# Geotechnical Report for Plan Change

Sandflat Road Subdivision,

Sandflat Road, Cromwell

**Report prepared for:**

River Terrace Developments Ltd

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GEOTECHNICAL WATER RESOURCES PAVEMENTS

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# 1 Introduction

## 1.1 General

This report presents the results of a geotechnical investigation carried out by GeoSolve Ltd in order to determine subsoil and groundwater conditions for the proposed Sandflat Road Subdivision, Cromwell. Geotechnical design parameters and foundation bearing parameters are provided as well as an assessment of the historic deep mining hazard located near the proposed subdivision. This report is sufficient for consent applications to the local authorities and is intended to support a proposed plan change request.

**Photo 1. Panoramic site photo taken from the northern end of the proposed subdivision looking southeast across the upper terrace surface. Kawarau Gorge Road is on the left of image.**

**Photo 2. Panoramic site photo taken from the terrace riser looking south towards the southern end of the proposed subdivision. Sandflat Road is on the far left of image.**

## 1.2 GeoSolve Scope of Work

The investigation was carried out for River Terrace Developments Limited in accordance with GeoSolve Ltd.'s proposal dated the 27th of July 2017, which outlines the scope of work and conditions of engagement.

GeoSolve's scope of work for the geotechnical investigation is summarised below:

- Review ORC and CODC planning and hazard maps;
- Detailed geological and geomorphological mapping of the subdivision area;
- 30-40 test pits to confirm the ground model across the development area with Scala penetrometer testing where appropriate;
- Preparation and issue of a report detailing the geotechnical investigations, geological setting, subsoil and groundwater conditions, natural hazards (including possible mitigation measures if required), earthworks cut and fill batters, foundation options, and general geotechnical recommendations for the site. The report will be suitable for plan change application.

Historic alluvial gold mining hazard

It should be noted that historic alluvial gold mining is known to have taken place on the property immediately south of the proposed subdivision area and along Pearson Road. Historic mining related activity in the area is known to have been deep, in the form of vertical shafts with lateral drives.

*Our geotechnical investigation assessed the historic mining hazard with the following scope:*

- Review of historic mining records, maps and information held on file;
- Detailed geological and geomorphological mapping of the subdivision area;
- Historic aerial photo review;
- 30-40 test pits across the development area to confirm the presence or absence of historic mining related activity;
- Sub-consult an experienced drilling consultant and local authority on historic mining activity in the region;
- Sub-consult an experienced local geological consultant (now retired) and local authority on mine engineering in the region.

## 1.3 Proposed Development

We understand it is proposed to subdivide the subject property and this requires a geotechnical assessment of the site to supplement a proposed plan change request with Council. At this stage subdivision planning is indicative only and is yet to be finalised. It has been indicated to GeoSolve Ltd that the proposed development will include up to 800 residential sections (from 200 m²+), a retirement village and a small commercial centre (together described as "subdivision").

No earthworks or development plans of the proposed subdivision have been supplied to GeoSolve at this time.

Appendix A, Figure 1a and 1b shows the outline of the proposed subdivision area.

# 2 Site Description

## 2.1 General

The proposed subdivision area comprises two adjacent properties, legal descriptions PT SEC 24 BLK I CROMWELL SD and SEC 28 BLK I CROMWELL SD and is located on the Cromwell Flat approximately 3 km southwest of Cromwell township, as shown in Figure 1 below.

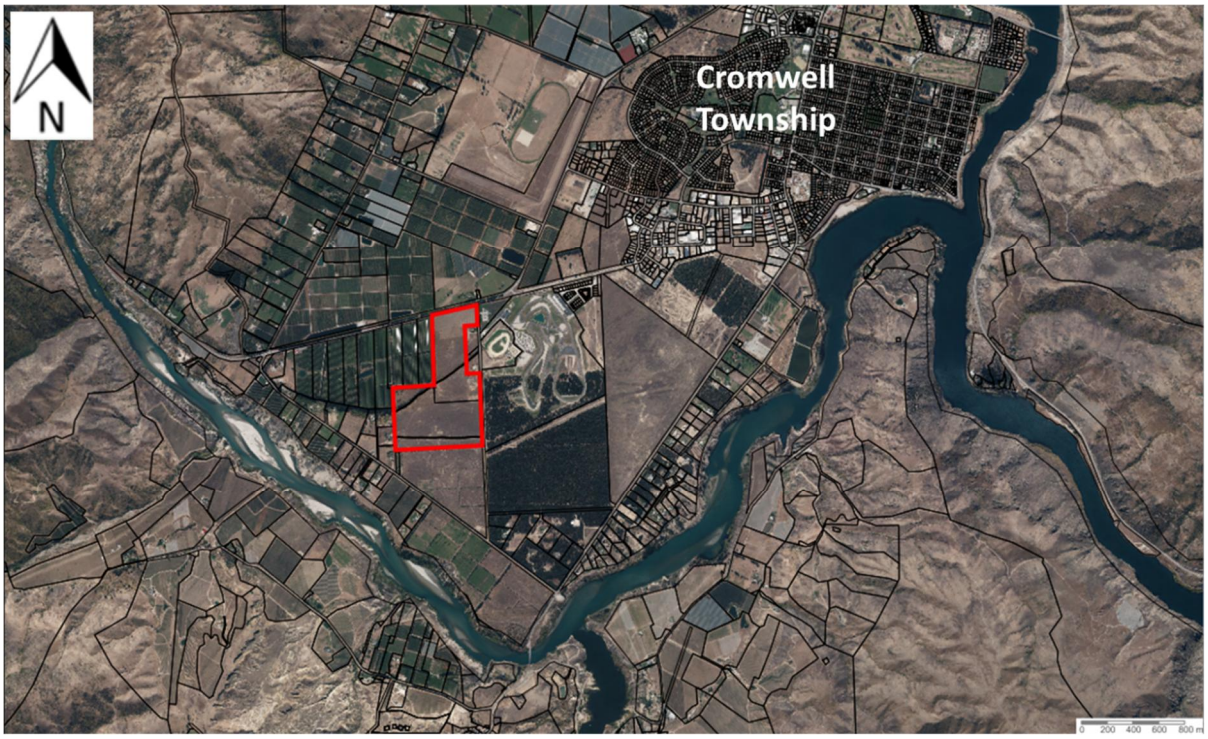



**Figure 1. Proposed subdivision area (outlined in red) in relation to Cromwell township and the surrounding area (Source: https://maps.codc.govt.nz/intramaps80/)**

The proposed subdivision covers an area of approximately 50 ha and is currently accessed off Sandflat Road opposite Highlands Motorsport Park.

The site is currently undeveloped with ground cover comprising grass and scattered briar bushes (Photo 1 and 2). A shelterbelt of well-established pine trees is present on the western boundary of the property on the upper terrace surface. A shelterbelt of eucalypt trees is present on the southern boundary of the property. A row of pine trees runs along a terrace riser on the western corner of the property (Appendix A, Figure 1a).

The proposed subdivision area is bounded by Kawarau Gorge Road to the north, Sandflat Road to the east, undeveloped land to the south, an orchard and numbers 131, 133 and 141 Pearson Road to the west (Appendix A, Figure 1a). The proposed subdivision area also partly surrounds numbers 18 and 54 Sandflat Road to the east (Appendix A, Figure 1a).

## 2.2 Topography and Surface Drainage

The site topography remains largely consistent across the subdivision area and consists of sub-horizontal (0-5°) outwash terrace surfaces interrupted by two gently to moderately inclined (6-22°) terrace risers. A subdued (6-10°) north facing terrace riser trending east-

west runs approximately parallel to the southern property boundary at the southern end of the site. A more pronounced (18-22°) southeast facing terrace riser trending northeast-southwest cuts through the centre of the site which forms the most prominent geomorphological feature on the ground surface within the boundaries of the proposed subdivision area. The area of land between the two terrace risers forms a degraded outwash surface and resembles a former paleo outwash channel of the Kawarau River.

Two disused water races are present within the boundaries of the proposed subdivision area. Each of these water races follows the contours around the base of the two separate terrace risers and are indicated on Appendix A, Figure 1a-1b by two narrow east-west and northeast-southwest trending property parcels. The water races are now disused and no surface water or flows were observed in the base of the water races during site investigations.

No spring flows or seepages were observed within the boundaries of the proposed subdivision during site investigations and the subsoils have been assessed to be granular free draining soils.

Geological site mapping and discussions with the previous landowner, who purchased the property in the early 1960's, indicate that the natural ground surface within the subdivision boundaries has been largely unaltered since its original geological formation.

Topographic site contour data, supplied by Paterson Pitts Group, is shown in Appendix A, Figure 1a.

# 3 Geotechnical Investigations

An engineering geological site assessment has been undertaken with confirmatory subsurface investigations. The following geotechnical investigations were carried out onsite over the 14-17th August 2017 for the purposes of this report:

- Geological and geomorphological site mapping of the proposed subdivision area;
- 39 Test pits (TP1-39), extending to a maximum depth of 4.0 m below ground level (bgl) to produce geological logs of the subsoils;
- 39 Scala Penetrometer tests (Sc1-39) to assess the relative density of the subsoils.

A walkover inspection of the site was also undertaken with an experienced local geological consultant (now retired) and an experienced local drilling consultant both of whom have extensive geological and engineering knowledge of the proposed subdivision area.

Investigation locations and logs are presented in Appendices A and B respectively.

# 4 Subsurface Conditions

## 4.1 Geological Setting

The Cromwell flat is underlain by thick sequences of fluvioglacial outwash alluvium of various ages. Over consolidated Manuherikia group lake sediments are present beneath the outwash alluvium, and schist bedrock is present at depth. Two well defined paleo-channels previously occupied by former courses of the Kawarau River bed are now infilled with outwash alluvium and underlie the extensive Cromwell flat (Appendix A, Figure 1b). Accumulations of alluvial gold within the beds of these former Kawarau outwash channels have been the focus of much exploration and mining activity. Deep mine shafts with lateral drives have attempted to exploit the auriferous river gravels held within the beds of these paleo-channels both historically and more recently (Appendix A, Figure 1b). Higher river terraces above the valley floor are occupied by older outwash gravels from former glacial periods. Post glacial windblown loess of varying thickness covers the surface of the Cromwell Flat.

The active Pisa Fault is located at the foot of the Pisa Range and is within 2.0 km northwest of the proposed subdivision. However, due to the estimated 10,000-20,000 year average return period for earthquakes on this fault, the seismic risk posed by this structure is considered low. The Alpine Fault, located approximately 120 km to the northwest, runs along the western foothills of the Southern Alps, and is likely to present a more significant seismic risk. There is a high probability that a major earthquake of Magnitude 8 or more will occur along the Alpine Fault within the next 50 years and such a rupture is likely to result in strong and prolonged ground shaking in the vicinity of Cromwell.

## 4.2 Stratigraphy

Results from the test pitting indicate the sub-surface stratigraphy comprises:

- 0.05 to 0.15 m thickness of **topsoil**, overlying;
- 0.1 to 0.45 m thickness of **loess**, overlying;
- 4.0 m+ thickness of **outwash sand and gravel (alluvium)**.

**Topsoil** was generally observed to be poorly developed across the subdivision area and was only observed at the surface of TP17-21, 23-32 and 34-38. The topsoil predominately comprises dark brown, soft organic SILT.

**Loess** was observed at either the ground surface or underlying topsoil in all test pits except TP26, 29, 30, 32, 33, 36, 37 and 39. The loess predominately comprises light brown, loose silty SAND or SAND.

**Outwash sand and gravel (alluvium)** was observed to underlie topsoil or loess soils in all test pit excavations to a maximum depth of 4.0 m bgl. The composition of the outwash alluvium varied significantly across the proposed subdivision area and consisted of brown, grey or white, loose to medium dense SAND with trace to some gravel, gravelly SAND, sandy GRAVEL or GRAVEL with trace to some sand with varying amounts of cobbles and boulders. Boulders up to 1.0 m diameter were observed. The outwash alluvium typically increased in sand content and density between 1.0 and 2.0 m bgl. The increase in soil density below this depth can be partly attributed to white calcite cementation of varying

intensity. The base of the outwash alluvium sequence was not observed in test pit excavations.

Piles of uncontrolled fill soils associated with the construction of a motocross track are situated slightly north of the subdued east-west trending terrace riser in the centre of the property. There are also remnants of two concrete building foundations on the ground surface situated in the centre of the subdivision area and slightly north of the southern property boundary.

