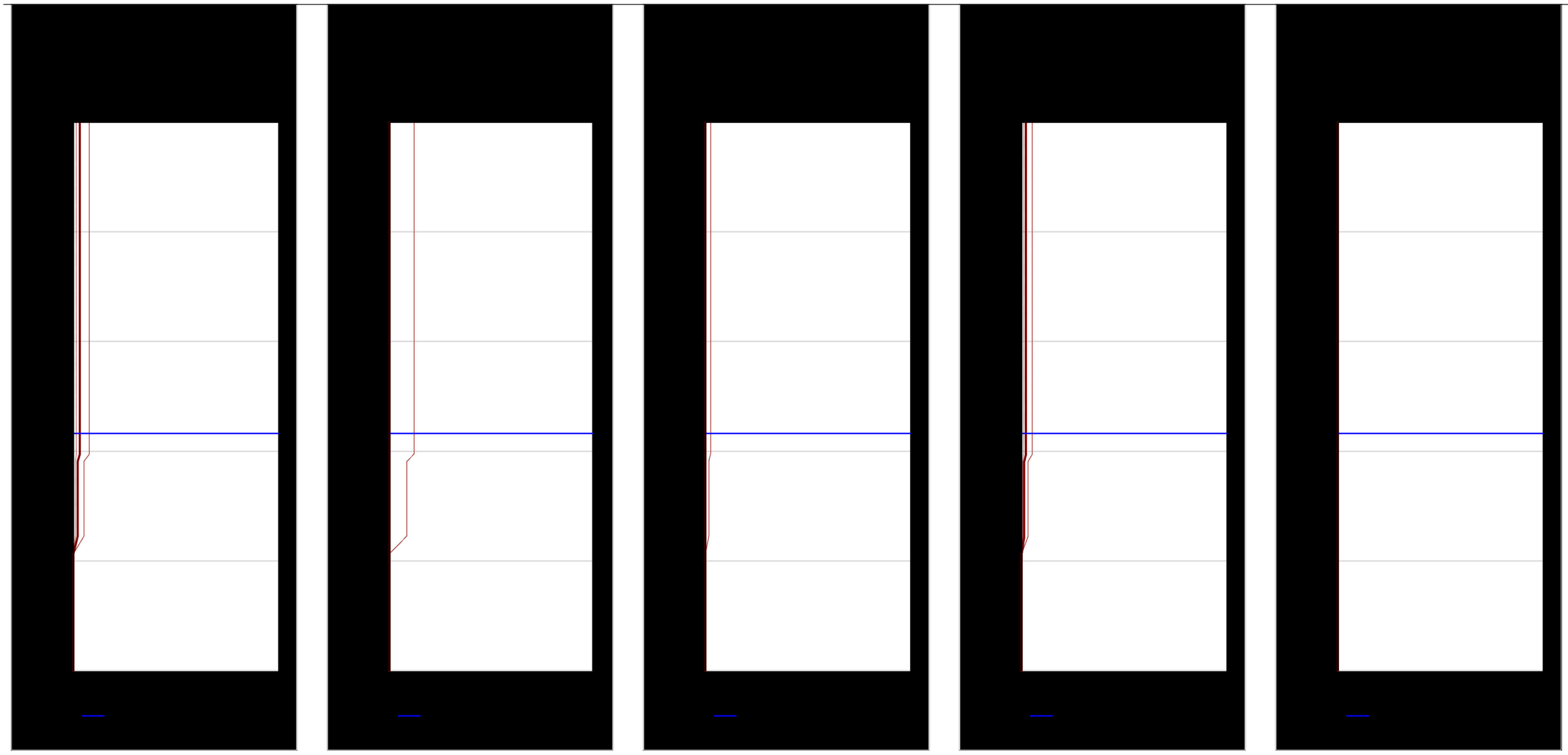
CPT Inversion	ammw
Groundwater	ammw
Susceptibility	ammw
Triggering	ammw
Consequence	ammw



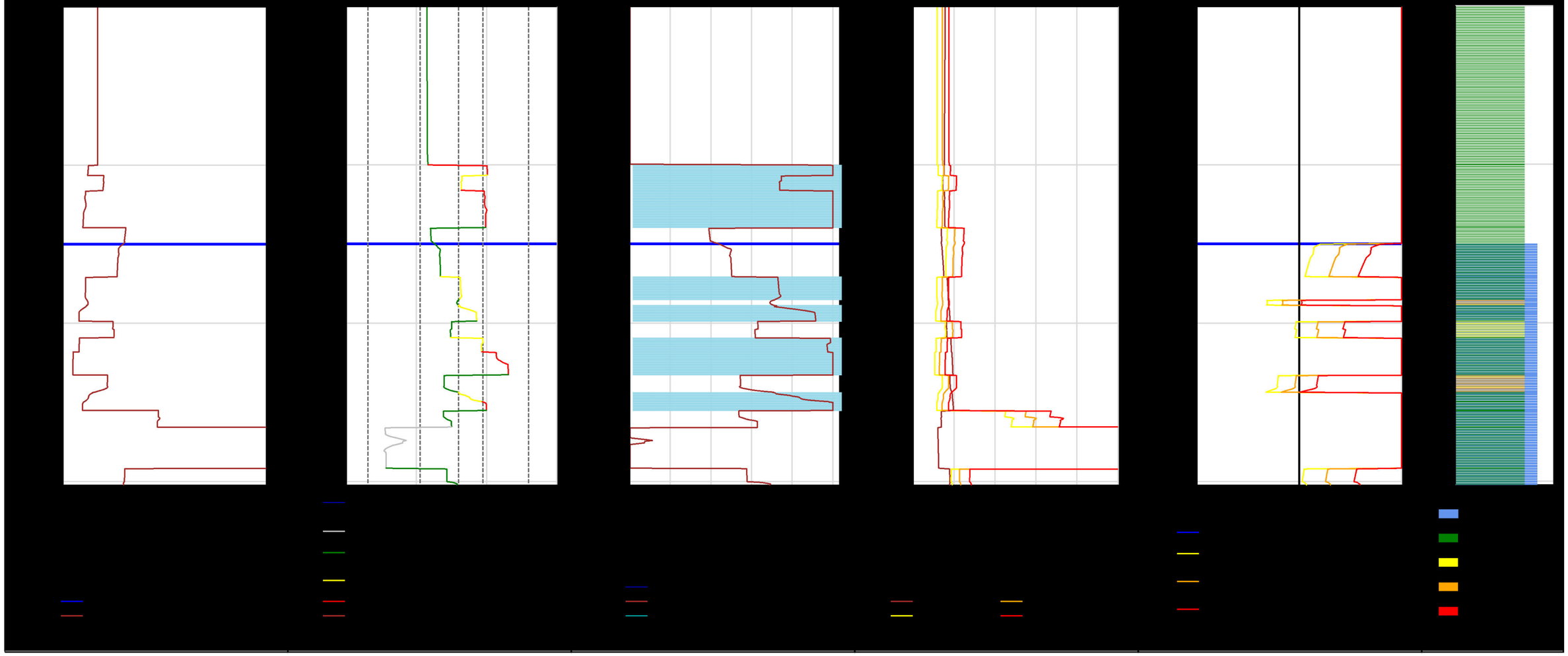
1. Sensitive, fine grained
2. Organic soils - peats
3. Clays - silty clay to clay
4. Silt mixtures - clayey silt to silty clay
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand *
9. Very stiff, fine grained *

*Heavily overconsolidated or cemented

CPT-based soil behavior type classification chart by Robertson (1990)



	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT01	140508	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	



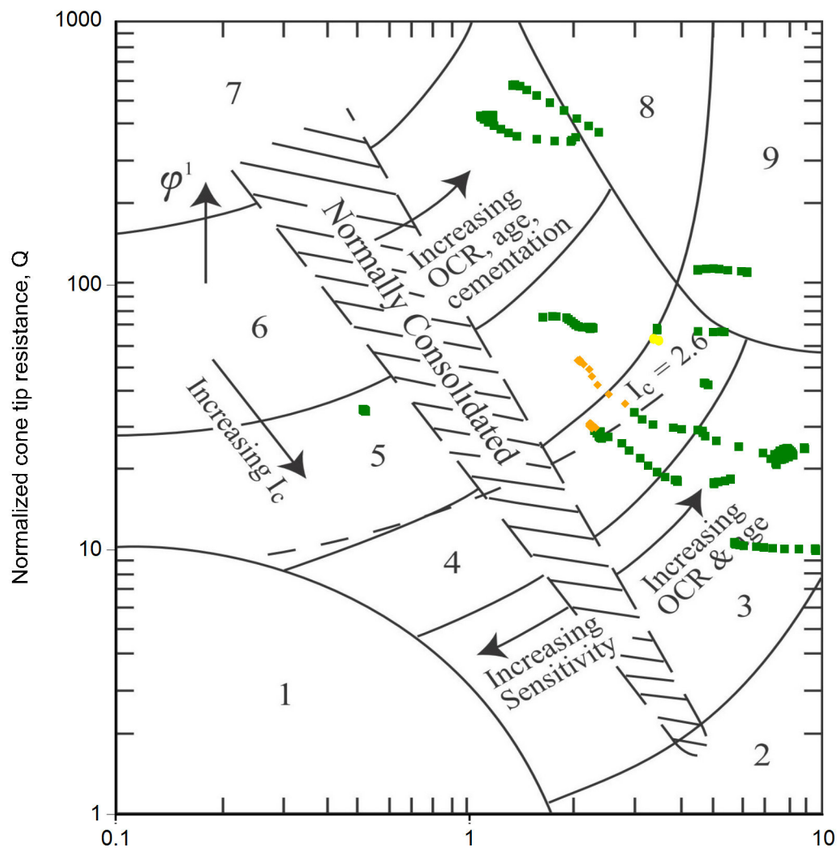
Note: Inverse filtered Qc/Fs data (10 cm²) used.