Full details of the observed subsurface stratigraphy can be found within the test pit logs contained in Appendix B.

## 4.3 Groundwater

No groundwater seepages or flows were observed in test pits during site investigations. The soils were observed to be in a predominately dry to moist condition.

The area of the proposed subdivision overlies the extensive Cromwell Terrace Aquifer designated by the Otago Regional Council (ORC), see Figure 2 below.

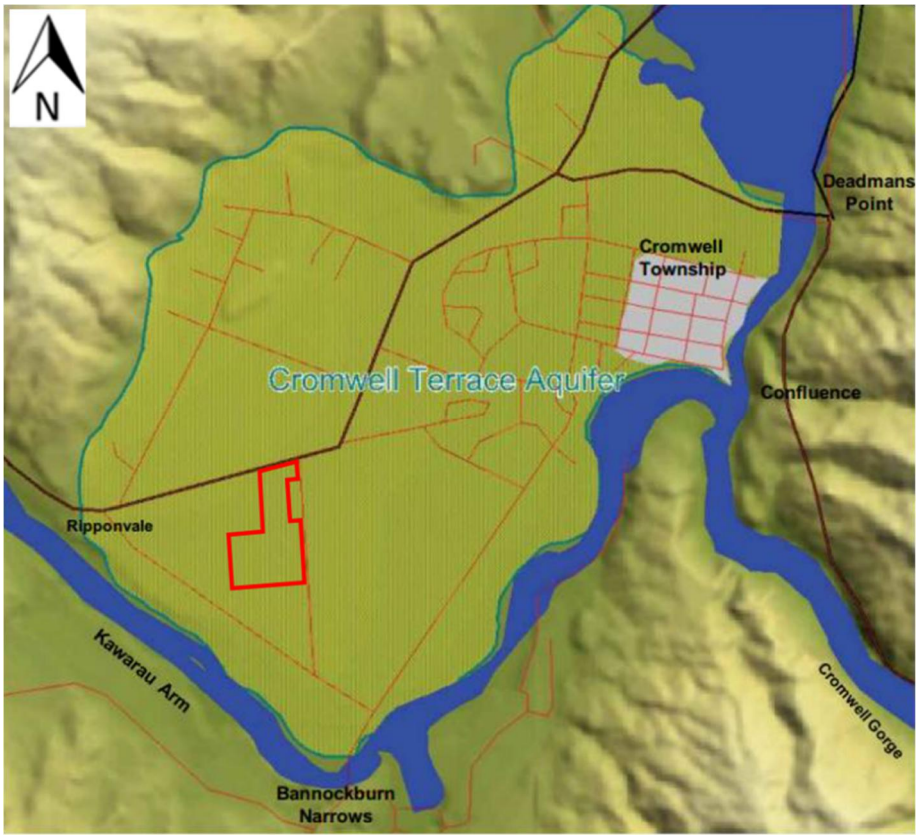



**Figure 2. Approximate location of the proposed subdivision area (outlined in red) in relation to the designated Cromwell Terrace Aquifer. Diagram sourced from Otago Regional Council, Cromwell Terrace Aquifer Study published October 2012.**

The regional groundwater table is expected to lie at considerable depth beneath the proposed subdivision area. Two ORC registered water bores (F41/0214 and F41/0171) located on the 54 Sandflat Road property to the east indicates the regional groundwater table lies at 25 m bgl. Four ORC registered water bores (F41/0175, F41/0180, F41/0350 and F41/0483) located to the south of the southern property boundary indicate the regional

groundwater table lies between 27-33 m bgl. On the elevated outwash terrace at the northern end of the subdivision area on the 18 Sandflat Road property an ORC registered water bore (F41/0300) indicates the regional groundwater table lies at 34 m bgl.

The regional groundwater table beneath this site is expected to be strongly influenced by the level of Lake Dunstan. Existing water bore locations and water exploration wells drilled on the Cromwell Flat post lake fill indicate that the presence of groundwater generally coincides with the position of the two Kawarau paleochannels (Appendix A, Figure 1b). This will need to be considered if water bores are to be drilled within the subdivision area as part of the proposed development.

## 4.4 Slope Stability

No slope instability was observed within the boundaries of the proposed subdivision during site investigations. This is supported by the generally sub-horizontal (0-5°) nature of the site topography.

It is anticipated that the pronounced southeast facing terrace riser trending northeast-southwest through the centre of the property will be altered during construction earthworks. However, at this stage earthworks and development plans have not yet been supplied to GeoSolve Ltd. Therefore, slope stability of the southeast facing terrace riser should be reassessed upon completion of earthworks to determine appropriate setback distances for buildings if they are to be constructed close to the existing terrace edge.

# 5 Engineering Considerations

## 5.1 General

The recommendations and opinions contained in this report are based upon ground investigation data obtained at discrete locations onsite and historical information held on the GeoSolve database. The nature and continuity of subsoil conditions away from the investigation locations is inferred and cannot be guaranteed.

## 5.2 Geotechnical Parameters

Table 1 provides a summary of the recommended geotechnical design parameters for the soils expected to be encountered during construction of foundations and retaining walls.

**Table 1 - Recommended Geotechnical Design Parameters.**

| Unit | Thickness (m) | Bulk Density $\gamma$ (kN/m$^3$) | Effective Cohesion $c'$ (kPa) | Effective Friction $\phi'$ (deg) | Elastic Modulus E (kPa) | Poissons Ratio $\nu$ |
|---|---|---|---|---|---|---|
| **Topsoil** (soft, organic SILT) | 0.05-0.15 | 16 | To be removed from beneath building and engineered fill footprints | | | |
| **Loess** (loose, silty SAND or SAND) | 0.1-0.45 | 18 | To be removed from beneath building footprints | | | |
| **Outwash Sand and Gravel** (loose to medium dense SAND with trace to some gravel, gravelly SAND, sandy GRAVEL or GRAVEL with trace to some sand with varying amounts of cobbles and boulders) | 4.0 observed | 18 | 0 | 32-37 | 10,000-20,000 | 0.3 |

## 5.3 Site Preparation/Earthworks

During the earthworks operations all topsoil, uncontrolled fill, organic matter and other unsuitable materials should be removed from the construction areas in accordance with the recommendations of NZS 4431:1989. These soil types will also need to be removed from areas where engineered fill is proposed. Loess in its natural state will not be suitable as an engineered fill subsoil and should either be removed or blended with other suitable material and re-compacted.

Robust, shallow graded sediment control measures should be instigated during construction where rainwater and drainage run-off across exposed soils is anticipated. If slope gradients in excess of 4% are proposed in topsoil, loess or outwash sand soils then the construction and lining of drainage channels is recommended, e.g. with geotextile and suitably graded rock, or similarly effective armouring.

Exposure to the elements should be limited for all foundation soils. Topsoil, hydro-seeding, plantings or similar coverage is recommended upon completion of engineered fill placement.

All fill that is utilised as bearing for foundations should be placed and compacted in accordance with the recommendations of NZS 4431:1989 and certification provided to that effect. The outwash soils can be used as engineered fill onsite (in accordance with an earthfill specification). To use the loess material as a fill source it will have to be blended with a more granular soil source to be satisfactory. The topsoil is not suitable for reuse as an engineered fill source and will need to be removed from fill source materials. Due to the changeable grain size and grading of the fill source materials onsite, a range of compaction reference tests will be required. Maximum density and optimum moisture content will vary. Compaction of the fill sources at lab tested optimum moisture content is critical for these soil types. Alternatively, if the earthworks budget allows it a designated borrow pit for fill source materials and the use of an onsite mobile screening plant could be considered. This would ensure that the fill source materials were blended to create a more well graded fill source. This would also ensure that the fill source materials remained consistent throughout the construction earthworks process for fill certification purposes. In all cases, cobbles and boulders over 150 mm in size will need to be screened from engineered fill sources. Boulders up to 1 m in dimeter were observed in test pits.

## 5.4 Excavations

At this stage, no earthworks plans have been provided to GeoSolve Ltd, although it is expected that cuts will be made within topsoil, loess and outwash soils.

Recommendations for temporary and permanent batter slope angles are described below in Table 2. Slopes that are required to be steeper than those described below should be structurally retained or subject to specific geotechnical design.

All slopes should be periodically monitored during construction for signs of instability and excessive erosion, and, where necessary, corrective measures should be implemented to the satisfaction of a suitably qualified Chartered Professional Engineer.

No seepage or groundwater was encountered during test pitting and hence groundwater is unlikely to be encountered during excavations. However, a geotechnical or civil engineer should inspect any seepage, spring flow or under-runners that may be encountered during construction.

The soils are anticipated to be excavated by conventional earthmoving methods, however boulders are likely to be encountered within the outwash soils.

### 5.4.1 Cut Slopes in Soil Materials

Table 2 summarises the recommended batter angles for temporary and permanent slopes up to 5 m high, which are formed in the soil materials identified onsite.

**Table 2 - Recommended maximum batter angles for cut slopes up to 5 m high in site soils.**

| Material Type | Recommended Maximum Batter Angles for Temporary Cut Slopes Formed in Soil (horizontal to vertical) | | Recommended Maximum Batter Angles for Permanent Cut Slopes Formed in Soil – dry ground only (horizontal to vertical) |
|---|---|---|---|
| | Dry Ground | Wet Ground | |
| Topsoil/Loess | 2H: 1V | 3H: 1V | 3H: 1V |
| Outwash Sand and Gravel (Alluvium) | 1.5H: 1V | 2H: 1V | 2.5H: 1V |

Permanent batters should be vegetated as soon as practicable to protect against erosion.

## 5.5 Engineered Fill Slopes

All fill should be placed and compacted in accordance with the recommendations of NZS4431:1989 and Central Otago District Council Standards. All cut and fill earthworks should be inspected and tested as appropriate during construction and certified by a Chartered Professional Engineer.

All un-retained fill slopes which are less than 5.0 m high should be constructed with a batter slope angle of 2.0H: 1.0V (horizontal to vertical) or flatter and be benched into sloping ground.

Reinforced earth slopes can be considered if batters need to be steeper than 2H:1V.

## 5.6 Ground Retention

All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 1 of this report. Due allowance should be made during the detailed design of all retaining walls for forces such as surcharge due to the sloping ground surface behind the retaining walls, groundwater, seismic and traffic loads.

All temporary slopes for retaining wall construction should be battered in accordance with the recommendations outlined in Table 2 of this report. Where these batter slopes cannot be achieved, temporary retaining will be required.

Groundwater seepages or flows were not observed during test pit investigations. This has the potential to develop following completion of the earthworks, in particular as a result of heavy or prolonged rainfall. To ensure potential groundwater seeps and flows are properly controlled behind the retaining walls, the following recommendations are provided:

- A minimum 0.3 m width of durable free draining granular material should be placed behind all retaining structures;
- A heavy duty non-woven geotextile cloth, such as Bidim A14, should be installed between the natural ground surface and the free draining granular material to prevent siltation and blockage of the drainage media;
- A heavy-duty (TNZ F/2 Class 500) perforated pipe should be installed within the drainage material at the base of all retaining structures to minimise the risk of excessive groundwater pressures developing. This drainage pipe should be connected to the permanent piped storm water system, and;

- Comprehensive waterproofing measures should be provided to the back face of all retaining walls forming changes in floor level within the dwelling to minimise groundwater seepage into the finished buildings.

It is recommended that the retaining wall excavation batters are inspected by a suitably qualified and experienced Geotechnical or Civil Engineer or Engineering Geologist.

## 5.7 Slope Stability

No evidence of existing slope instability was identified during our walkover inspection of the site. No cut and fill plans have been provided to GeoSolve at this stage and therefore it is considered that slope stability should be reassessed following earthworks design.

## 5.8 Groundwater Issues

The regional groundwater table is expected to lie well below any future foundation levels and is not expected to be encountered during any future construction on this site. Dewatering or other groundwater-related construction issues are therefore unlikely to be required.

It should be noted that ORC resource consent will be required prior to drilling any water bores or heat transfer holes if these are considered as part of the proposed development.

It is important that GeoSolve be contacted should there be any seepage, spring flow or under-runners encountered during construction.

## 5.9 Foundation Considerations

Topsoil, uncontrolled fill, loess and organic matter including tree roots should be stripped from the building footprints or engineered fill platform areas. Foundation loads will be transferred to the outwash sand and gravel deposits or engineered fill overlying the same in all cases.

All unsuitable materials identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction. Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect.

To minimise the effects of freeze-thaw cycles in footings founded on soil, all shallow foundations should be founded a minimum of 0.4 m below the adjacent finished ground surface.

It is recommended that foundation excavations and fill platform subgrade be inspected by a suitably qualified and experienced civil or geotechnical engineer to confirm the conditions are in accordance with the assumptions and recommendations provided in this report.

Inspection and testing (Heavy Dynamic Probe/Scala penetrometers) should be completed along footing alignments during construction to confirm the above values are applicable and that the soil has not been softened by weather or excavation, particularly in the outwash sand. Plate compaction or static rolling is recommended following building

platform and footing excavation to stiffen up the foundation subgrade prior to construction.

## 5.10 Soil Bearing Capacity

Moderate to good bearing for shallow foundations is available on the outwash sand and gravel deposits, which will provide an allowable bearing capacity of 70 kPa to 100 kPa (210-300 kPa ultimate geotechnical bearing capacity), for 400 mm wide by 400 mm deep strip footings. Alternatively, if foundations (footings or raft foundations) were to bear on engineered fill overlying outwash sand and gravel deposits this will provide good bearing (100 kPa allowable), for 400 mm wide by 400 mm deep shallow footings, provided fill is at least 300 mm deep under any footings.

Specific shallow investigations and bearing capacity confirmation is recommended for individual building platforms.

## 5.11 Site Subsoil Category

For detailed design purposes, it is recommended the magnitude of seismic acceleration be estimated in accordance with the recommendations provided in NZS 1170.5:2004.

The site is “Class D” (Deep soil site) in accordance with NZS 1170.5:2004 seismic provisions. The soil parameters for static conditions given above require no downgrading for seismic bearing. The materials are not subject to liquefaction or other strength loss on cyclic loading.

# 6 Historic Deep Mining Hazard

## 6.1 Overview of Historic Mining on the Cromwell Flat

Historically the fluvioglacial outwash alluvium of the Cromwell Flat has been the focus of much mining and exploration activity. This activity has focussed on the accumulations of alluvial gold held within the beds of two former outwash channels of the Kawarau River. The former course of the Kawarau River eroded into the surface of the underlying Manuherikia group sediments forming two distinct paleochannels beneath the Cromwell Flat, which have subsequently been infilled with outwash alluvium. One of these paleochannels (the Northern Paleochannel) trends west-east through the centre of the proposed subdivision beneath the ground surface (Appendix A, Figure 1b). The second paleochannel (the Southern Paleochannel) trends west northwest-east southeast through Pearson and Sandflat Road approximately 120-250 m south of the proposed subdivision boundary (Appendix A, Figure 1b). The regional groundwater table in the area is strongly influenced by the level of Lake Dunstan and generally coincides with the position of these two paleochannels.

A study undertaken by N. Modriniak and E. Marsden for the New Zealand Department of Scientific and Industrial Research in 1933 clearly identified the two paleochannels on the Cromwell Flat using seismic geophysical survey. The 1933 geophysical trace of the two buried paleochannels have been overlaid onto a current aerial image to show their position in relation to the proposed subdivision as shown in Appendix A, Figure 1b.

The historic mine shafts that are known to exist in the local vicinity of the proposed subdivision are shown on Appendix A, Figure 1b. In all cases, these mineshafts have attempted to intercept the paleochannels by sinking down vertical shafts from the ground surface through the outwash gravel. Upon reaching the surface of the Manuherikia group sediments lateral drives were generally extended out from the base of the main shaft to reach either bed of the paleochannels.

The previous owner of the subdivision area confirmed that there has been no mining related instability or subsidence occur within the boundaries of the proposed subdivision post lake fill. Mining related sinkholes and subsidence is known to have occurred around the margins of the Lake Dunstan Kawarau Arm during and post lake fill. No mining related features were identified in test pit excavations TP1-39.

A brief discussion of each of the mineshafts identified on GeoSolve site plan Appendix A, Figure 1b is made below in descending order of risk to the proposed subdivision.

### 6.1.1 Horn's Shaft

Horn's mineshaft is located inside the property boundary of 54 Sandflat Road near the base of the prominent terrace riser (Appendix A, Figure 1b). Although this shaft is not located within the boundaries of the subject property it is directly adjacent to the eastern boundary. Very little evidence of the existence of this shaft can now be observed on the ground surface and no evidence of Horn's Shaft was observed in TP17. However, the previous property owner who filled in this mine shaft shortly after purchasing the property confirmed that it was located just inside the boundaries of 54 Sandflat Road. This statement matches up with observations made using 1949 stereopair aerial imagery which clearly shows the

open entrance to the mine shaft. A local geological consultant of Cromwell (now retired) also confirmed that he recalls inspecting a mining related feature near the western boundary of 54 Sandflat Road as outlined in photo 3 below.

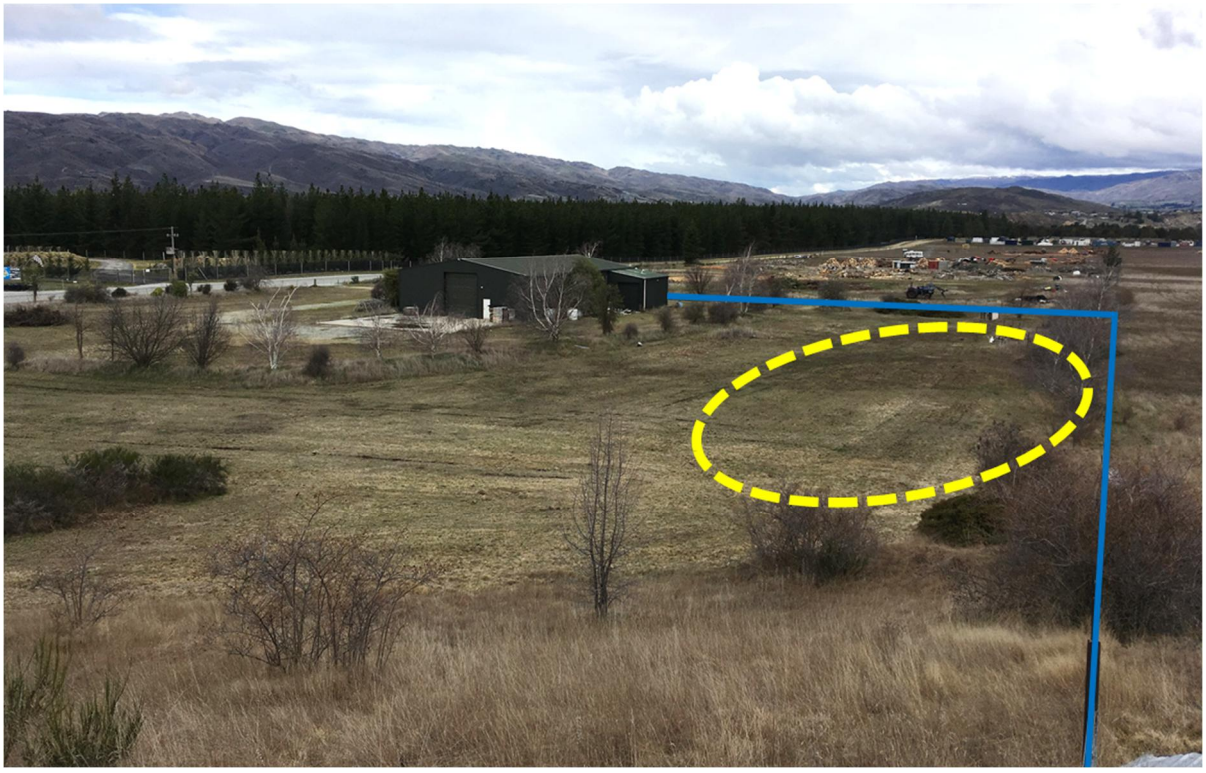


**Photo 3. Approximate area of Horn's Shaft (circled in yellow) against the western boundary of 54 Sandflat Road (outlined in blue). The subdivision area is on right and upper right of image.**

A newspaper extract from the Cromwell Argus dated 29 October 1934 and titled "The Mines Statement" gives important details on Horn's Shaft. It states that Horn's Shaft was sunk to a total depth of 112 feet (34.1 m) where sinking subsequently stopped as the groundwater inflow at that depth was beyond the capacity of the pumps in use at the time. This indicates that no lateral drives were driven off Horn's main vertical shaft. This evidence is further supported by the previous property owner who has always been of the understanding that the mine only consisted of a vertical shaft and did not include lateral drives.

A water well drilled pre-lake fill immediately south of 54 Sandflat Road on 28-01-1966 by A. M. Bisley & Co Ltd indicates that the static water level was at 113 feet (34.4 m) bgl. This water level data correlates well with the groundwater issues experienced while sinking Horn's Shaft.

### 6.1.2 Bell's Number One Shaft

Bell's number one mineshaft is located on the undeveloped property to the south of the proposed subdivision area (Appendix A, Figure 1b). Of all the mine shafts on GeoSolve site plan Appendix A, Figure 1b this shaft has the most obvious remaining evidence of its existence on the ground surface as shown in photo 4 and 5 below.

**Photo 4. Location of Bell's number one shaft indicated by the gravel spoil heap in centre of image.**

**Photo 5. Surface depression of Bell's number one shaft with household rubbish at the surface.**

A newspaper extract from the same article, Cromwell Argus dated 29 October 1934 and titled "The Mines Statement" makes reference to an R. Bell who bottomed a shaft south of

the proposed subdivision. This extract states that the mineshaft bottomed at 136 feet (41.4 m) although it does not give details as to whether lateral drives were driven once the Manuherikia group sediments were reached.

The previous property owner remembers being told that Bell's Number One Shaft had a lateral drive at its base, which tunnelled north towards the subdivision area. Although it is now difficult to substantiate this claim without detailed mine plans it does make geological sense. Considering that sinking on Horn's Shaft was stopped due to groundwater it is likely that a lateral drive off Bell's Number One Shaft drove northwards in order to avoid the groundwater in the Southern Paleochannel. However, even if this is the case it is still very unlikely that a lateral drive driven from Bell's Number One Shaft would have made it under the proposed subdivision area, as the distance between the two is approximately 175 m.

### 6.1.3 Bell & Hooper Shaft

The Bell & Hooper Mine Shaft is located on the western boundary of number 131 Pearson Road approximately 130 m from the proposed subdivision boundary (Appendix A, Figure 1b). The current landowner of 131 Pearson Road confirmed that he has never seen any evidence of the Bell & Hooper Shaft on the ground surface.

It is unlikely that any lateral drives off this shaft would have tunnelled eastwards towards the subdivision area considering the location of the paleochannel directly to the north (Appendix A, Figure 1b). No information on this shaft could be found, however a newspaper extract from the Cromwell Argus dated 29 October 1934 and titled "The Mines Statement" gives details on Frye & Giddens Shaft located to the west of the Bell & Hooper Shaft off GeoSolve plan area Appendix A, Figure 1b. Frye & Giddens shaft bottomed at 90 feet (27.4 m) then a lateral drive was extended towards the south. Due to low gold grades encountered to the south a lateral drive was subsequently driven northwards towards the Northern Paleochannel where gold grades improved. This adds further credence to the theory that the Bell & Hooper Shaft would not have tunnelled eastwards towards the proposed subdivision.

### 6.1.4 Remaining Shafts

The remaining shafts as shown on GeoSolve plan Appendix A, Figure 1b (Aotearoa, Bell Smith, 1980's Shaft and Bell's Number One and Two shafts) have all been subsequently covered over. Only subtle evidence of Bell's Number One and Two Shafts remains on the ground surface.

Considering the location of these five shafts in relation to the Southern Paleochannel and their distance from the proposed subdivision area, it is very unlikely that any lateral drives from these shafts would have extended beneath the subject property.

## 6.2 Deep Mining Hazard Mitigation Recommendations

Horn's Shaft poses a low risk to the proposed subdivision; however, setback mitigation is recommended. It is likely that settlement induced by seismic shaking could create a sink hole or crown hole around the perimeter of Horn's Shaft. It is understood that a reserve area is designated adjacent to this area as indicated on preliminary subdivision plans presented to the Cromwell Community Board. The proposed reserve area shown on the

preliminary subdivision plans will provide a satisfactory exclusion zone adjacent to Horn's shaft.