	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT01A	140510	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	

	PL	SV1D (mm)	CTL (m)	LPI	LSN	CT (m)	LPIish
OUTPUT	15%	12	0.5	1	3	4	0
	50%	7	0.3	0	2	4.7	0
	85%	3	0	0	1	6	0

Reviewed by:

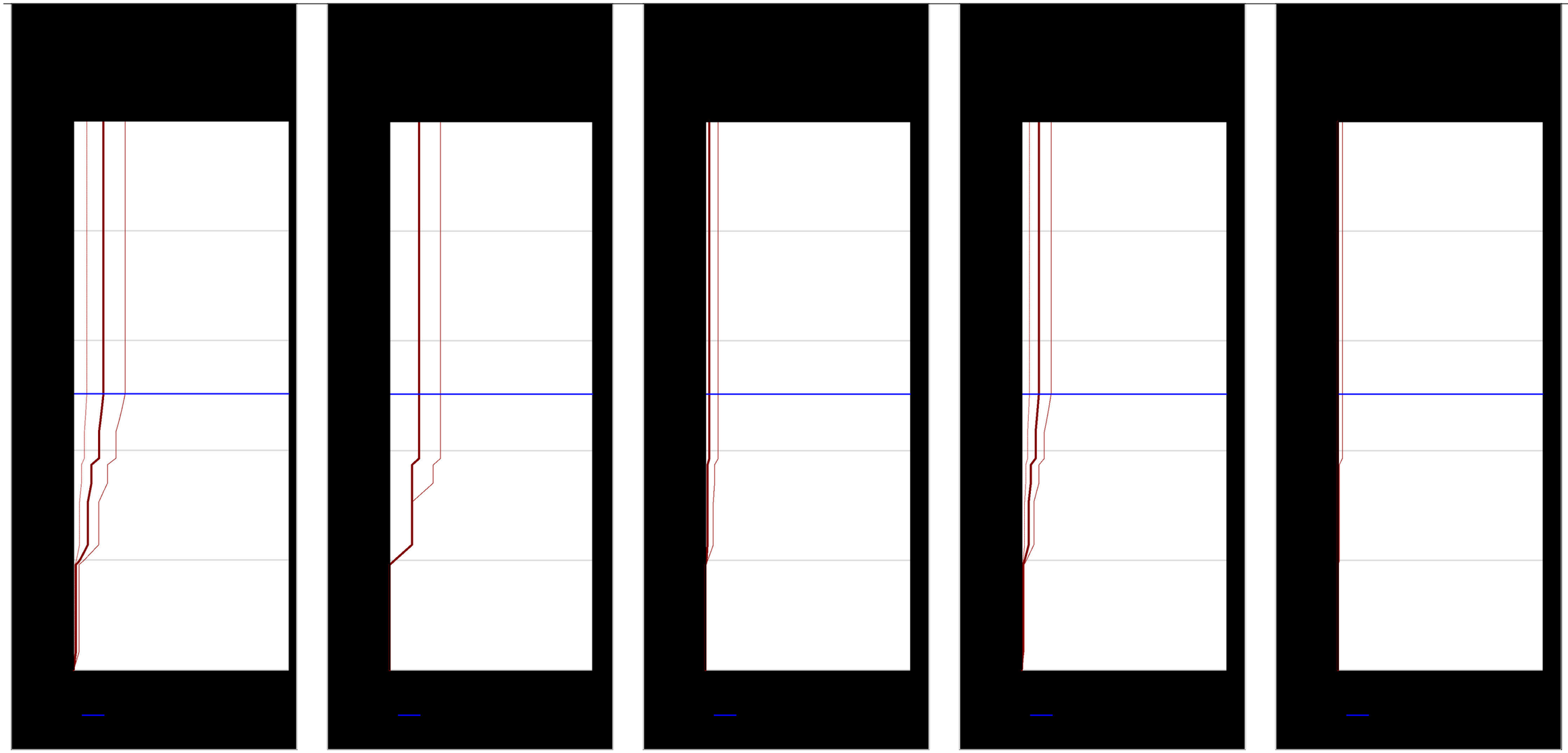
CPT Inversion	ammw
Groundwater	ammw
Susceptibility	ammw
Triggering	ammw
Consequence	ammw



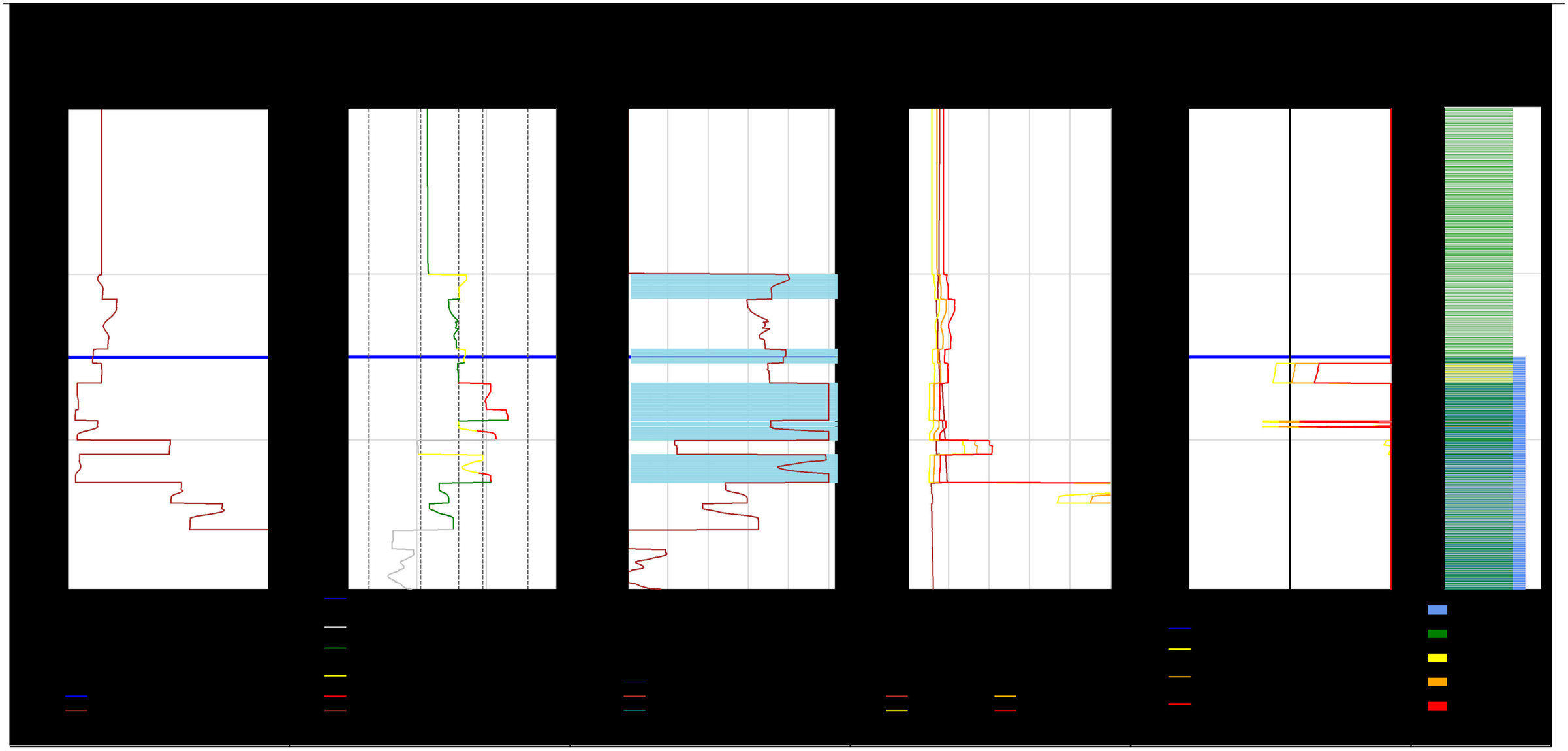
1. Sensitive, fine grained
2. Organic soils - peats
3. Clays - silty clay to clay
4. Silt mixtures - clayey silt to silty clay
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand *
9. Very stiff, fine grained *

*Heavily overconsolidated or cemented

CPT-based soil behavior type classification chart by Robertson (1990)



	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT01A	140510	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	



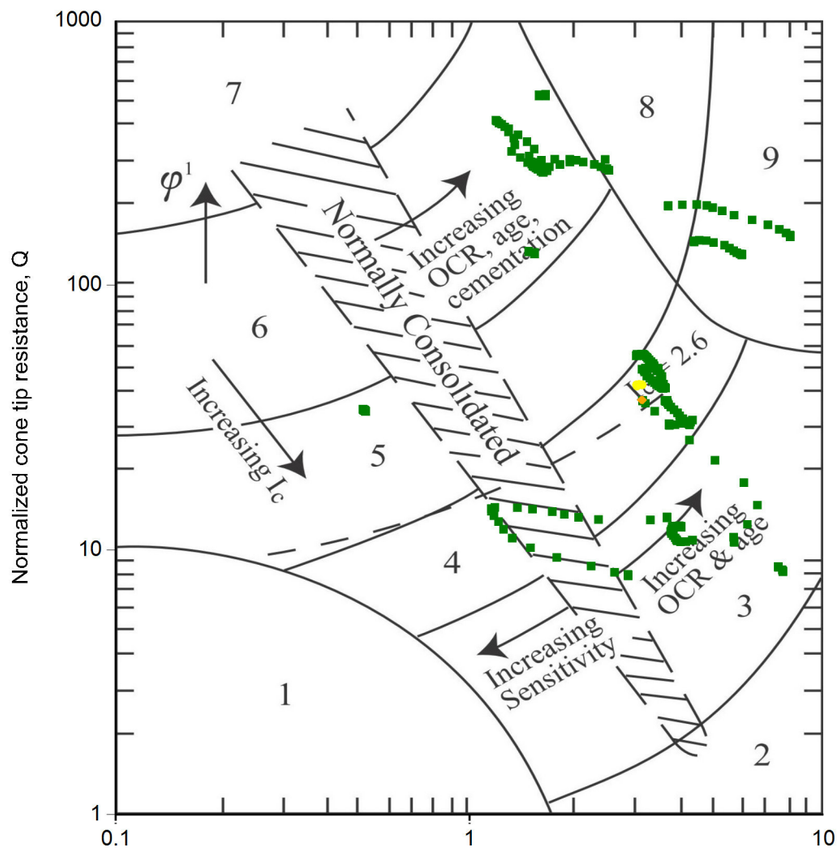
Note: Inverse filtered Qc/Fs data (10 cm²) used.

	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	γ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT02	140509	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	

	PL	SV1D (mm)	CTL (m)	LPI	LSN	CT (m)	LPIish
OUTPUT	15%	5	0.3	0	2	3.2	0
	50%	2	0	0	1	5.8	0
	85%	1	0	0	0	5.8	0

Reviewed by:

CPT Inversion	ammw
Groundwater	ammw
Susceptibility	ammw
Triggering	ammw
Consequence	ammw