It is recommended that stormwater transfer to ground does not take place within the immediate vicinity of Horn's Shaft. An increase in groundwater dissipation through these soil types beyond the current natural capacity could cause the perimeter area of the shaft to settle. Sprinkler irrigation related to the proposed reserve area is not expected to have an adverse effect on Horn's Shaft.

To address these two issues, it is recommended that no building or disposal of stormwater to ground should be permitted within 20 m of the western boundary of 54 Sandflat Road in the vicinity of Horn's Shaft (Appendix A, Figure 1b).

It is considered that the remaining mine shafts shown on Appendix A, Figure 1b present no risk to the proposed subdivision and will not require mitigation.

## 6.3 Further Geotechnical Work

It is considered that the work produced as part of this report has been adequate to prove the deep mining related hazard is a low risk to the proposed subdivision. Standard subdivision planning measures will mitigate this hazard.

If more evidence is required to further de-risk this hazard for consent a more detailed desktop review can be undertaken by GeoSolve. This would include a review of Mines Department Records held on file at Archives New Zealand Dunedin Office and a more extensive search of personal memoirs and documents.

# 7 Neighbouring Structures/Hazards

**Natural Hazards:** Known seismic hazards affecting the development are detailed in Section 4.1 and appropriate allowance should be made for seismic loading during detailed design of the future buildings, foundations, and retaining walls. The proposed subdivision area is not located within any mapped slope instability features, alluvial fan, flooding or any other hazard features on the ORC database.

The ORC hazard register indicates that the subdivision area has a low susceptibility of seismic liquefaction. However, GeoSolve can confirm that there is no risk of liquefaction on this site due to the depth to groundwater, which is recorded at 25-34 m depth in several bores around the sites proximity.

Flooding is not considered a risk assuming stormwater runoff is controlled following subdivision construction. The development is significantly higher than the Kawarau Arm of Lake Dunstan, which is the closest body of flowing water, located approximately 500 m to the southwest of this site.

**Deep Mining Hazard:** The historic deep mining hazard identified on the GeoSolve database for this area has been discussed in Section 6 of this report.

**Distances to adjoining structures:** Residential, commercial and horticultural properties are situated on the eastern and western boundaries of the proposed subdivision. The distance from subdivision boundaries to adjoining structures ranges from 5-40 m. The Highlands Motorsport Park is located on the eastern side of Sandflat Road. No adverse geotechnical implications apply for neighbouring properties during construction provided appropriate vibration, dust and noise mitigation measures are undertaken.

**Aquifers:** No aquifer resource will be adversely affected by the proposed development. ORC resource consent will be required prior to drilling any waterbores or heat transfer holes if these are proposed as part of the development.

**Erosion and Sediment Control:** The site presents some potential to generate silt runoff during heavy rainfall events and this would naturally drain downslope. Effective systems for erosion control are runoff diversion drains and contour drains, while for sediment control, options are earth bunds, silt fences, hay bales, vegetation buffer strips and sediment ponds. Details for implementation are given within the following link: http://esccanterbury.co.nz/

**Noise:** It is expected that conventional earthmoving equipment, such as excavators, trucks and rollers will be required during construction. The earthworks contractor should take appropriate measures to control the construction noise, and ensure CODC requirements are met in regard to this issue.

**Dust:** Regular dampening of soil materials with sprinklers to CODC standards should be effective if required. Particular consideration should be given to dust mitigation measures during earthworks construction along the western boundary of the subdivision taking into account the orchard.

**Vibration:** No vibration induced settlement is expected in these soil types. The effects of vibrations from heavy vibrating rollers on adjacent structures will need to be considered if engineered fill is to be placed and compacted within 20 m of an existing structure.

# 8 Conclusions and Recommendations

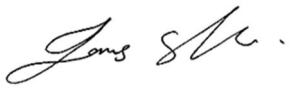
- The site is underlain by surficial topsoil and loess deposits which overlie outwash sand and gravel deposits (alluvium) overlying Manuherikia group lake sediments at depth beneath the surface of the proposed subdivision;
- Groundwater seepages or flows were not observed in any of the test pits during site investigations;
- Nearby ORC borehole data indicates that the regional groundwater table lies at considerable depth beneath this site at 25-34 m bgl;
- No evidence of ground surface slope instability has been identified on site, this should be reassessed following earthworks design;
- The deep mining related hazard has been discussed in Section 6 of this report and mitigation recommendations are provided in Section 6.2. Historic mine shaft positions are shown on Appendix A, Figure 1b;
- Recommendations for further work are discussed in Section 6.3;
- Moderate to good bearing for shallow foundations is available on the outwash sand and gravel deposits, which will provide an allowable bearing capacity of 70 kPa to 100 kPa, for 400 mm wide by 400 mm deep shallow footings.
  Alternatively, if foundations (footings or raft foundations) were to bear on engineered fill overlying outwash sand and gravel deposits this will provide good bearing (100 kPa allowable), for 400 mm wide by 400 mm deep shallow footings, provided fill is at least 300 mm deep under any footings;
- Recommendations for temporary and permanent batter slope angles are described in Table 2. Slopes that are required to be steeper than those described should be structurally retained or subject to specific geotechnical design;
- All retaining walls should be designed by a Chartered Professional Engineer using the geotechnical parameters recommended in Table 1 of this report;
- The outwash soils are considered suitable for use as engineered fill (during earthworks season and in accordance with an earthfill specification). An onsite borrow pit and mobile screening plant could be considered as discussed in Section 5.3;
- All unsuitable soils identified in foundation excavations, particularly those softened by exposure to water, should be undercut and replaced with engineered fill during construction;
- Any fill that is utilised as bearing for foundations should be placed and compacted in accordance with NZS 4431:1989 and certification provided to that effect;
- For detailed design purposes, it is recommended that the site is classified “Class D – Deep Subsoil” in accordance with NZS 1170.5:2004 seismic provisions;
- A suitably qualified geotechnical or civil engineer should inspect all excavations, batter slopes and additionally any seepage, spring flow or under-runners that may be encountered during construction.

# 9 Applicability

This report has been prepared for the benefit of River Terrace Developments Limited with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

It is important that we be contacted if there is any variation in subsoil conditions from those described in this report.

Please do not hesitate to contact the undersigned if we can provide any further assistance with this project.

| Report prepared by: | Reviewed for GeoSolve Ltd by: |
|---|---|
|  |  |
| ..... | ..... |
| James Stewart | Fraser Wilson |
| Engineering Geologist | Senior Engineering Geologist |
| GeoSolve Ltd | GeoSolve Ltd |

# Appendix A: Site Investigation Plans


Kawarau Gorge Road
Sandflat Road
TP1
TP2
TP3
TP4
PERM1
PERM2
TP8
TP7
TP6
TP5
TP9
TP10
TP11
PERM4
PERM3
TP14
TP13
TP12
PERM5
TP15
TP16
TP17
PERM6
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PERM7
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PERM12
TP31
PERM9
TP32
TP33
TP34
TP35
PERM10
TP39
TP38
TP37
TP36
229
230
231
232
225
220
219
222
237
SCALE 1:3500
0 35 70 105 140 175 (m)
Key:
GeoSolve Test Pit Locations
Paterson Pitts Permeability Test Locations
Site contours, 0.5m intervals
Proposed subdivision outline
GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz
DRAWN WCG Nov.17
DRAFTING CHECKED JAS Nov.17
APPROVED FAW Nov.17
CADFILE: 170574_SP.dwg
SCALES (AT A3 SIZE): 1:250
PROJECT No: 170574
River Terrace Developments Limited
Geotechnical Investigation
Sandflat Road, Cromwell
Investigation Plan
FIG No: Appendix A - Figure 1a
REV. 1


Key:

- Paleochannel Seismic Geophysical Trace (1933)
- Historic Mine Shaft
- Proposed subdivision outline

GEOSOLVE
Level 1, 70 MacAndrew Road, South Dunedin
www.geosolve.co.nz

| | | |
|---|---|---|
| DRAWN | WCG | Nov.17 |
| DRAFTING CHECKED | JAS | Nov.17 |
| APPROVED | FAW | Nov.17 |
| CADFILE: 170574_SP.dwg | | |
| SCALES (AT A3 SIZE): 1:500 | | |
| PROJECT No: 170574 | | |

# River Terrace Developments Limited

Geotechnical Investigation

Sandflat Road, Cromwell

Geological Plan

FIG No: Appendix A - Figure 1b

REV. 1

# Appendix B: Site Investigation Data

GeoSolve Ltd

# EXCAVATION LOG

EXCAVATION NUMBER: **TP 1**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Light brown, silty SAND. Sand is fine. Loose. Massive. | Moist | LOESS |
| | | 0.5 | | Light brown, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | | 0.7 | | Grey, SAND with trace of gravel. Sand is fine to coarse. Gravel is fine. Loose. Massive. | Dry | OUTWASH SAND |
| | | 1.6 | | Grey, SAND with some gravel to sandy GRAVEL with trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 500 mm diameter. Loose to medium dense. Bedded. | Dry | OUTWASH SAND & GRAVEL |
| | NO SEEPAGE | 3.0 | | Grey/white, gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse. Gravel is predominantly fine to medium. Gravel is sub-rounded. White calcite cementation. Loose to medium dense. Laminated. | Dry | OUTWASH SAND |

Total Depth = 3 m

COMMENT: Running of loose soils back into test pit below 1.6 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 2**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Light brown, silty SAND with trace of gravel. Sand is fine to coarse. Gravel is fine. Loose. Massive. | Moist | LOESS |
| | | 1.2 | | Brown/grey, SAND with some gravel to gravelly SAND with trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 300 mm diameter. Loose. Bedded. | Moist | OUTWASH SAND |
| | NO SEEPAGE | 3.0 | | Grey/white, SAND with some gravel to gravelly SAND with trace of cobbles. Sand is fine to coarse. Gravel is fine to medium. Gravel is sub-rounded to rounded. White calcite cementation. Loose to medium dense. Laminated. | Dry | OUTWASH SAND |

Total Depth = 3 m

| | |
|---|---|
| COMMENT: Test pit walls stood well - minor running of loose soils back into test pit below 1.2 m depth. | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 3**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.25 | | Light brown, silty SAND with trace of gravel. Sand is fine to coarse. Gravel is fine. Loose. Massive. | Moist | LOESS |
| | | 0.6 | | Brown, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.3 | | Grey, SAND with some gravel & trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 300 mm diameter. Loose. Laminated. | Moist | OUTWASH SAND |
| | | 2.4 | | Grey/white, sandy GRAVEL with minor cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Entire layer is cemented with calcite. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.0 | | Grey, gravelly SAND to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 500 mm diameter. Loose to medium dense. Laminated. | Dry | OUTWASH SAND & GRAVEL |

Total Depth = 3 m

| | |
|---|---|
| COMMENT: Slumping of test pit walls above 1.3 m depth. | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 4**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Light brown, silty SAND with trace of gravel. Sand is fine to coarse. Gravel is fine. Loose. Massive. | Moist | LOESS |
| | | 0.6 | | Brown, GRAVEL with trace of sand. Sand is fine to coarse. Gravel is fine to coarse. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.5 | | Grey, gravelly SAND to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 300 mm diameter. Loose. Bedded. | Moist | OUTWASH SAND & GRAVEL |
| | | 1.6 | | Grey/white, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Entire layer is cemented with calcite. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |
| | | 2.3 | | Grey, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.2 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Layers of calcite cementation. Boulders up to 400 mm diameter. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.2 m

COMMENT: Slumping of test pit walls above 1.5 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 5**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.4 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 0.7 | | Brown, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.3 | | Grey, SAND with minor to some gravel. Sand is fine to coarse. Gravel is fine to coarse. Loose. Massive. | Dry | OUTWASH SAND |
| | NO SEEPAGE | 3.3 | | Grey, sandy GRAVEL with trace of cobbles & boulders & interbedded layers of gravelly SAND. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 300 mm diameter. Light calcite cementation. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.3 m

COMMENT: Slumping of test pit walls above 1.3 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 6**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | NO SEEPAGE | 3.3 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 450 mm diameter. Light calcite cementation. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.3 m

COMMENT: Slumping of test pit walls above 1.0 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 7**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.2 | | Light brown, silty SAND with trace of tree roots. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | NO SEEPAGE | 3.0 | | Grey, gravelly SAND to sandy GRAVEL with trace to minor cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Light calcite cementation. Loose. Bedded. | Dry | OUTWASH SAND & GRAVEL |

Total Depth = 3 m

COMMENT: Significant continual slumping of test pit walls and running of loose soils from ground level to 3.0 m bgl. Very difficult to keep test pit open.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 8**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.2 | | Light brown, SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 0.8 | | Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.3 | | Grey, SAND. Sand is fine to medium. Loose. Massive. | Moist | OUTWASH SAND |
| | NO SEEPAGE | 3.3 | | Grey, gravelly SAND to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Predominantly medium to coarse sand. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Loose to medium dense. Bedded. | Dry | OUTWASH SAND & GRAVEL |

Total Depth = 3.3 m

COMMENT: Minor slumping of test pit walls.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

GeoSolve Ltd

# EXCAVATION LOG

EXCAVATION NUMBER: **TP 9**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.15 | | Light brown, silty SAND with trace of tree roots. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 0.6 | | Grey/brown, sandy GRAVEL with trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 300 mm diameter. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.4 | | Grey, gravelly SAND with trace of boulders. Sand is fine to coarse. Gravel is fine to medium. Boulders up to 1.0 m diameter. Loose. Laminated. | Dry to moist | OUTWASH SAND |
| | NO SEEPAGE | 3.7 | | Grey/white, gravelly SAND to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Light calcite cementation. Boulders up to 350 mm diameter. Medium dense. Bedded. | Dry | OUTWASH SAND & GRAVEL |

Total Depth = 3.7 m

COMMENT: Minor slumping of test pit walls and running of loose soils above 1.4 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 10**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 2.3 | | Grey/brown, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 700 mm diameter. Light calcite cementation. Loose to medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey, gravelly SAND to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 350 mm diameter. Medium dense. Bedded. | Dry | OUTWASH SAND & GRAVEL |

Total Depth = 3.5 m

COMMENT: Minor slumping of test pit walls above 2.3 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 11**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.2 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 2.0 | | Brown/grey, sandy GRAVEL to GRAVEL with some sand. Sand is medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose. Bedded. | Dry to moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.2 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.2 m

| | |
|---|---|
| COMMENT: Slumping of test pit walls and running of loose soils above 2.0 m depth. | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 12**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.15 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 1.4 | | Grey/brown, sandy GRAVEL. Sand is medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.3 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 500 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.3 m

COMMENT: Minor slumping of test pit walls above 1.4 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 13**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.2 | | Light brown, SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | NO SEEPAGE | 3.5 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Sand is predominantly medium to coarse. Gravel is sub-rounded to rounded. Boulders up to 800 mm diameter. Light calcite cementation. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Minor slumping of test pit walls above 1.5 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 14**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.15 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 1.5 | | Grey, gravelly SAND to sandy GRAVEL with lenses of SAND & trace of cobbles & boulders. Sand is fine to coarse. Sand is predominantly medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 300 mm diameter. Loose to medium dense. Bedded. | Moist | OUTWASH SAND & GRAVEL |
| | NO SEEPAGE | 3.7 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Light calcite cementation. Boulders up to 300 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.7 m

COMMENT: Minor slumping of test pit walls above 1.5 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 15**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 14-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 14-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.2 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 0.6 | | Grey, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.9 | | Grey/brown, gravelly SAND with lenses of GRAVEL with minor sand. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Horizons of calcite cementation. Loose. Bedded/laminated. | Dry | OUTWASH SAND & GRAVEL |
| | NO SEEPAGE | 3.3 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.3 m

COMMENT: Test pit walls stood well - no slumping occurred.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 16**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Light brown, silty SAND. Sand is fine to coarse. Loose. Massive. | Moist | LOESS |
| | | 1.5 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Sand is predominantly medium to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Slumping of test pit walls and running of loose soils above 1.5 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 17**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.45 | | Light brown, silty SAND. Sand is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 0.75 | | Brown, GRAVEL with trace of sand. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 2.5 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with minor cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 800 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey, GRAVEL with some sand. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Minor slumping of test pit walls above 0.75 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 18**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.3 | | Light brown, silty SAND. Sand is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 1.0 | | Brown, GRAVEL with minor sand. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Massive. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.6 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 300 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.6 m

COMMENT: Slumping of test pit walls and running of loose soils above 1.0 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 19**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.55 | | Light brown, silty SAND. Sand is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 1.1 | | Brown, GRAVEL with minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey/white, sandy GRAVEL to GRAVEL with some sand with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 300 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Running of loose soils above 1.1 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 20**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.15 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.5 | | Light brown, silty SAND. Sand is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 0.85 | | Brown, GRAVEL with minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Massive. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.8 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 600 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.8 m

COMMENT: Test pit walls stood well - only minor slumping above 0.85 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd

# EXCAVATION LOG

EXCAVATION NUMBER: **TP 21**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.15 | | Brown, sandy organic SILT. Sand is fine to medium. Soft/loose. Massive. | Moist | TOPSOIL/LOESS |
| | | 1.2 | | Grey/brown, GRAVEL with some sand & trace of cobbles. Sand is fine to medium. Gravel is fine to coarse. Gravel is predominantly fine to medium. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 2.0 | | Grey/brown, gravelly SAND to sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is predominantly fine to medium. Loose to medium dense. Bedded. | Dry | OUTWASH SAND & GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 900 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Slumping of test pit walls and running of loose soils above 2.0 m depth.

Logged By: JAS

Checked Date:

Sheet: 1 of 1

GeoSolve Ltd

# EXCAVATION LOG

EXCAVATION NUMBER: **TP 22**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.3 | | Brown, silty SAND with trace of gravel. Sand is fine to medium. Gravel is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 0.85 | | Brown, sandy GRAVEL. Sand is fine to coarse. Gravel is fine to medium. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.6 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 300 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.6 m

COMMENT: Significant running of loose soils and slumping of test pit walls above 0.85 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 23**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.3 | | Light brown, silty SAND. Sand is fine. Loose. Massive. | Moist | LOESS |
| | | 0.5 | | Light brown, silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Loose to medium dense. Massive. | Moist | OUTWASH GRAVEL |
| | | 1.2 | | Grey, GRAVEL with minor to some sand. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.7 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 500 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.7 m

COMMENT: Significant slumping of test pit walls and running of loose soils above 1.2 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 24**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.2 | | Light brown, silty SAND. Sand is fine. Loose. Massive. | Moist | LOESS |
| | | 1.3 | | Brown, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.6 | | Grey/white, GRAVEL with some sand & trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 400 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.6 m

| | |
|---|---|
| COMMENT: | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 25**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Brown, sandy organic SILT. Soft. Massive. | Moist | TOPSOIL/LOESS |
| | | 1.0 | | Brown, sandy GRAVEL with minor cobbles & layers of GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.7 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 500 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |

Total Depth = 3.7 m

COMMENT: Minor slumping of test pit walls and running of loose soils above 1.0 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 26**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Black, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.3 | | Grey/brown, sandy GRAVEL with minor cobbles & lenses of GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.9 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders & trace of silt. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 400 mm diameter. Calcite cementation. Medium dense. Bedded. | Moist | OUTWASH GRAVEL |

Total Depth = 3.9 m

COMMENT: Test pit walls stood well - minor slumping above 1.3 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 27**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 15-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 15-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.2 | | Light brown, silty SAND. Sand is fine. Loose. Massive. | Moist | LOESS |
| | | 1.4 | | Grey/brown, sandy GRAVEL with minor cobbles & lenses of GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.9 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders & trace of silt. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 400 mm diameter. Calcite cementation. Medium dense. Bedded. | Moist | OUTWASH GRAVEL |

Total Depth = 3.9 m

| | |
|---|---|
| COMMENT: | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 28**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.2 | | Light brown, silty SAND. Sand is fine. Loose. Massive. | Moist | LOESS |
| | | 1.3 | | Grey/brown, GRAVEL with trace to minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.9 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 300 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.9 m

COMMENT: Significant slumping of test pit walls and running of loose soils above 1.3 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 29**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.5 | | Grey/brown, GRAVEL with minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.9 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with trace of cobbles & trace of silt. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Light calcite cementation. Medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |

Total Depth = 3.9 m

COMMENT: Slumping of test pit walls and running of loose soils above 1.5 m depth.

Logged By: JAS
Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 30**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.2 | | Grey/brown, GRAVEL with minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 4.0 | | Grey/white, GRAVEL with some sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Very light calcite cementation. Medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |

Total Depth = 4 m

COMMENT: Significant slumping of test pit walls and running of loose soils above 1.2 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 31**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.3 | | Light brown, silty SAND with trace of gravel. Sand is fine. Gravel is fine. Loose. Massive. | Moist | LOESS |
| | | 1.2 | | Grey/brown, GRAVEL with trace to minor sand & trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.6 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 600 mm diameter. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.6 m

COMMENT: Significant slumping and running of loose soils above 1.2 m depth. Absence of calcite cementation below 1.2 m depth - soils become less dense because of this.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 32**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.3 | | Dark grey, GRAVEL with minor sand & minor cobbles & trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 400 mm diameter. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.8 | | Grey, sandy GRAVEL with minor cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 500 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.8 m

COMMENT: Significant slumping of test pit walls and running of loose soils above 1.3 m depth. Absence of calcite cementation below 1.3 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 33**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 1.3 | | Dark grey, GRAVEL with some sand & trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 400 mm diameter. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.7 | | Grey/white, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is predominantly fine to medium. Gravel is sub-rounded. Very light calcite cementation. Loose to medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |

Total Depth = 3.7 m

COMMENT: Significant slumping of test pit walls and running of loose soils above 1.3 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 34**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 16-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 16-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Brown, sandy organic SILT. Soft. Massive. | Moist | TOPSOIL/LOESS |
| | | 1.4 | | Dark grey, GRAVEL with some sand & trace of cobbles. Sand is medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.2 | | Grey/white, GRAVEL with some sand to sandy GRAVEL with minor cobbles & trace of boulders. Sand is fine to coarse. Gravel is fine to coarse. Boulders up to 400 mm diameter. Calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.2 m

COMMENT: Significant slumping and running of loose soils above 1.4 m depth. Very difficult to keep test pit open.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 35**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 17-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 17-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, sandy organic SILT. Sand is fine to medium. Soft. Massive. | Moist | TOPSOIL/LOESS |
| | | 0.5 | | Grey/brown, GRAVEL with minor to some sand with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 0.75 | | Grey, silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | | 1.2 | | Dark/grey, gravelly SAND with trace of cobbles. Sand is medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose. Bedded. | Moist | OUTWASH SAND |
| | NO SEEPAGE | 3.8 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders & horizons of GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Boulders up to 500 mm diameter. Light calcite cementation. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.8 m

COMMENT: Significant slumping and running of loose soils above 1.2 m depth.

Logged By: JAS

Checked Date:

GeoSolve Ltd

# EXCAVATION LOG

EXCAVATION NUMBER: **TP 36**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 17-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 17-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.1 | | Grey/brown, sandy GRAVEL with trace of cobbles & layers of GRAVEL. Sand is medium to coarse. Gravel is fine to coarse. Gravel is predominantly fine to medium. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | NO SEEPAGE | 3.5 | | Grey/white, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to medium. Gravel is sub-rounded. Boulders up to 400 mm diameter. Very ligh calcite cementation at top 200-300 mm of unit. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.5 m

COMMENT: Slumping of test pit walls and running of loose soils above 1.1 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 37**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | | Inclination: VERTICAL | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 17-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 17-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.05 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 1.2 | | Grey/brown, gravelly SAND with trace of cobbles & boulders. Sand is medium to coarse. Gravel is fine to medium. Gravel is predominantly fine to medium. Boulders up to 700 mm diameter. Loose. Weak bedding. | Moist | OUTWASH SAND |
| | | 2.3 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 300 mm diameter. Calcite cementation at top 200-300 mm of unit. Loose to medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |
| | | 2.9 | | Grey, SAND. Sand is fine to medium. Loose. Laminated. | Dry to moist | OUTWASH SAND |
| | NO SEEPAGE | 3.7 | | Grey, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Medium dense. Bedded. | Dry to moist | OUTWASH GRAVEL |

Total Depth = 3.7 m

COMMENT: Slumping of test pit walls above 1.2 m depth.