1. Sensitive, fine grained
2. Organic soils - peats
3. Clays - silty clay to clay
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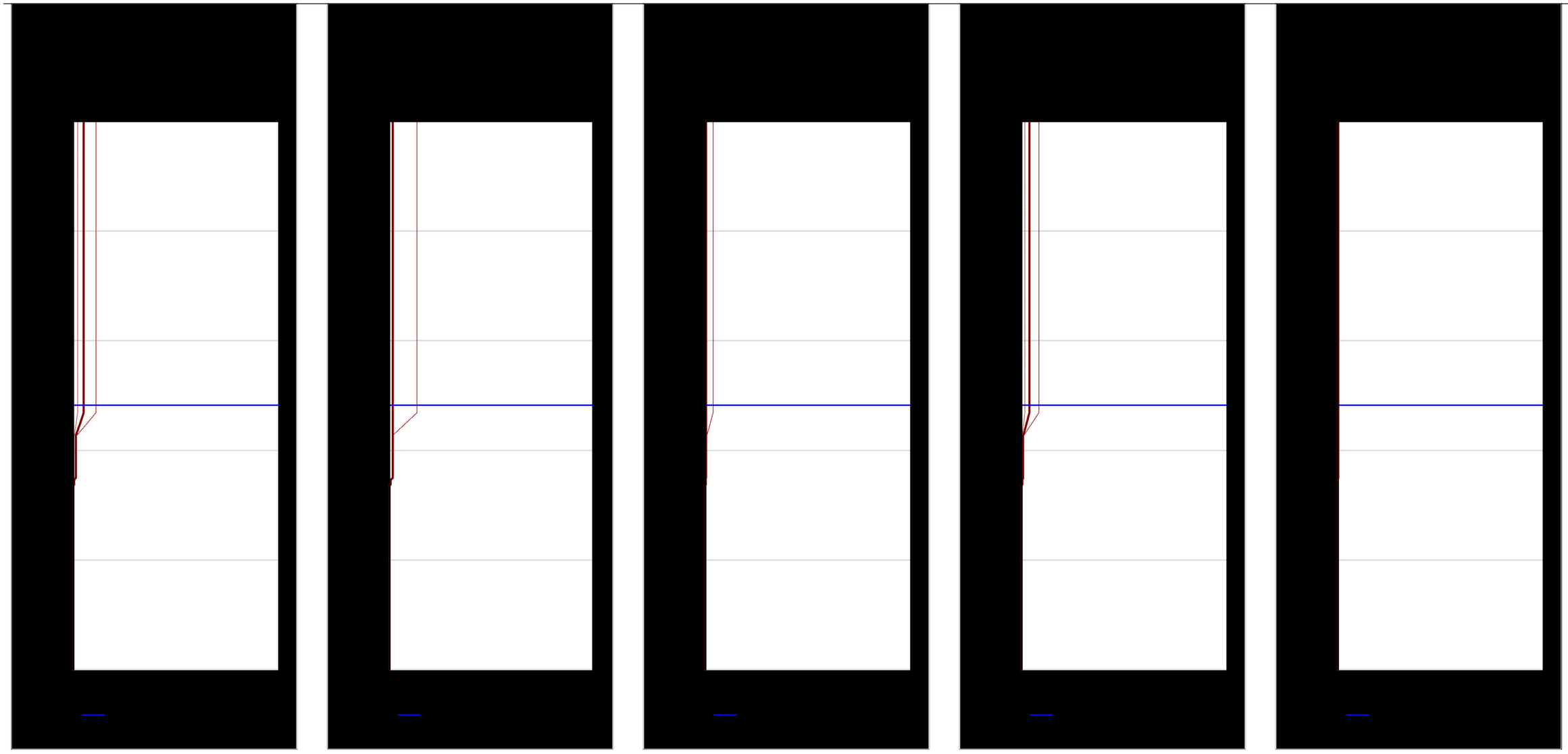
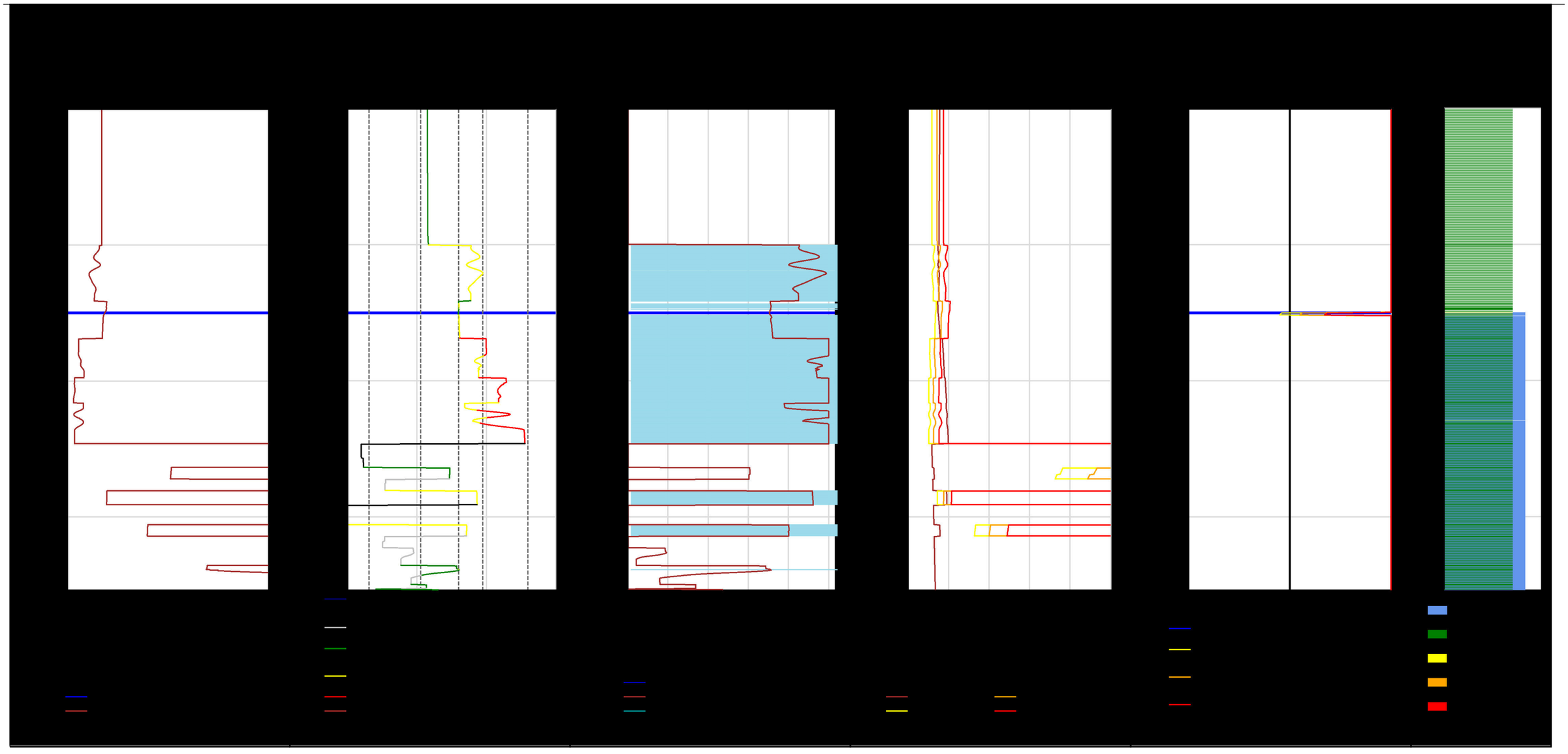
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand *
9. Very stiff, fine grained *

*Heavily overconsolidated or cemented

CPT-based soil behavior type classification chart by Robertson (1990)



	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT02	140509	30/07/2019	2	6	0.29	BI-2014	ZRB-2002	18		0	



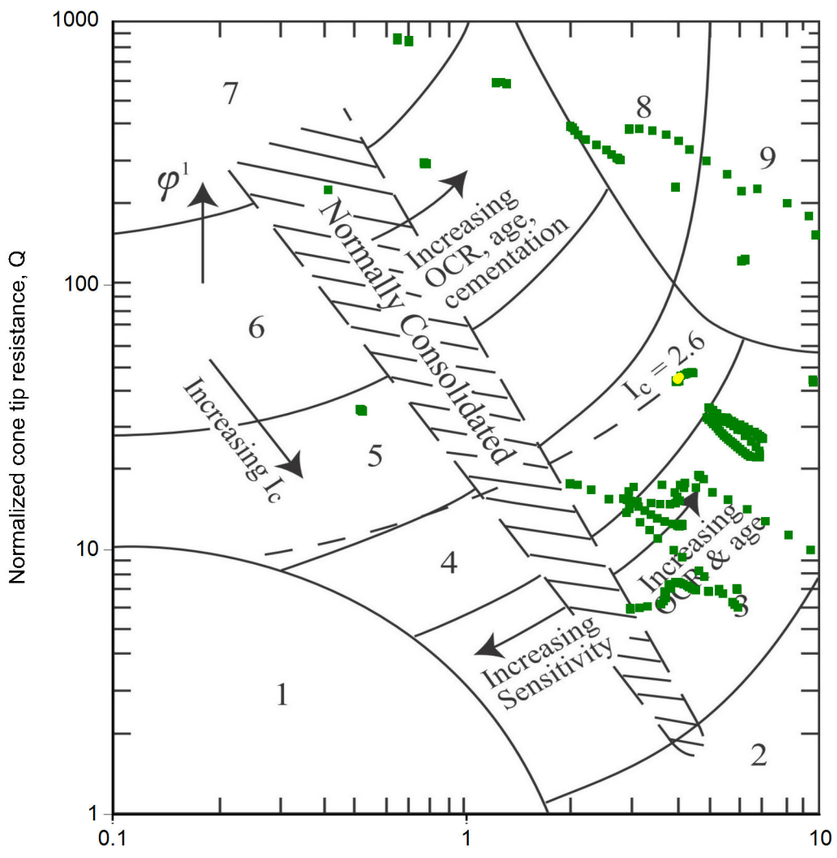
Note: Inverse filtered Qc/Fs data (10 cm²) used.

	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT04	140514	1/01/2014	2	6	0.29	BI-2014	ZRB-2002	18		0	

	PL	SV1D (mm)	CTL (m)	LPI	LSN	CT (m)	LPIish
OUTPUT	15%	1	0	0	0	7.1	0
	50%	0	0	0	0	7.1	0
	85%	0	0	0	0	7.1	0

Reviewed by:

CPT Inversion	ammw
Groundwater	ammw
Susceptibility	ammw
Triggering	ammw
Consequence	ammw