Logged By: JAS
Checked Date:
Sheet: 1 of 1

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 38**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: VERTICAL | | Direction: |

| | | | | | |
|---|---|---|---|---|---|
| EASTING: | mE | EQUIPMENT: 8 tonne excavator | | OPERATOR: Quinn | |
| NORTHING: | mN | INFOMAP NO. | | COMPANY: Parcell Contracting | |
| ELEVATION: | m | DIMENSIONS: | | HOLE STARTED: 17-Aug-17 | |
| METHOD: | | EXCAV. DATUM: | | HOLE FINISHED: 17-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 0.1 | | Dark brown, organic SILT. Soft. | Moist | TOPSOIL |
| | | 0.2 | | Light brown, silty SAND. Sand is fine to medium. Loose. Massive. | Moist | LOESS |
| | | 0.3 | | Light brown, silty sandy GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Loose. Massive. | Moist | OUTWASH GRAVEL |
| | | 1.2 | | Grey, GRAVEL with minor to some sand & trace of cobbles. Sand is medium to coarse. Gravel is fine to coarse. Gravel is sub-rounded to rounded. Loose. Bedded. | Moist | OUTWASH GRAVEL |
| | | 2.6 | | Grey, gravelly SAND with trace of cobbles. Sand is medium to coarse. Gravel is fine to medium. Gravel is sub-rounded. Calcite cemented at top 200-300 mm of unit. Loose to medium dense. Weak bedding. | Dry | OUTWASH SAND |
| | NO SEEPAGE | 3.3 | | Grey, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Loose to medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.3 m

COMMENT: Significant slumping of test pit walls above 1.2 m depth.

Logged By: JAS

Checked Date:

# GeoSolve Ltd
# EXCAVATION LOG

EXCAVATION NUMBER: **TP 39**

| | | | |
|---|---|---|---|
| PROJECT: Winton-Cromwell Sandflat Rd | | | Job Number: 170574 |
| LOCATION: SEE SITE PLAN | Inclination: | VERTICAL | Direction: |

| | | | |
|---|---|---|---|
| EASTING: mE | EQUIPMENT: 8 tonne excavator | OPERATOR: Quinn | |
| NORTHING: mN | INFOMAP NO. | COMPANY: Parcell Contracting | |
| ELEVATION: m | DIMENSIONS: | HOLE STARTED: 17-Aug-17 | |
| METHOD: | EXCAV. DATUM: | HOLE FINISHED: 17-Aug-17 | |

| SCALA PENETRATION | GROUNDWATER / SEEPAGE | DEPTH (m) | GRAPHIC LOG | SOIL / ROCK CLASSIFICATION, PLASTICITY OR PARTICLE SIZE CHARACTERISTICS, COLOUR, WEATHERING, SECONDARY AND MINOR COMPONENTS | WATER CONTENT | GEOLOGICAL: SOIL / ROCK TYPE, ORIGIN, MINERAL COMPOSITION, DEFECTS, STRUCTURE, FORMATION |
|---|---|---|---|---|---|---|
| | | 1.1 | | Grey/brown, gravelly SAND with lenses of GRAVEL. Sand is fine to coarse. Gravel is fine to coarse. Loose. Bedded. | Moist | OUTWASH SAND |
| | | 2.1 | | Grey/white, sandy GRAVEL with trace of cobbles. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Calcite cemented. Loose to medium dense. Bedded. | Moist | OUTWASH GRAVEL |
| | | 2.6 | | Grey, SAND. Sand is fine to medium. Loose. Laminated. | Moist | OUTWASH SAND |
| | NO SEEPAGE | 3.7 | | Grey, sandy GRAVEL with trace of cobbles & boulders. Sand is fine to coarse. Gravel is fine to coarse. Gravel is sub-rounded. Boulders up to 300 mm diameter. Medium dense. Bedded. | Dry | OUTWASH GRAVEL |

Total Depth = 3.7 m

| | |
|---|---|
| COMMENT: Less than 50 mm of topsoil at surface of test pit. Slumping of test pit walls above 1.1 m depth. | Logged By: JAS |
| | Checked Date: |
| | Sheet: 1 of 1 |

GEOSOLVE LTD

# SCALA PENETROMETER LOG

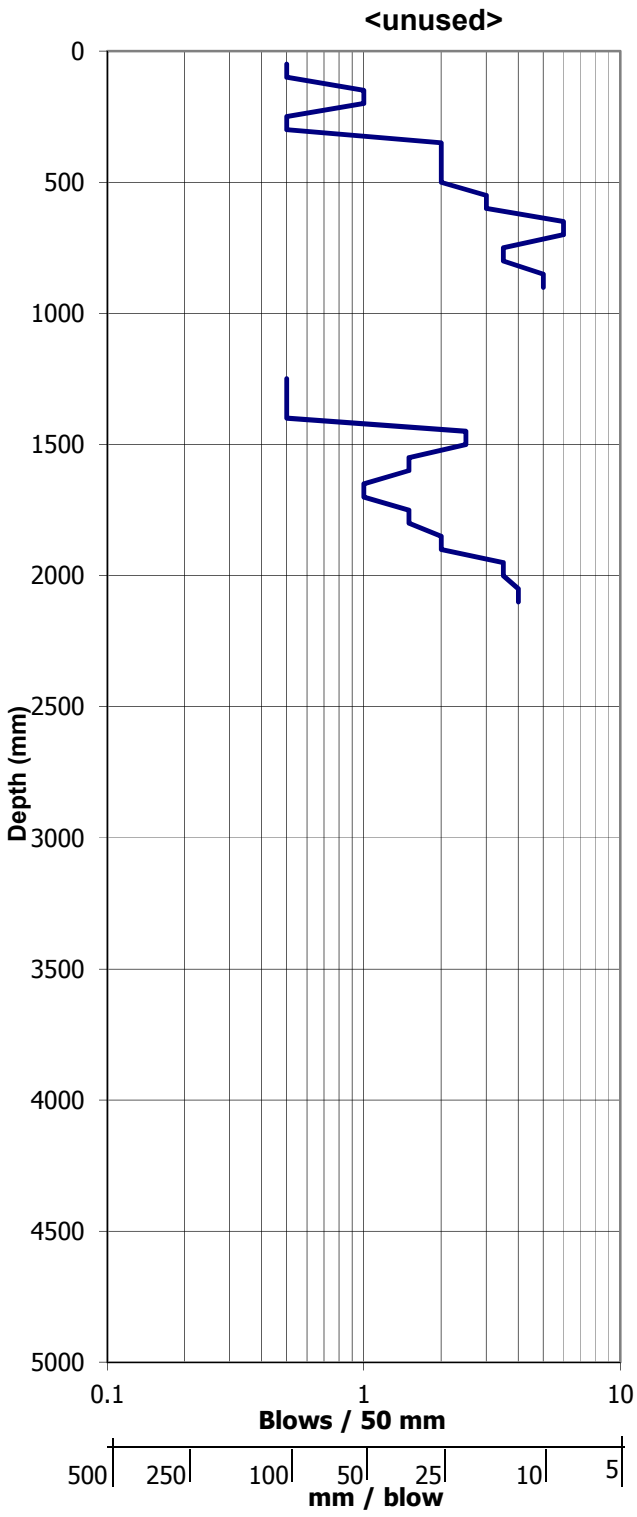
Job No: *170574*
Project: *Sandflat Rd*
Location: *TP1*
RL: *gl*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC1***
**Sheet** ***1***
**of** ***28***

| SC1 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 1 |
| 200 | 1 |
| 250 | 0.5 |
| 300 | 0.5 |
| 350 | 2 |
| 400 | 2 |
| 450 | 2 |
| 500 | 2 |
| 550 | 3 |
| 600 | 3 |
| 650 | 6 |
| 700 | 6 |
| 750 | 3.5 |
| 800 | 3.5 |
| 850 | 5 |
| 900 | 5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 0.5 |
| 1400 | 0.5 |
| 1450 | 2.5 |
| 1500 | 2.5 |
| 1550 | 1.5 |
| 1600 | 1.5 |
| 1650 | 1 |
| 1700 | 1 |
| 1750 | 1.5 |
| 1800 | 1.5 |
| 1850 | 2 |
| 1900 | 2 |
| 1950 | 3.5 |
| 2000 | 3.5 |
| 2050 | 4 |
| 2100 | 4 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC1 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

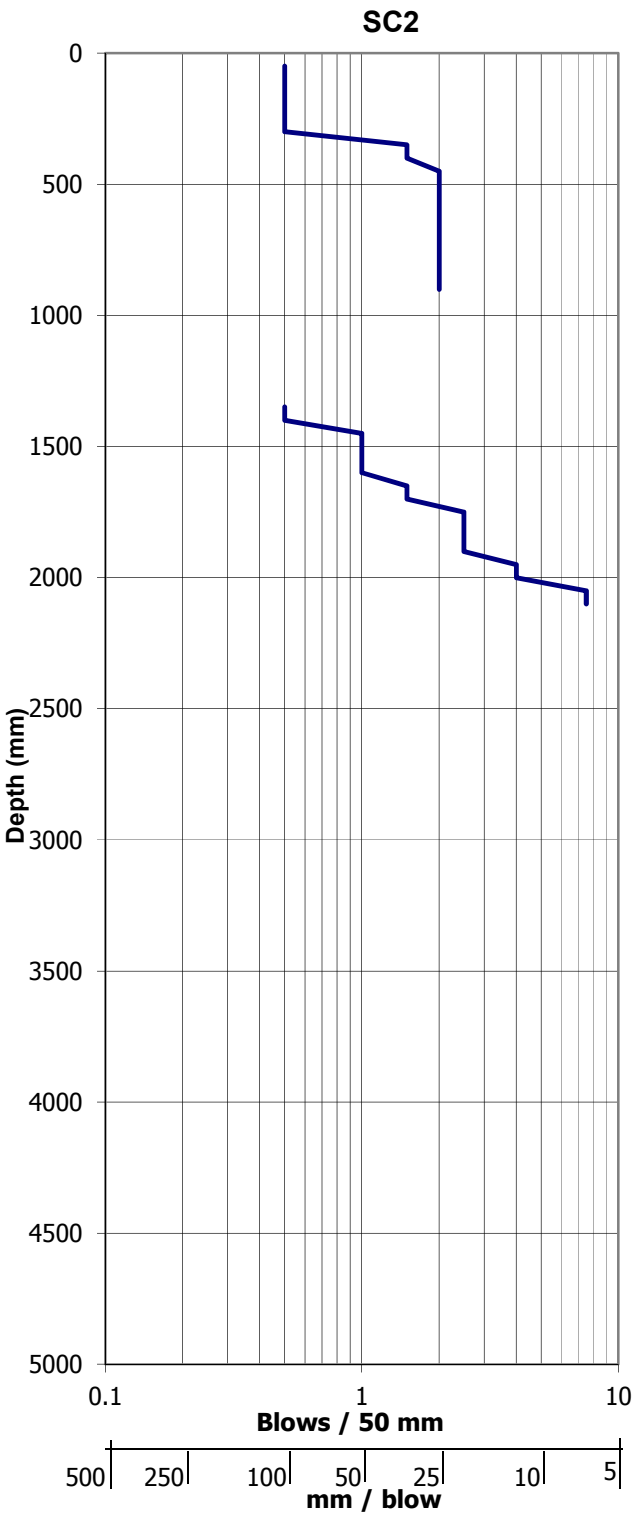
Job No: *170574*
Project: *Sandflat Rd*
Location: *TP2*
RL: *gl*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC2***
**Sheet** ***2***
**of** ***28***

| SC2 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 0.5 |
| 200 | 0.5 |
| 250 | 0.5 |
| 300 | 0.5 |
| 350 | 1.5 |
| 400 | 1.5 |
| 450 | 2 |
| 500 | 2 |
| 550 | 2 |
| 600 | 2 |
| 650 | 2 |
| 700 | 2 |
| 750 | 2 |
| 800 | 2 |
| 850 | 2 |
| 900 | 2 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0 |
| 1300 | 0 |
| 1350 | 0.5 |
| 1400 | 0.5 |
| 1450 | 1 |
| 1500 | 1 |
| 1550 | 1 |
| 1600 | 1 |
| 1650 | 1.5 |
| 1700 | 1.5 |
| 1750 | 2.5 |
| 1800 | 2.5 |
| 1850 | 2.5 |
| 1900 | 2.5 |
| 1950 | 4 |
| 2000 | 4 |
| 2050 | 7.5 |
| 2100 | 7.5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC2 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