1. Sensitive, fine grained
2. Organic soils - peats
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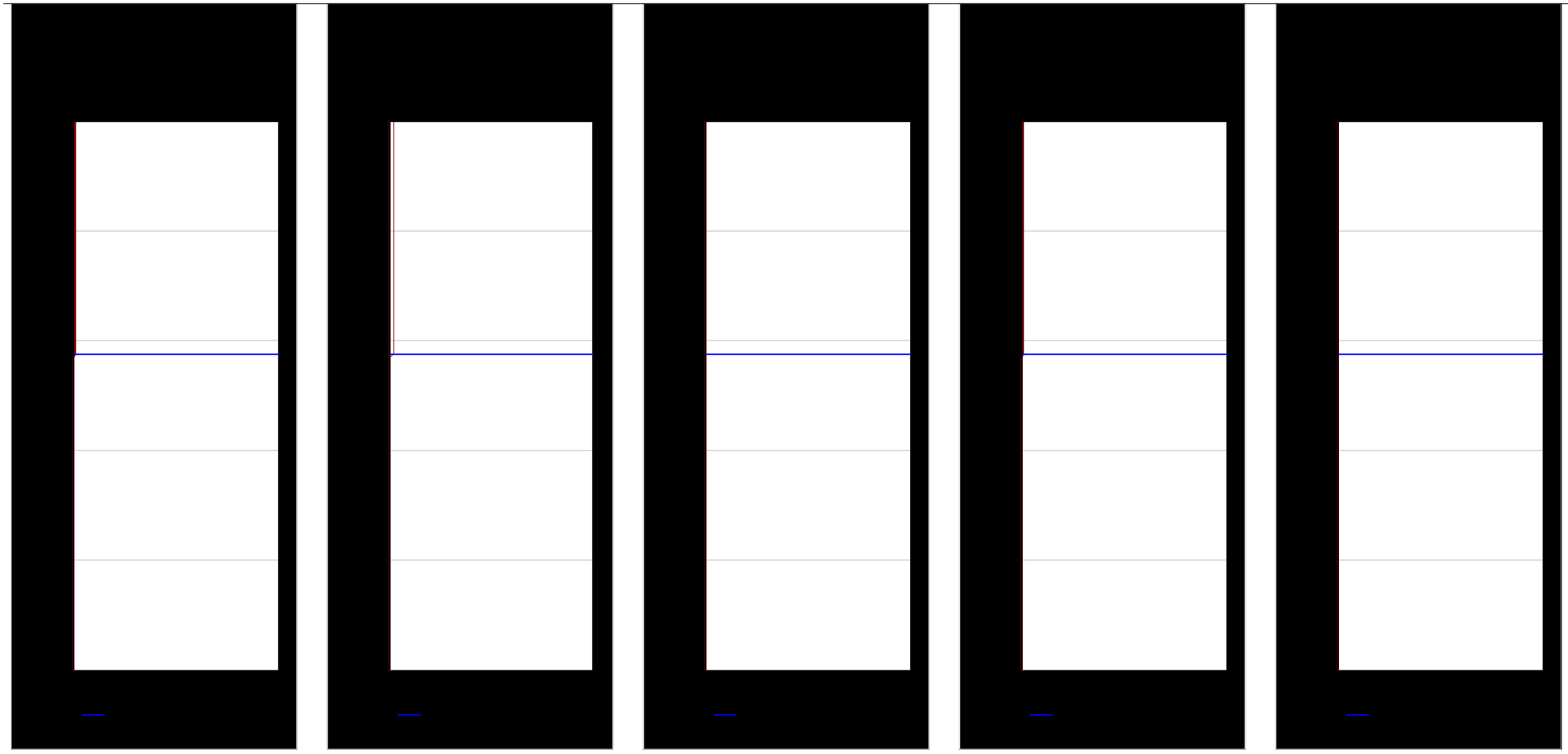
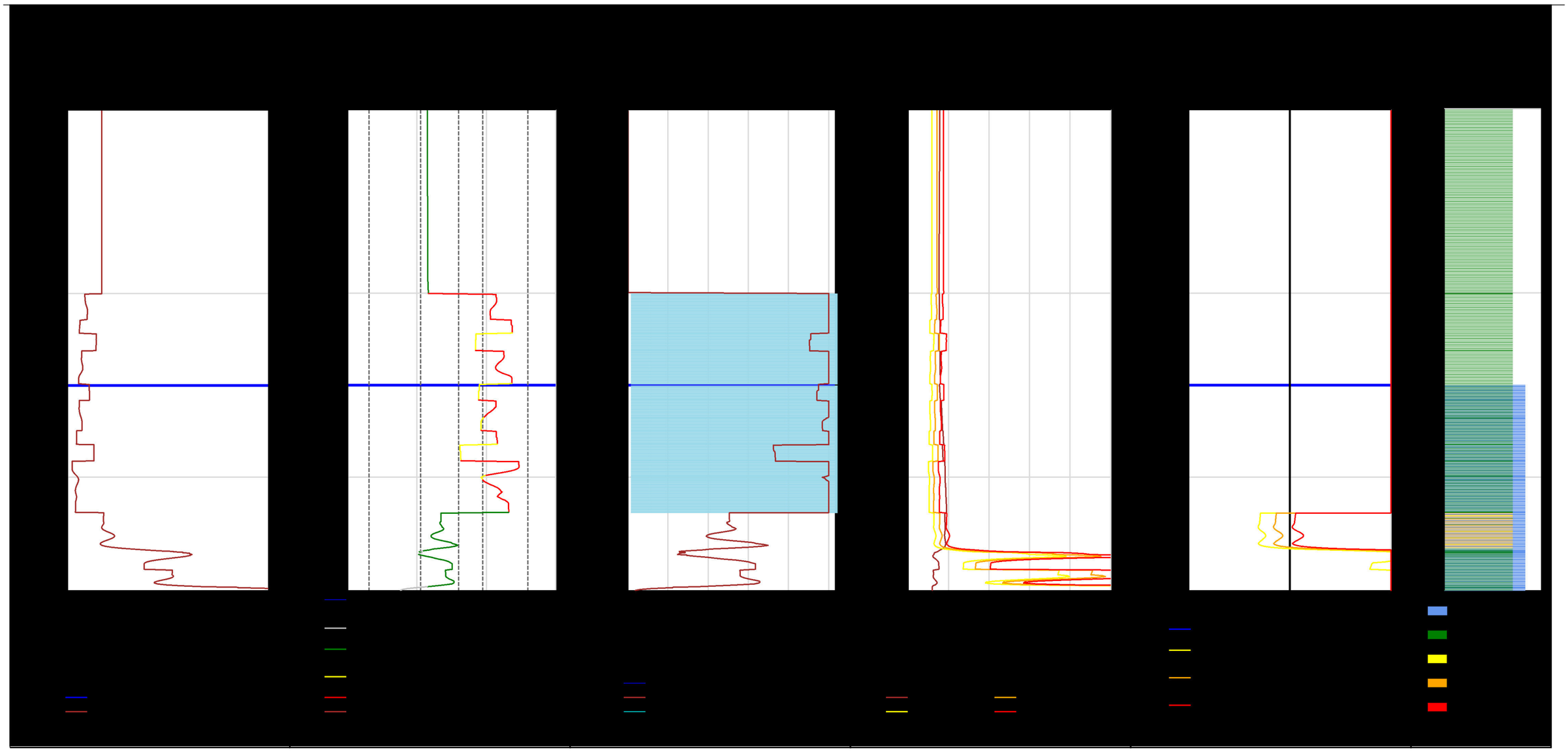
5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
7. Gravelly sand to dense sand
8. Very stiff sand to clayey sand *
9. Very stiff, fine grained *

*Heavily overconsolidated or cemented

CPT-based soil behavior type classification chart by Robertson (1990)



	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT04	140514	1/01/2014	2	6	0.29	BI-2014	ZRB-2002	18		0	



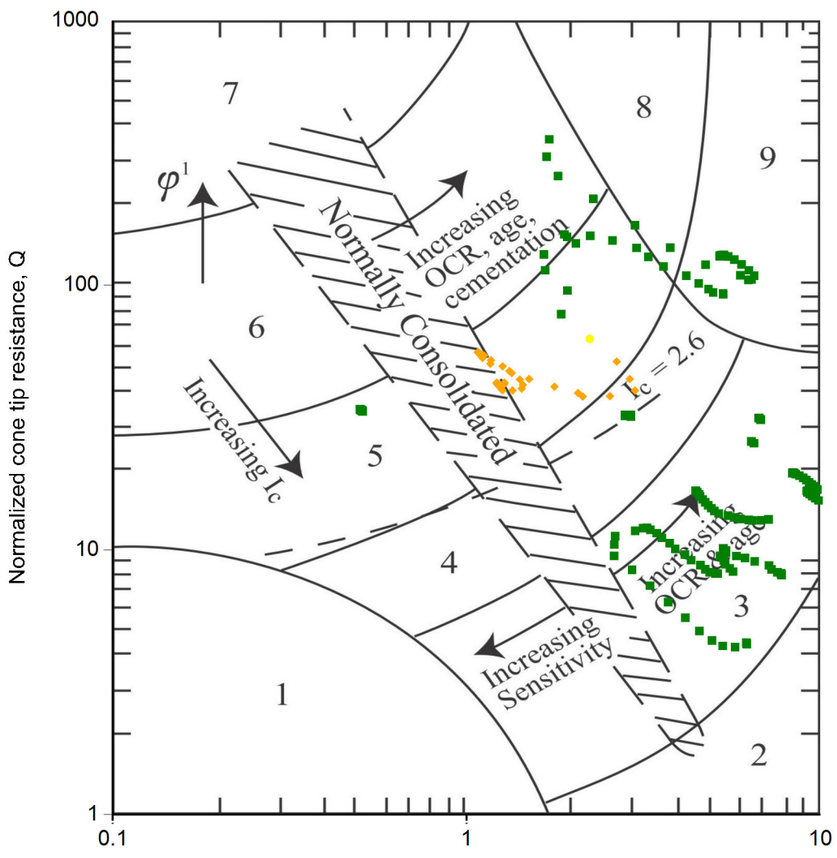
Note: Inverse filtered Qc/Fs data (10 cm²) used.

	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT05	140515	1/01/2014	2	6	0.29	BI-2014	ZRB-2002	18		0	

	PL	SV1D (mm)	CTL (m)	LPI	LSN	CT (m)	LPIish
OUTPUT	15%	10	0.4	1	2	4.5	0
	50%	7	0.4	0	2	4.5	0
	85%	3	0	0	1	5.2	0

Reviewed by:

CPT Inversion	ammw
Groundwater	ammw
Susceptibility	ammw
Triggering	ammw
Consequence	ammw



1. Sensitive, fine grained
2. Organic soils - peats
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5. Sand mixtures - silty sand to sandy silt
6. Sands - clean sand to silty sand
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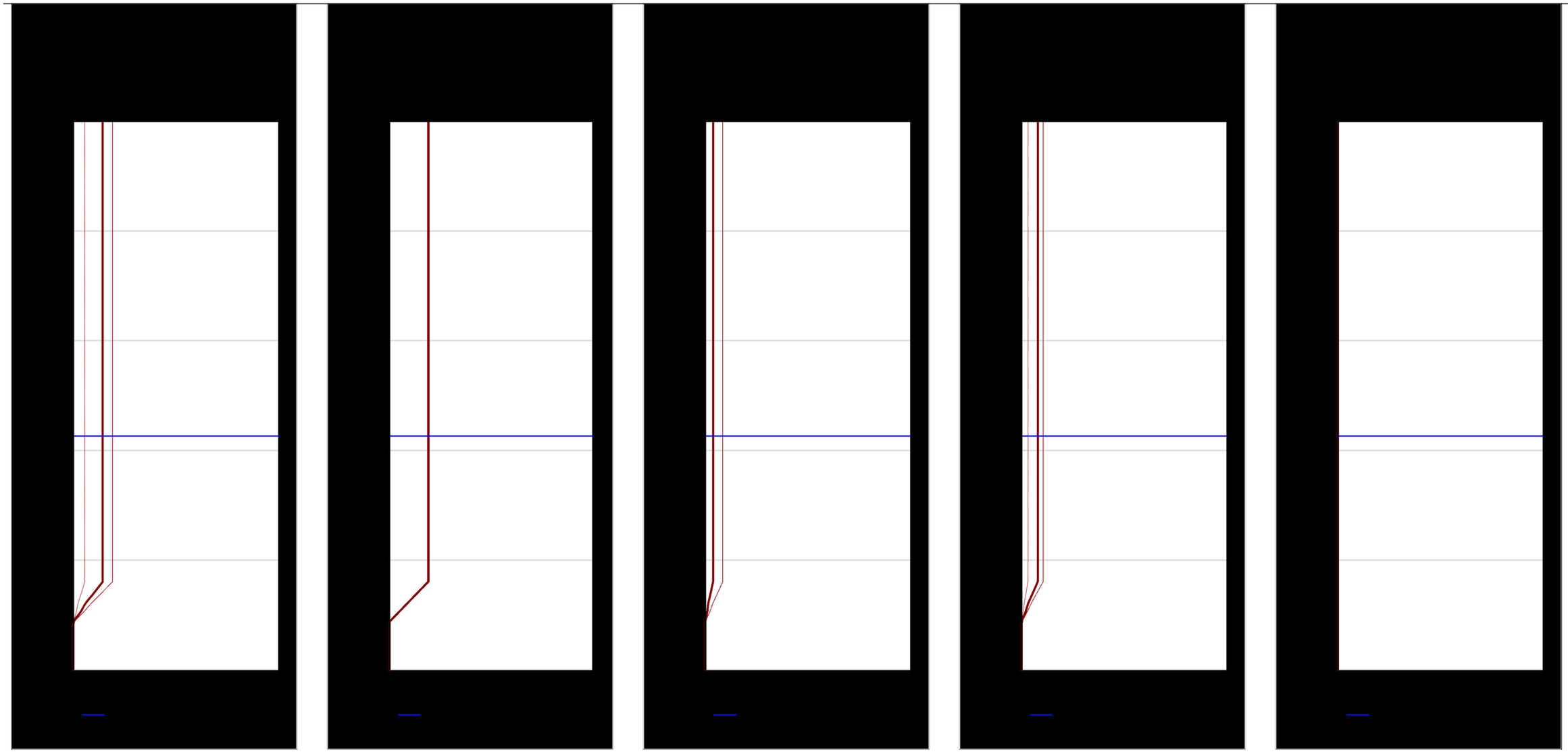
8. Very stiff sand to clayey sand *
9. Very stiff, fine grained *