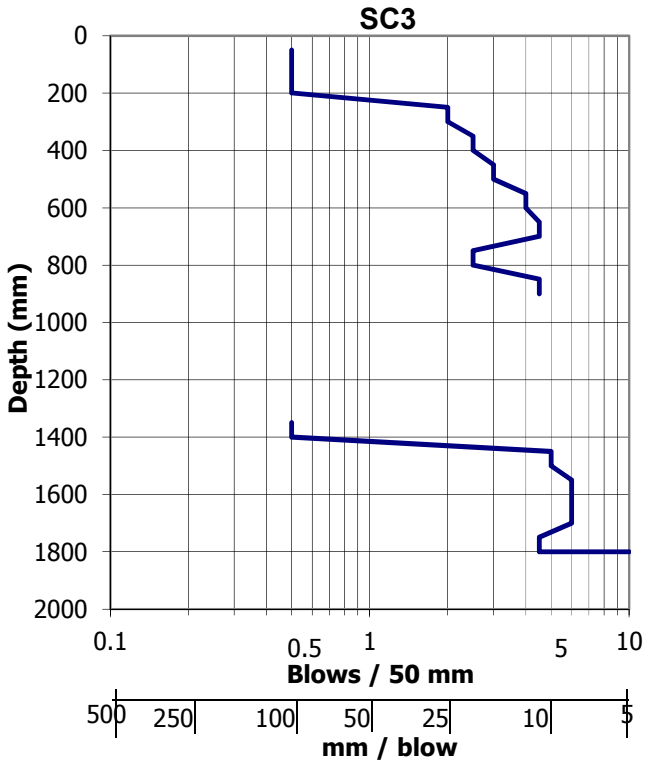
# SCALA PENETROMETER LOG

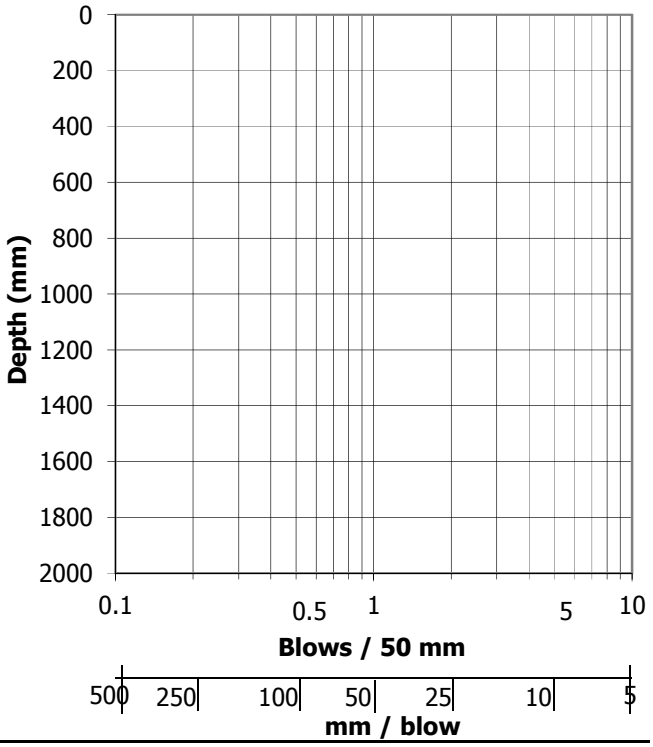
Job No: *170574*
Project: *Sandflat Rd*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

| Test Number | *SC3* |
|---|---|
| Sheet | *3* |
| of | *28* |

| SC3 Location: TP3 RL: gl | | Location: RL: | |
|---|---|---|---|
| mm Driven | No. of Blows | mm Driven | No. of Blows |
| 50 | *0.5* | 50 | |
| 100 | *0.5* | 100 | |
| 150 | *0.5* | 150 | |
| 200 | *0.5* | 200 | |
| 250 | *2* | 250 | |
| 300 | *2* | 300 | |
| 350 | *2.5* | 350 | |
| 400 | *2.5* | 400 | |
| 450 | *3* | 450 | |
| 500 | *3* | 500 | |
| 550 | *4* | 550 | |
| 600 | *4* | 600 | |
| 650 | *4.5* | 650 | |
| 700 | *4.5* | 700 | |
| 750 | *2.5* | 750 | |
| 800 | *2.5* | 800 | |
| 850 | *4.5* | 850 | |
| 900 | *4.5* | 900 | |
| 950 | | 950 | |
| 1000 | | 1000 | |
| 1050 | | 1050 | |
| 1100 | | 1100 | |
| 1150 | | 1150 | |
| 1200 | | 1200 | |
| 1250 | *0* | 1250 | |
| 1300 | *0* | 1300 | |
| 1350 | *0.5* | 1350 | |
| 1400 | *0.5* | 1400 | |
| 1450 | *5* | 1450 | |
| 1500 | *5* | 1500 | |
| 1550 | *6* | 1550 | |
| 1600 | *6* | 1600 | |
| 1650 | *6* | 1650 | |
| 1700 | *6* | 1700 | |
| 1750 | *4.5* | 1750 | |
| 1800 | *4.5* | 1800 | |
| 1850 | *refusal* | 1850 | |
| 1900 | | 1900 | |
| 1950 | | 1950 | |
| 2000 | | 2000 | |
| Inferred Soil Type | | Inferred Soil Type | |
| Watertable Depth | | Watertable Depth | |



GEOSOLVE LTD

# SCALA PENETROMETER LOG

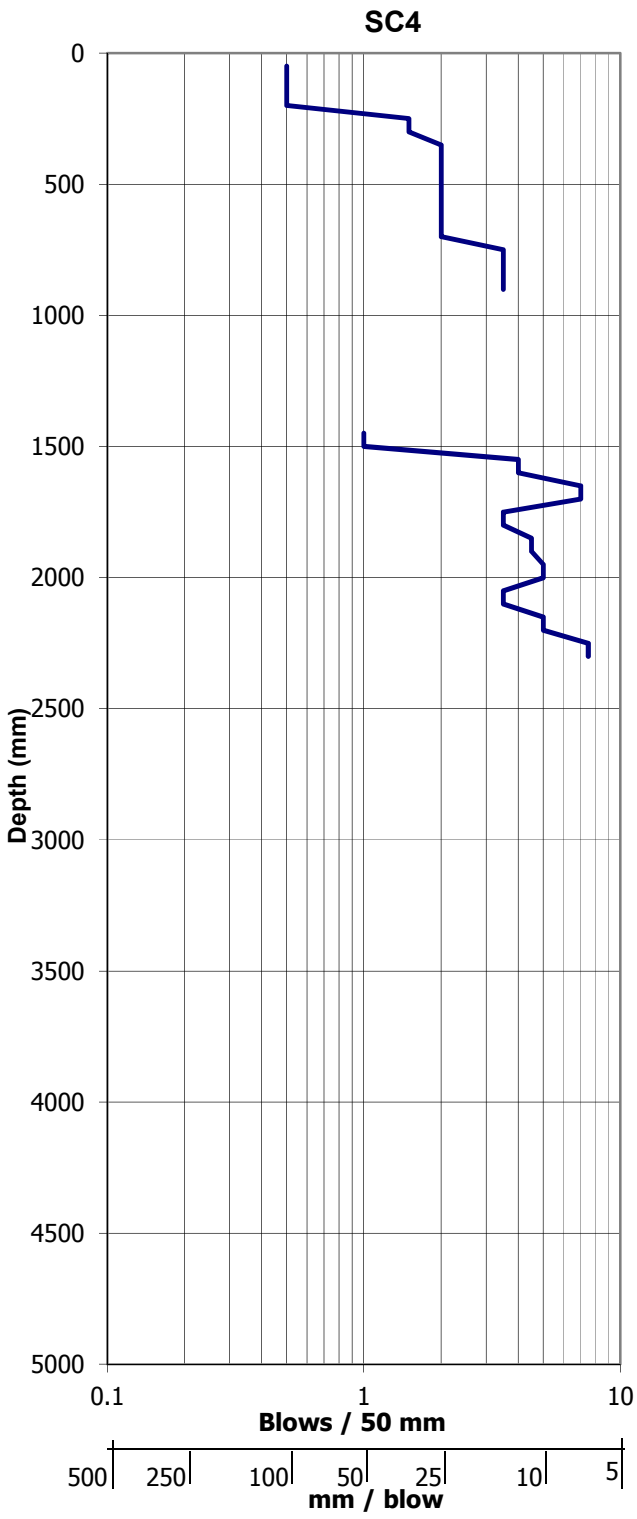
Job No: *170574*
Project: *Sandflat Rd*
Location: *TP4*
RL: *gl*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC4***
**Sheet** ***4***
**of** ***28***

| SC4 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 0.5 |
| 200 | 0.5 |
| 250 | 1.5 |
| 300 | 1.5 |
| 350 | 2 |
| 400 | 2 |
| 450 | 2 |
| 500 | 2 |
| 550 | 2 |
| 600 | 2 |
| 650 | 2 |
| 700 | 2 |
| 750 | 3.5 |
| 800 | 3.5 |
| 850 | 3.5 |
| 900 | 3.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | |
| 1400 | |
| 1450 | 1 |
| 1500 | 1 |
| 1550 | 4 |
| 1600 | 4 |
| 1650 | 7 |
| 1700 | 7 |
| 1750 | 3.5 |
| 1800 | 3.5 |
| 1850 | 4.5 |
| 1900 | 4.5 |
| 1950 | 5 |
| 2000 | 5 |
| 2050 | 3.5 |
| 2100 | 3.5 |
| 2150 | 5 |
| 2200 | 5 |
| 2250 | 7.5 |
| 2300 | 7.5 |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC4 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

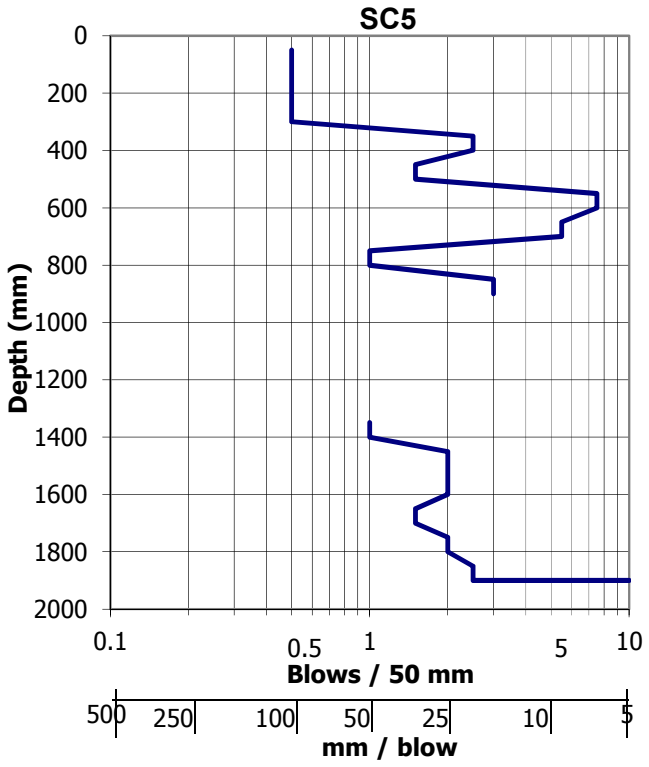
# SCALA PENETROMETER LOG

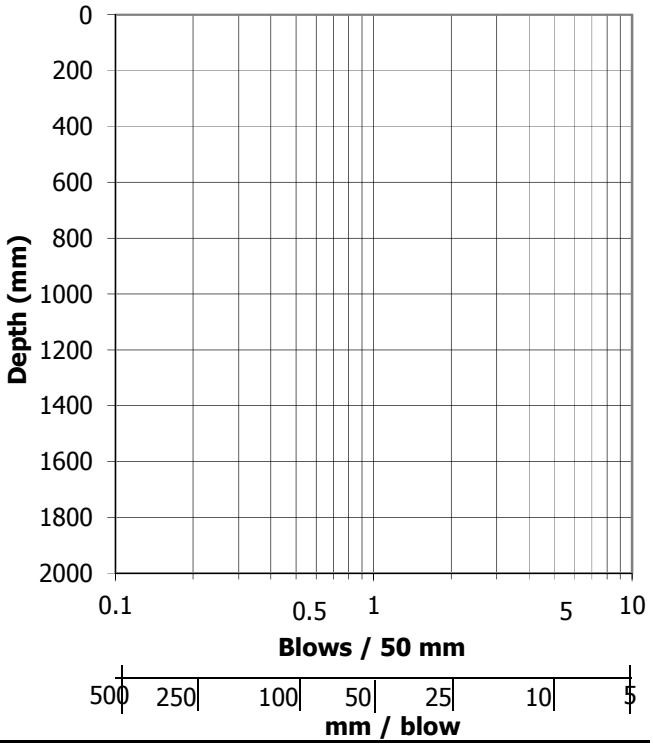
Job No: *170574*
Project: *Sandflat Rd*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