*Heavily overconsolidated or cemented

CPT-based soil behavior type classification chart by Robertson (1990)

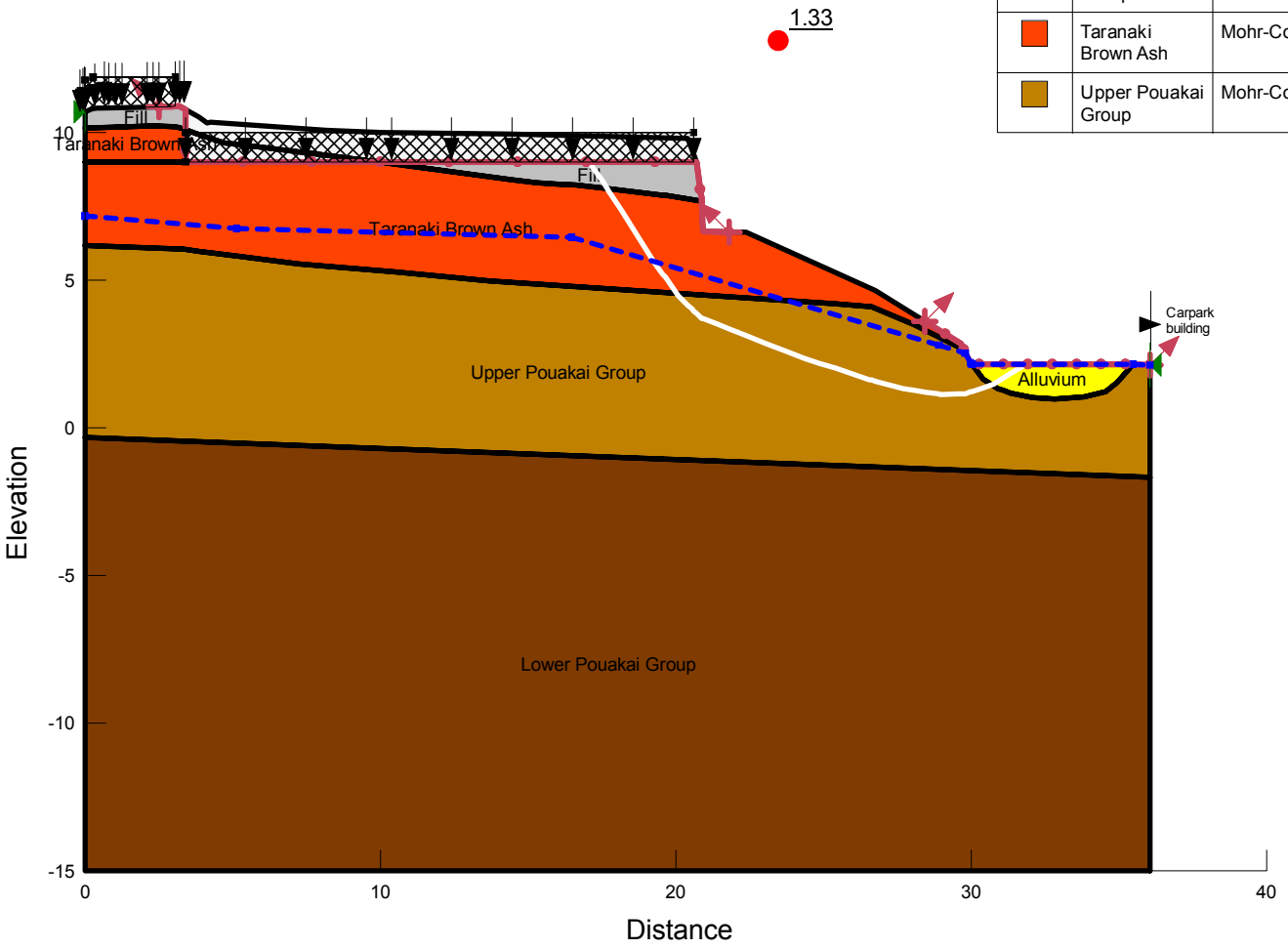


	Run Description	TTGD ID	Investigation Date	Pre-drill (m)	Magnitude	PGA (g)	Trigger Method	Settlement Method	ɣ (kN/m³)	Surcharge/Cut/Fill	Surcharge (kPa)	Cut/Fill Height (m)
INPUT	CPT05	140515	1/01/2014	2	6	0.29	BI-2014	ZRB-2002	18		0	

Appendix E: Slope stability analyses

Analysis Notes:
1. Name: 2. Static Normal GW Conditions
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



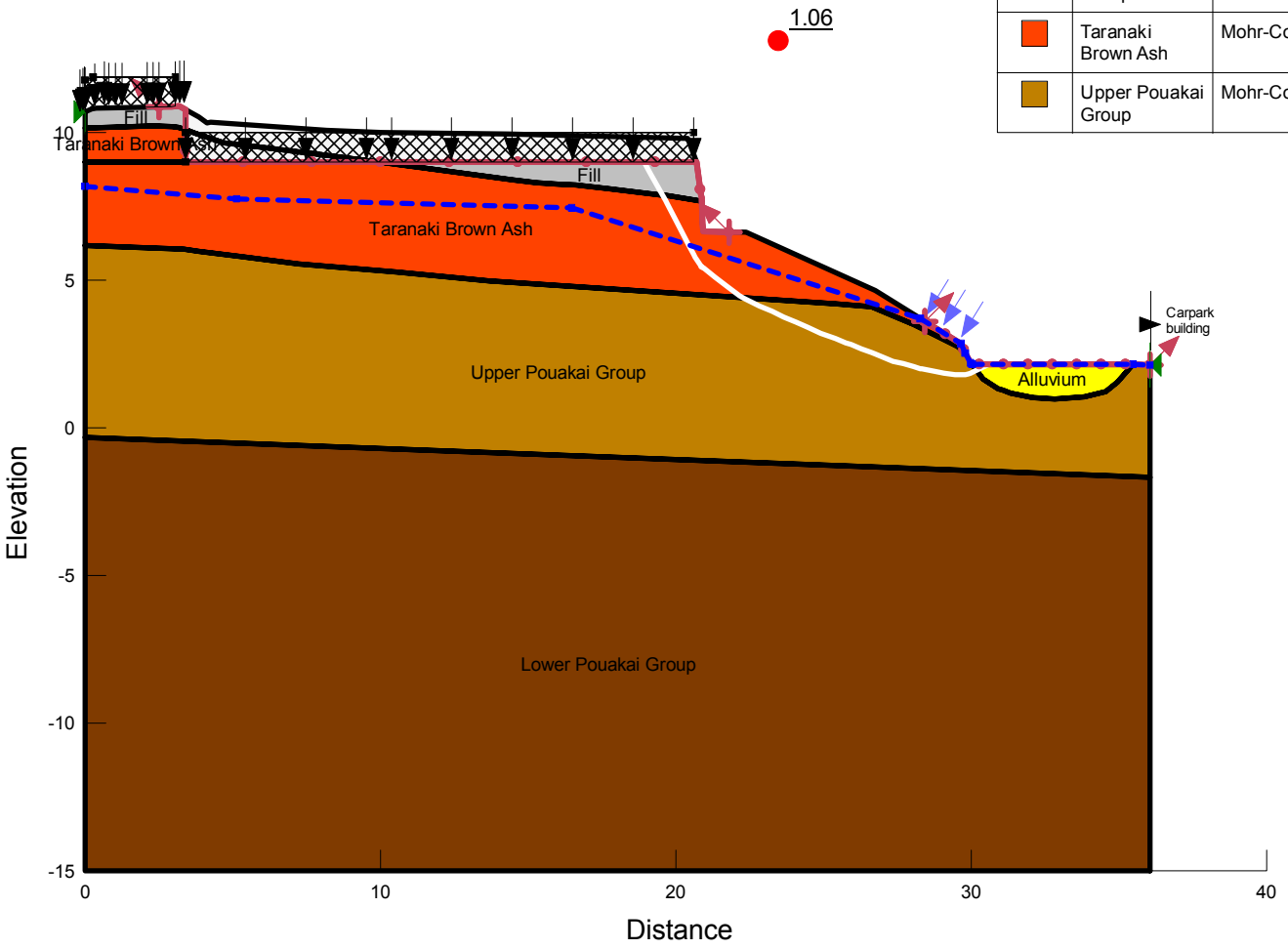
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 2. Static Normal GW Conditions		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 3. Elevated GW Conditions
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



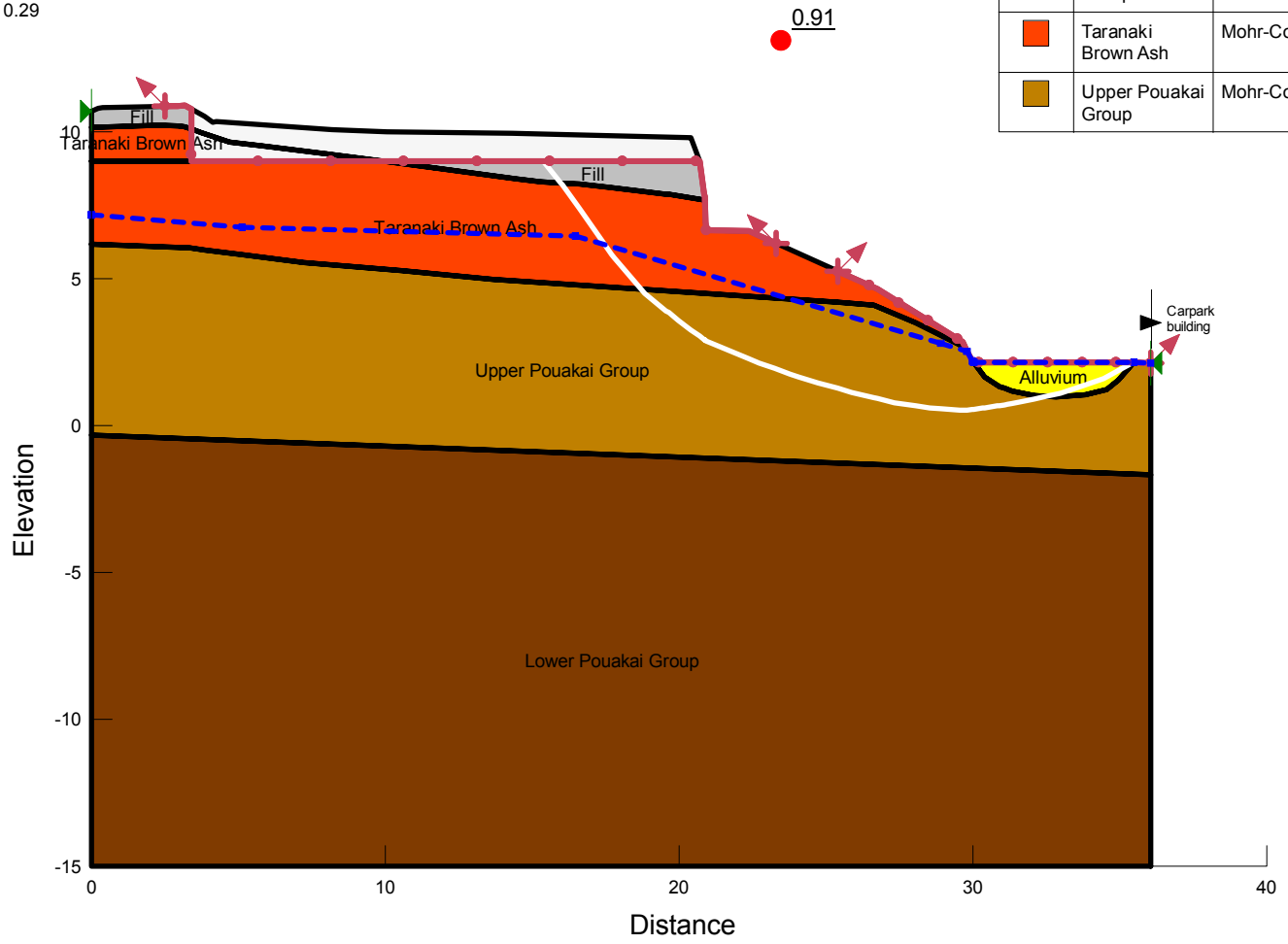
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 3. Elevated GW Conditions		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 4. Seismic with Static Normal GW Conditions
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load: 0.29

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



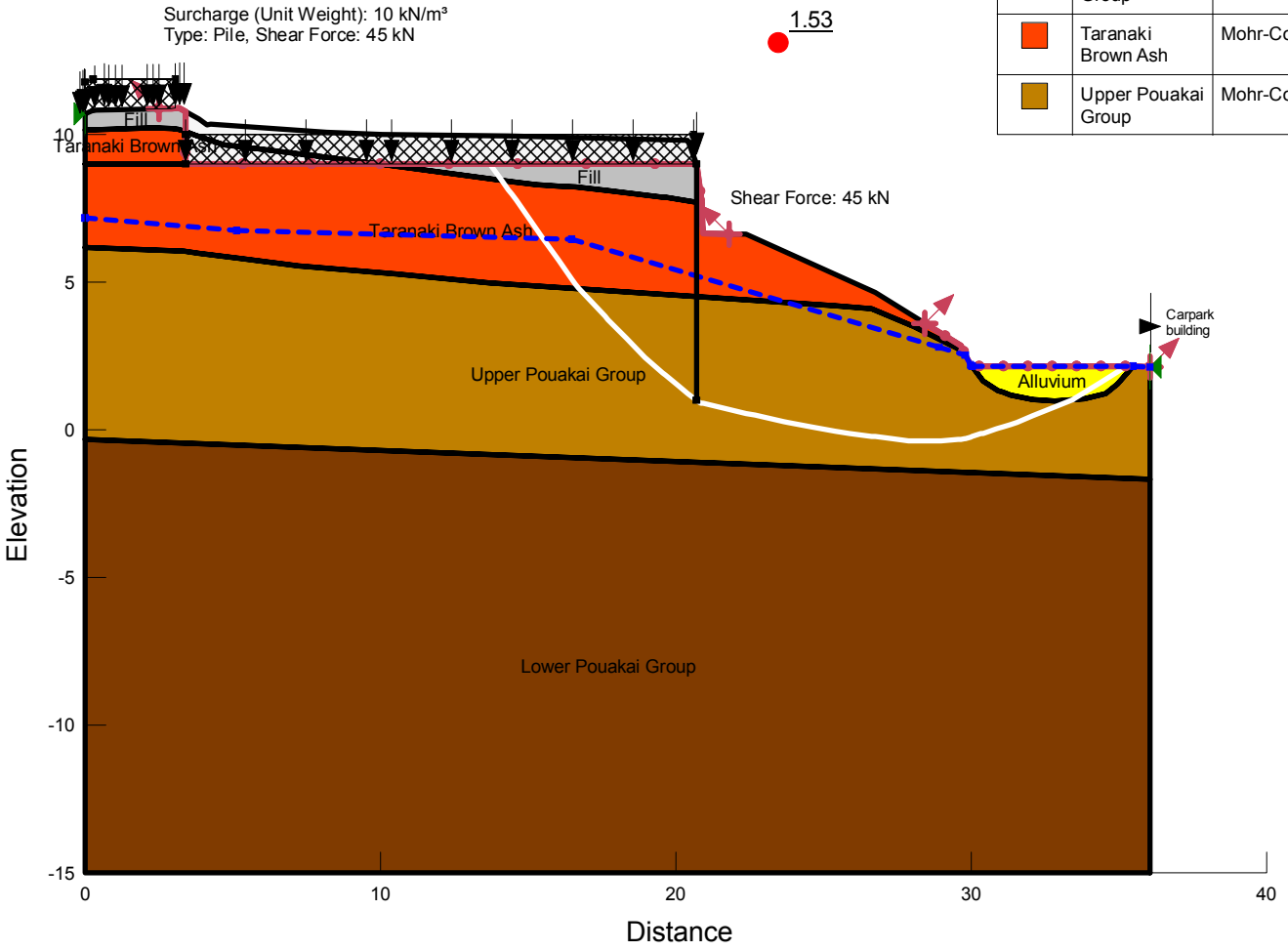
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 4. Seismic with Static Normal GW Conditions		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 2. Static Normal GW Conditions, pile length optimized
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



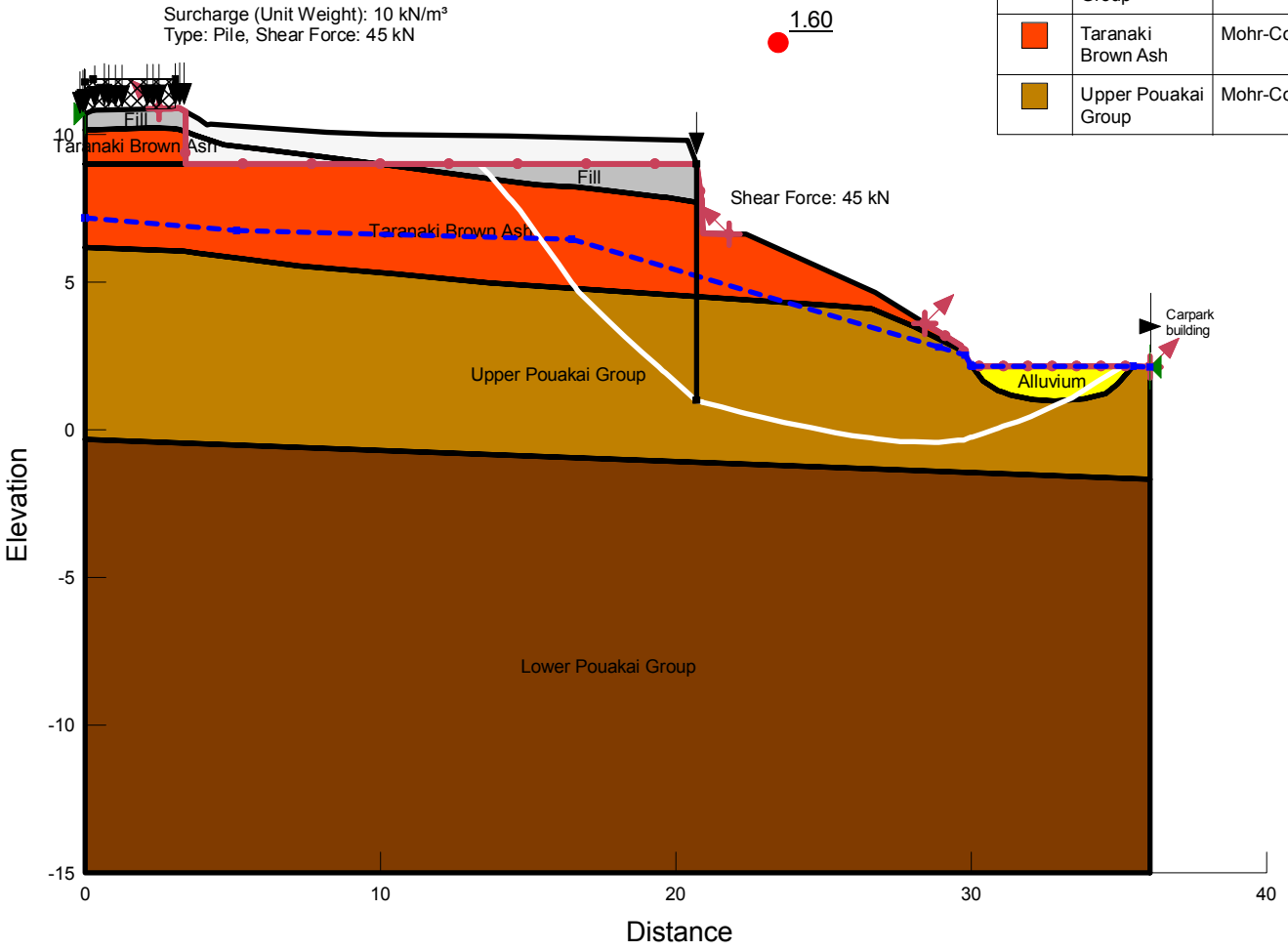
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 2. Static Normal GW Conditions, pile length optimized		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 2. Static Normal GW Conditions, pile length optimized, susp floor
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



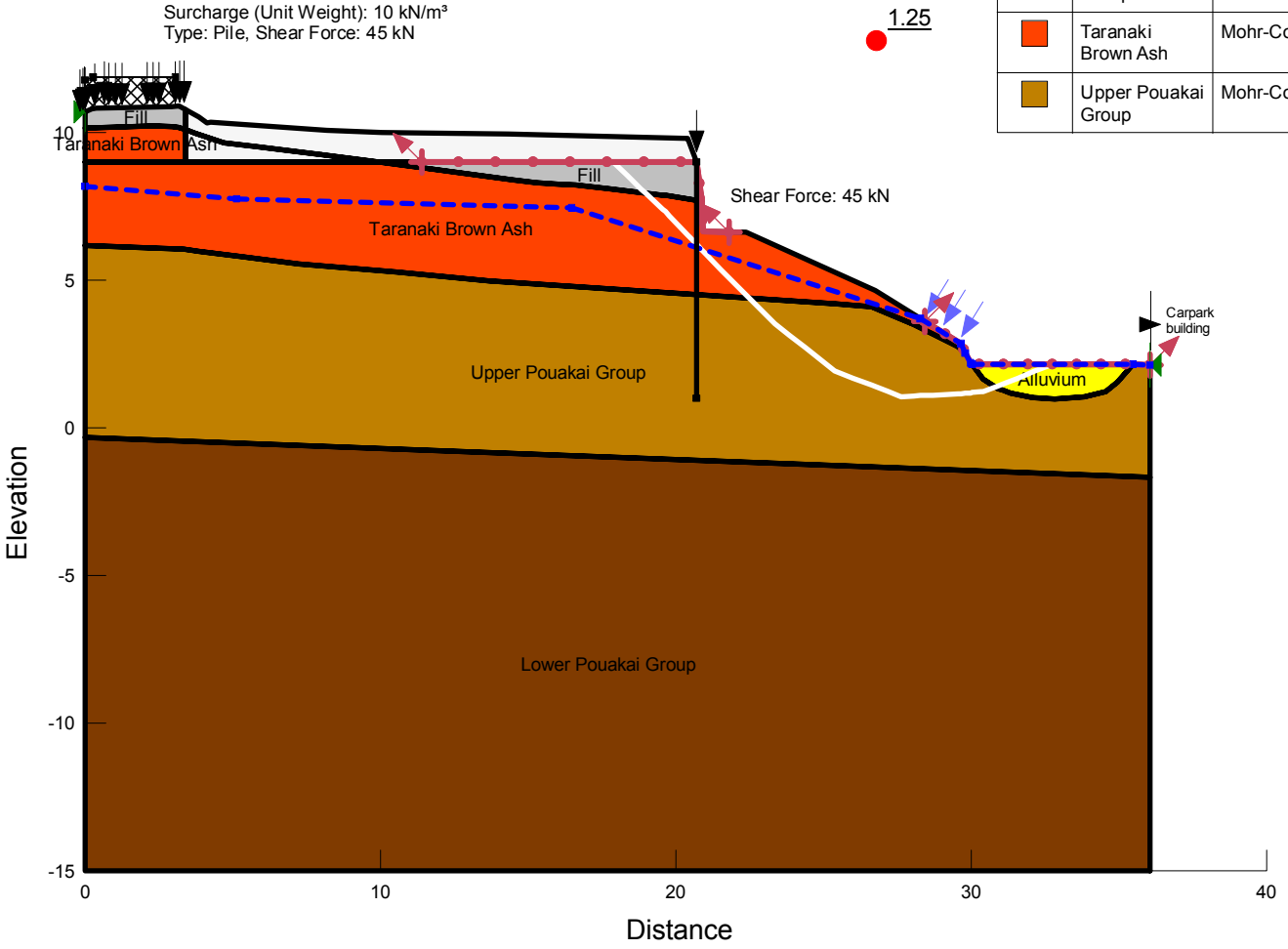
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 2. Static Normal GW Conditions, pile length optimized, susp floor		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 3. Elevated GW Conditions, pile length optimized
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



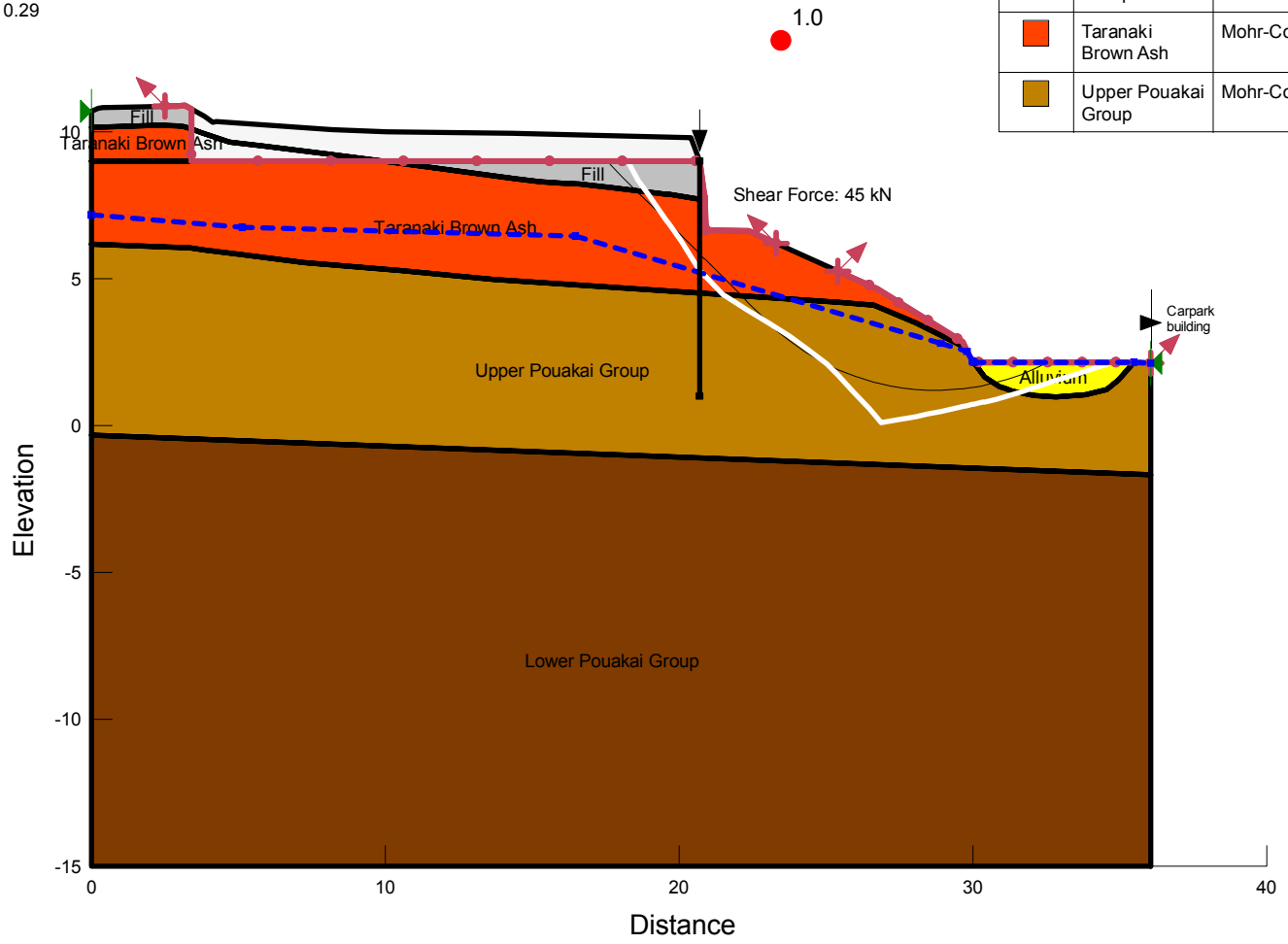
Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 3. Elevated GW Conditions, pile length optimized		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 4. Seismic with Static Normal GW Conditions, pile length optimized (45kN)
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load: 0.29

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



Tonkin+Taylor

Title: 51 Brougham Slope W_20191203.gsz		Job Number: 1011502.0000
Analysis: 4. Seismic with Static Normal GW Conditions, pile length optimized (45kN)		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

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APPENDIX L DRAFT DESIGN OF NPDC SITE

Figure L 8: Draft redesign of Huatoki Stream area with connection to 45-51 Brougham Street (Source: BOON Limited)

Figure L 9: Draft redesign of Huatoki Stream area with connection to 45-51 Brougham Street (Source: BOON Limited)

APPENDIX M RECOMMENDATION – NOTABLE TREE

14th October 2019

K.D. Holdings Limited

53 Brougham Street

NEW PLYMOUTH

Attn: Kevin Doody

JOB 3297 NOTABLE TREE at 51 BROUGHAM STREET, NEW PLYMOUTH

We have considered the effects of the existing notable tree on the proposed new building structure, and on the stability of the existing ground.

We confirm the tree and its roots will be affected by the proposed pile foundations and by the potential slip plane related to the steep downslope to the Huatoki stream.

The following discussion provides the justification around the recommendation.

Geotechnical Assessment

We have received the following information and advice from Tonkin and Taylor Ltd in their geotechnical report where:

a) They recommend pile foundations for the proposed building,
b) They have assessed three different slope stability cases and in all three cases a slip plane forms within 51 Brougham Street as described on the attached cross sections where the slip plane is indicated by the white line, and
c) They recommend a suspended concrete basement slab to span over the potential slip area.

Building Foundations

The foundations in the location of the tree roots will be designed to support a suspended slab and ground beams with piles where:

a) The regular nature of the building layout will dictate the location of the piles at the gridline intersections which will likely coincide with the irregular root locations, meaning it would be very difficult and unlikely for the piles to miss the tree roots and leave them undamaged,
b) The piles could be adjusted in the area of the roots, however because of the intensive nature of the root system the same outcome as in a) would apply, and
c) The Arborist noted that if the roots were damaged the tree could potentially become unstable because the tree is positioned on the steep stream bank where these roots provided the necessary anchoring for the tree.

The notable tree is within the slip plane identified by Tonkin & Taylor where the main geotechnical considerations are:

a) The Arborist could comment on the stability of the tree if the soil which the tree is founded in slips away, and
b) The tree would likely fall with the slip plane surface that could result in potential damage to the neighbouring buildings.

The Tree

The Arborist has identified that the tree is coming to the end of its effective life span and should be removed at some time in the near future.

This means any decision on the tree should be taken in context with the design life of the proposed new building of at least 50 years.

Summary

We have assessed the existing tree and advise that it is not practicable to keep the tree because:

a) the extensive root system will be damaged by the proposed piles and foundation beams,
b) the tree is located above the existing potential slip plane that extends down to the Huatoki Stream and removing the tree would mitigate potential damage to neighbouring buildings, and
c) the short remaining life of the tree is inconsistent with the design life of the proposed new building.

This report is prepared for your use as owners and for your agents for the stated purpose and cannot be used for any other purpose or by others unless authority is given by the undersigned.

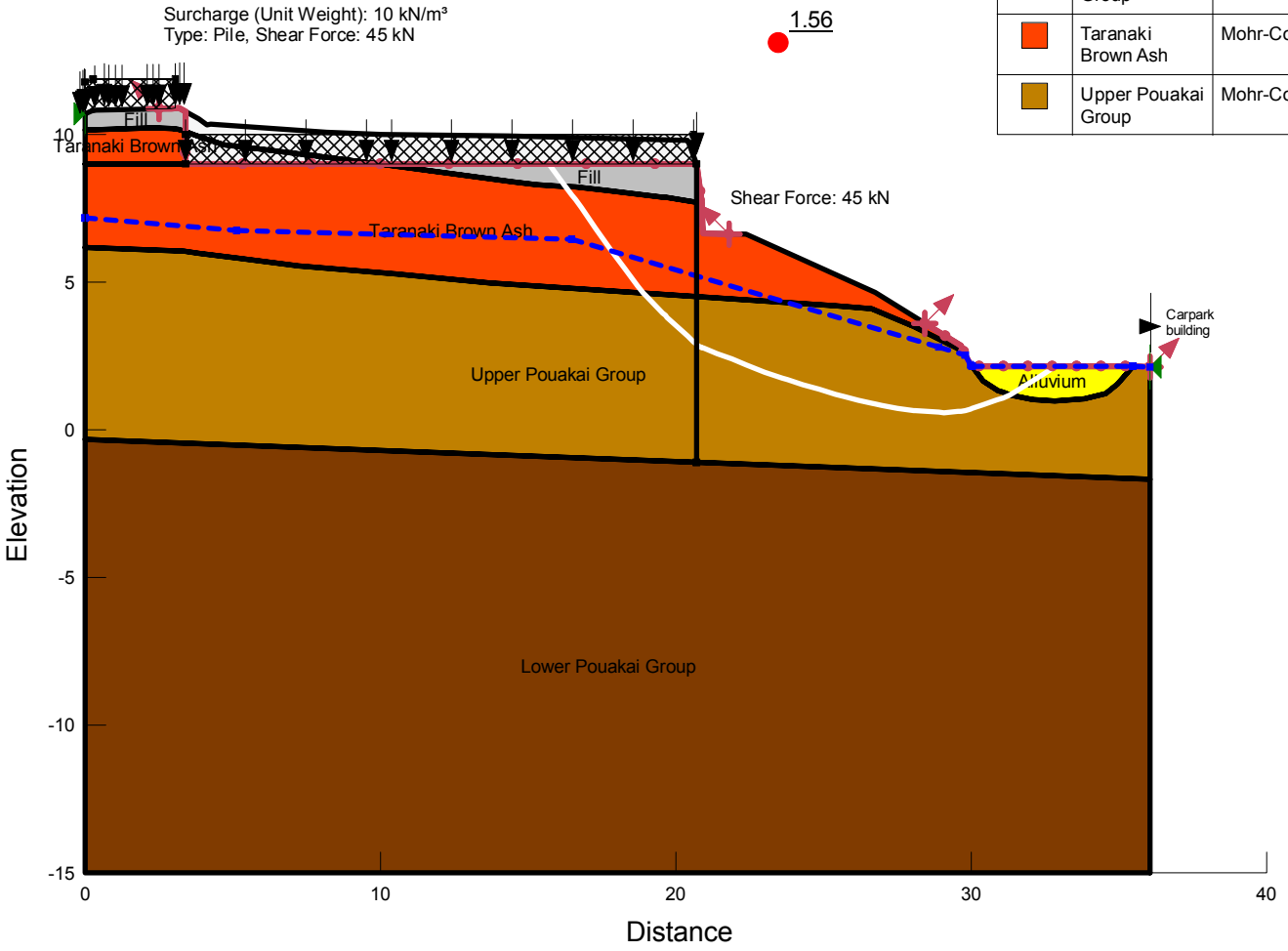
Yours faithfully

A D L Fraser

Managing Director **CPEng, CMEngNZ**

Analysis Notes:
1. Name: 2. Static Normal GW Conditions, pile
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



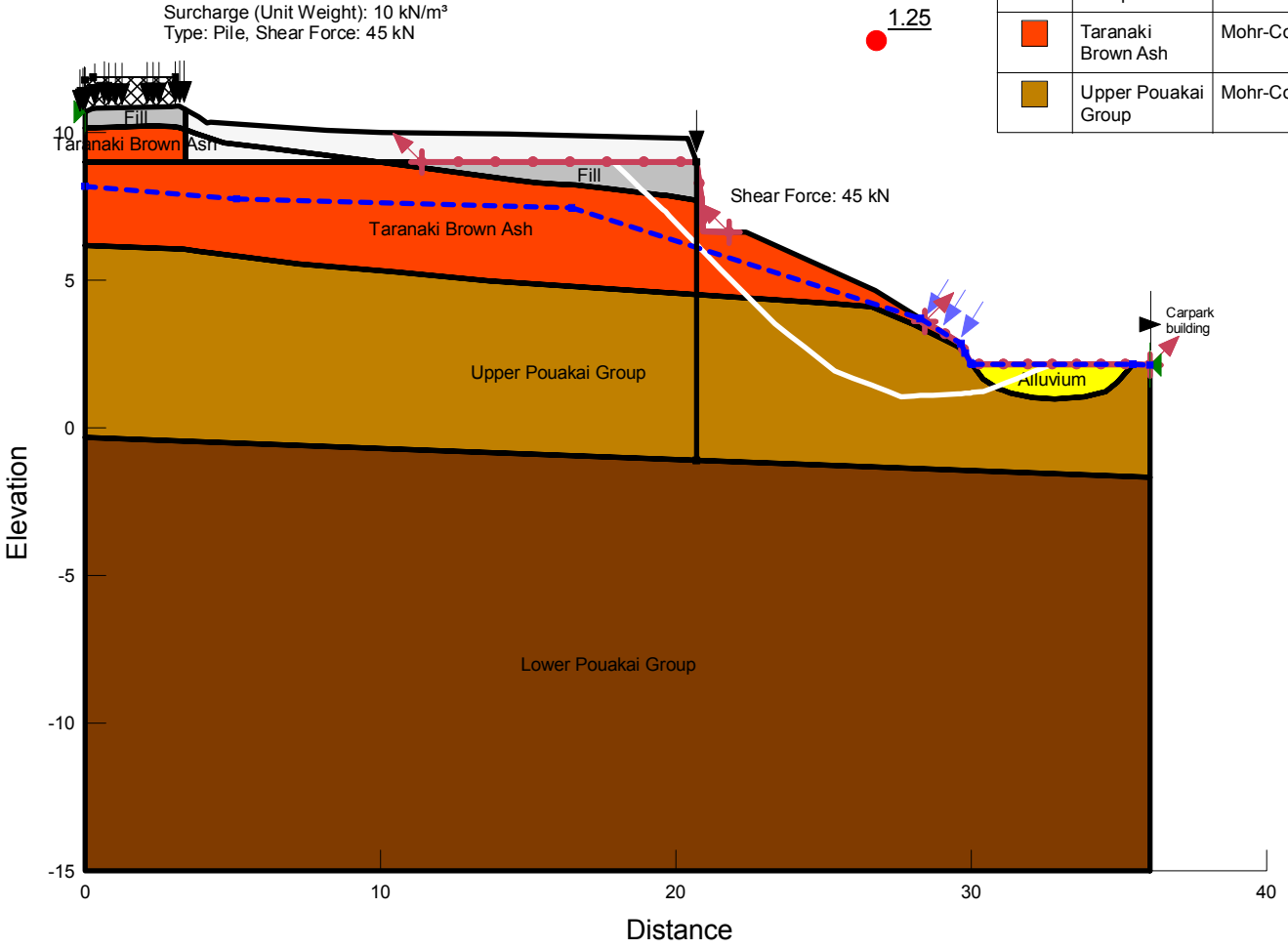
Tonkin+Taylor

Title: 51 Brougham Slope W_20190915.gsz		Job Number: 1011502.0000
Analysis: 2. Static Normal GW Conditions, pile		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 3. Elevated GW Conditions, pile
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load:

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1

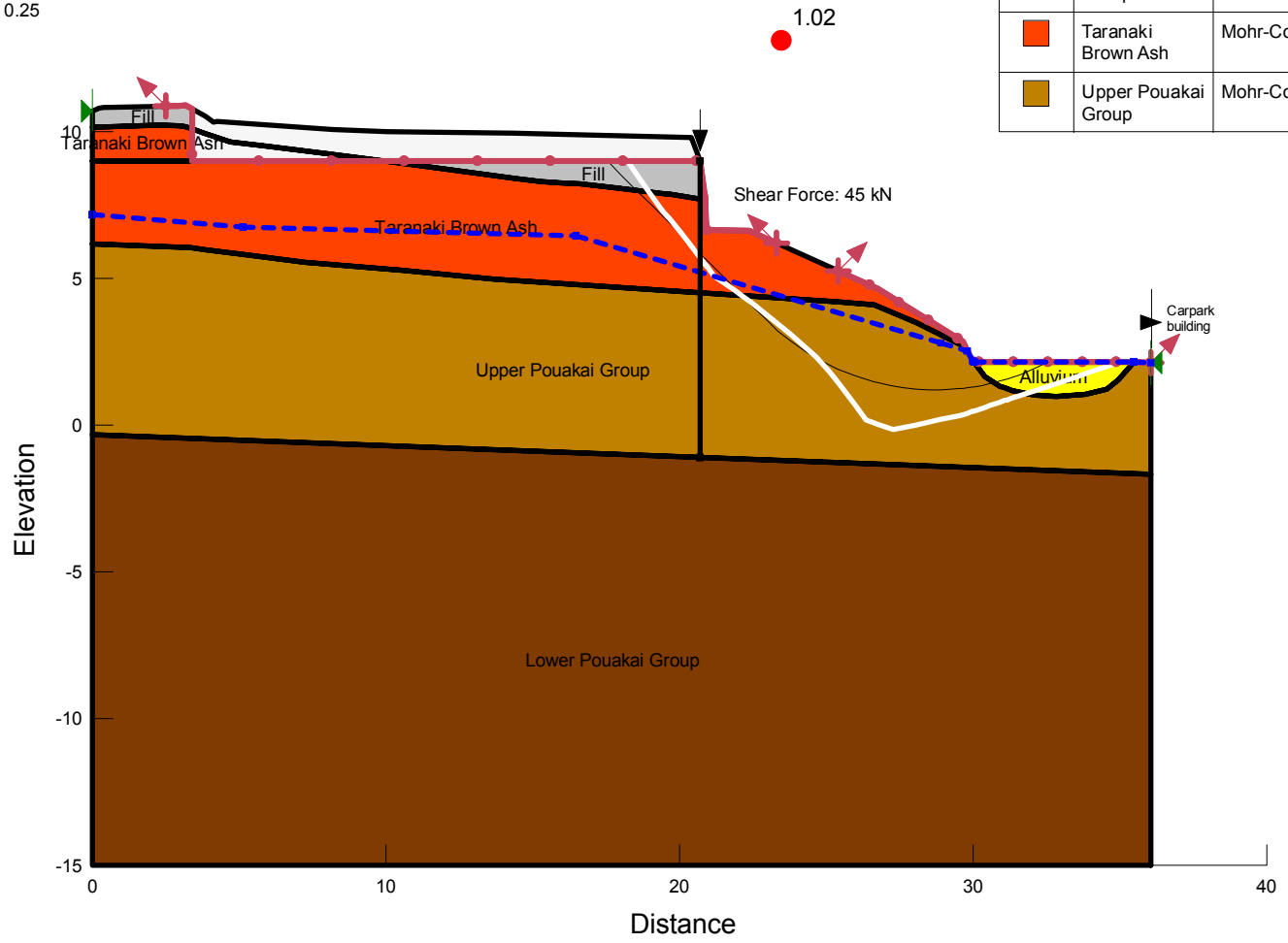


Tonkin+Taylor	Title: 51 Brougham Slope W_20190915.gsz	Job Number: 1011502.0000
	Analysis: 3. Elevated GW Conditions, pile	Analysed by: CMCD
	Comments: Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\

Analysis Notes:
1. Name: 4. Seismic with Static Normal GW Conditions, pile
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Optimization: Yes
7. Tension Crack Option: (none)
8. F of S Calculation Option: Constant
9. Horz Seismic Load: 0.25

Color	Name	Model	Unit Weight (kN/m³)	Cohesion' (kPa)	Phi' (°)	Piezometric Line
	Alluvium	Mohr-Coulomb	18	2	32	1
	Fill	Mohr-Coulomb	16	2	30	1
	Lower Pouakai Group	Mohr-Coulomb	18	0	40	1
	Taranaki Brown Ash	Mohr-Coulomb	16	5	40	1
	Upper Pouakai Group	Mohr-Coulomb	18	2	35	1



Tonkin+Taylor

Title: 51 Brougham Slope W_20190915.gsz		Job Number: 1011502.0000
Analysis: 4. Seismic with Static Normal GW Conditions, pile		Analysed by: CMCD
Comments:	Scale: 1:250 @ A4	Checked by: EMAD

Directory: P:\1011502\WorkingMaterial\Slope Stability\