| Test Number | *SC5* |
|---|---|
| Sheet | *5* |
| of | *28* |

| SC5 Location: TP5 RL: gl | | Location: RL: | |
|---|---|---|---|
| mm Driven | No. of Blows | mm Driven | No. of Blows |
| 50 | *0.5* | 50 | |
| 100 | *0.5* | 100 | |
| 150 | *0.5* | 150 | |
| 200 | *0.5* | 200 | |
| 250 | *0.5* | 250 | |
| 300 | *0.5* | 300 | |
| 350 | *2.5* | 350 | |
| 400 | *2.5* | 400 | |
| 450 | *1.5* | 450 | |
| 500 | *1.5* | 500 | |
| 550 | *7.5* | 550 | |
| 600 | *7.5* | 600 | |
| 650 | *5.5* | 650 | |
| 700 | *5.5* | 700 | |
| 750 | *1* | 750 | |
| 800 | *1* | 800 | |
| 850 | *3* | 850 | |
| 900 | *3* | 900 | |
| 950 | | 950 | |
| 1000 | | 1000 | |
| 1050 | | 1050 | |
| 1100 | | 1100 | |
| 1150 | | 1150 | |
| 1200 | | 1200 | |
| 1250 | *0* | 1250 | |
| 1300 | *0* | 1300 | |
| 1350 | *1* | 1350 | |
| 1400 | *1* | 1400 | |
| 1450 | *2* | 1450 | |
| 1500 | *2* | 1500 | |
| 1550 | *2* | 1550 | |
| 1600 | *2* | 1600 | |
| 1650 | *1.5* | 1650 | |
| 1700 | *1.5* | 1700 | |
| 1750 | *2* | 1750 | |
| 1800 | *2* | 1800 | |
| 1850 | *2.5* | 1850 | |
| 1900 | *2.5* | 1900 | |
| 1950 | *refusal* | 1950 | |
| 2000 | | 2000 | |
| Inferred Soil Type | | Inferred Soil Type | |
| Watertable Depth | | Watertable Depth | |



GEOSOLVE LTD

# SCALA PENETROMETER LOG

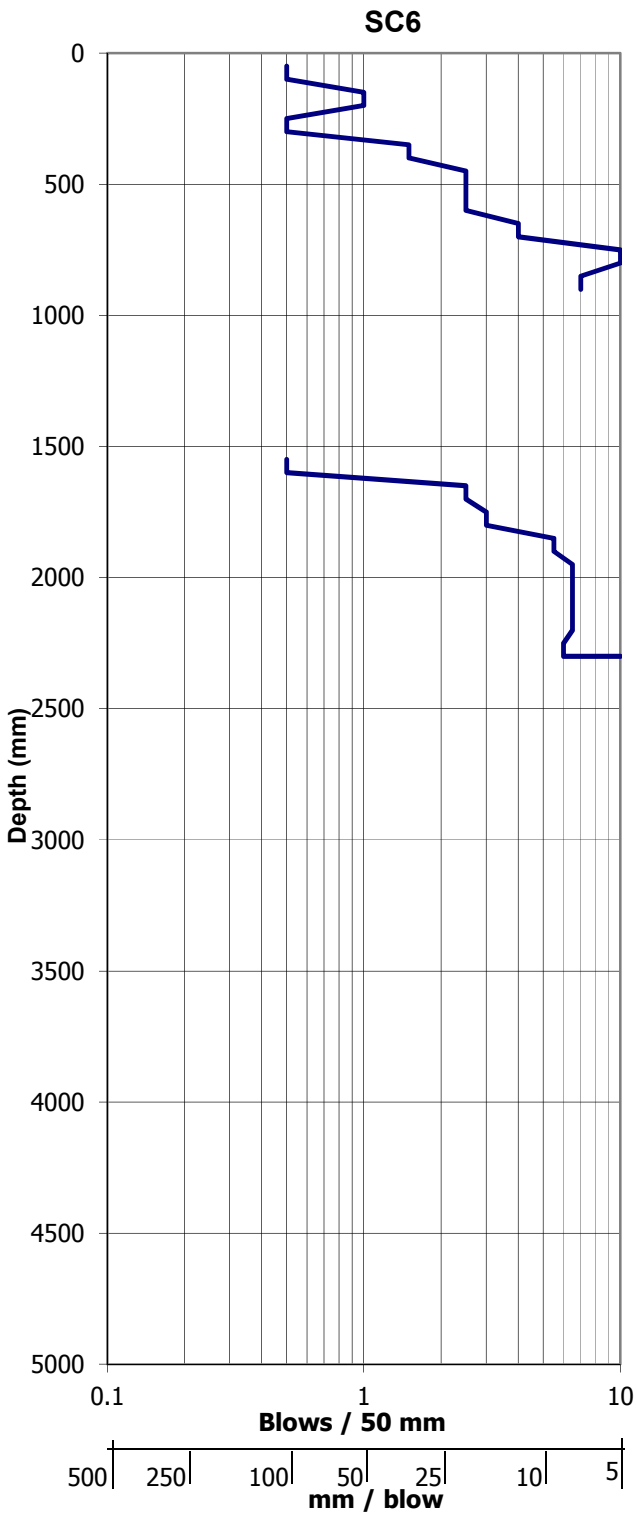
Job No: *170574*
Project: *Sandflat Rd*
Location: *TP6*
RL: *gl*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC6***
**Sheet** ***6***
**of** ***28***

| SC6 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 1 |
| 200 | 1 |
| 250 | 0.5 |
| 300 | 0.5 |
| 350 | 1.5 |
| 400 | 1.5 |
| 450 | 2.5 |
| 500 | 2.5 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | 4 |
| 700 | 4 |
| 750 | 10 |
| 800 | 10 |
| 850 | 7 |
| 900 | 7 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | |
| 1400 | |
| 1450 | |
| 1500 | |
| 1550 | 0.5 |
| 1600 | 0.5 |
| 1650 | 2.5 |
| 1700 | 2.5 |
| 1750 | 3 |
| 1800 | 3 |
| 1850 | 5.5 |
| 1900 | 5.5 |
| 1950 | 6.5 |
| 2000 | 6.5 |
| 2050 | 6.5 |
| 2100 | 6.5 |
| 2150 | 6.5 |
| 2200 | 6.5 |
| 2250 | 6 |
| 2300 | 6 |
| 2350 | refusal |
| 2400 | |
| 2450 | |
| 2500 | |

| SC6 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

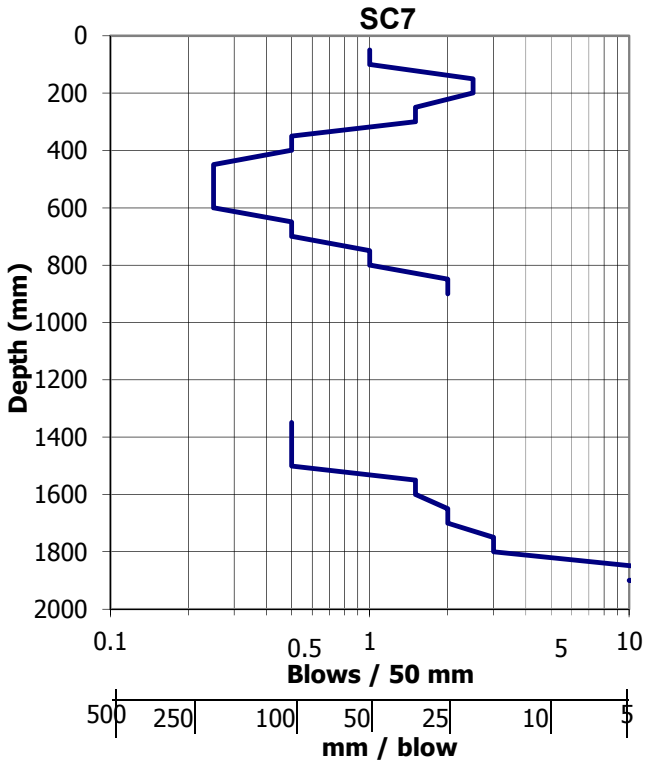
Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

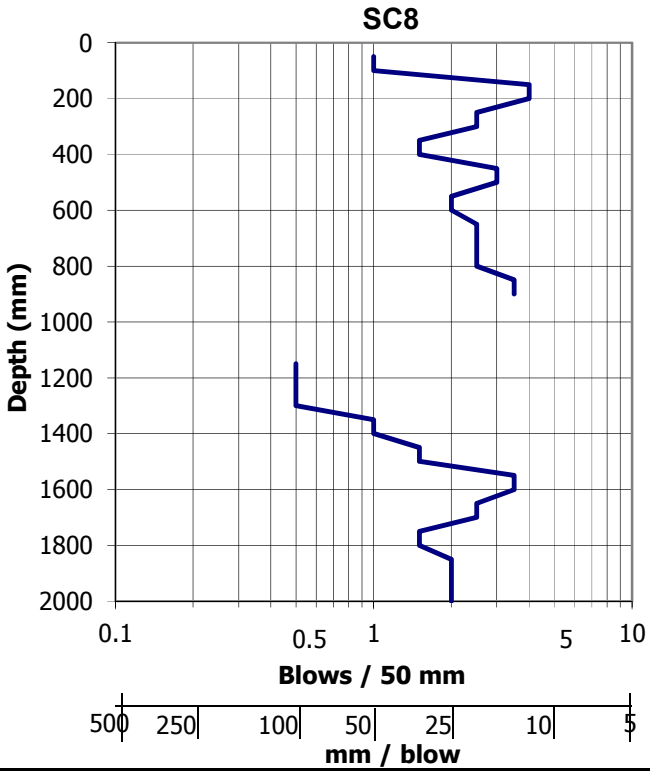
**Test Number** *SC7 & SC8*

**Sheet** *7*
**of** *28*

| SC7 Location: TP7 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 2.5 |
| 200 | 2.5 |
| 250 | 1.5 |
| 300 | 1.5 |
| 350 | 0.5 |
| 400 | 0.5 |
| 450 | 0.25 |
| 500 | 0.25 |
| 550 | 0.25 |
| 600 | 0.25 |
| 650 | 0.5 |
| 700 | 0.5 |
| 750 | 1 |
| 800 | 1 |
| 850 | 2 |
| 900 | 2 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0 |
| 1300 | 0 |
| 1350 | 0.5 |
| 1400 | 0.5 |
| 1450 | 0.5 |
| 1500 | 0.5 |
| 1550 | 1.5 |
| 1600 | 1.5 |
| 1650 | 2 |
| 1700 | 2 |
| 1750 | 3 |
| 1800 | 3 |
| 1850 | 10.5 |
| 1900 | 10.5 |
| 1950 | refusal |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| SC8 Location: TP8 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 4 |
| 200 | 4 |
| 250 | 2.5 |
| 300 | 2.5 |
| 350 | 1.5 |
| 400 | 1.5 |
| 450 | 3 |
| 500 | 3 |
| 550 | 2 |
| 600 | 2 |
| 650 | 2.5 |
| 700 | 2.5 |
| 750 | 2.5 |
| 800 | 2.5 |
| 850 | 3.5 |
| 900 | 3.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | 0.5 |
| 1200 | 0.5 |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1 |
| 1400 | 1 |
| 1450 | 1.5 |
| 1500 | 1.5 |
| 1550 | 3.5 |
| 1600 | 3.5 |
| 1650 | 2.5 |
| 1700 | 2.5 |
| 1750 | 1.5 |
| 1800 | 1.5 |
| 1850 | 2 |
| 1900 | 2 |
| 1950 | 2 |
| 2000 | 2 |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

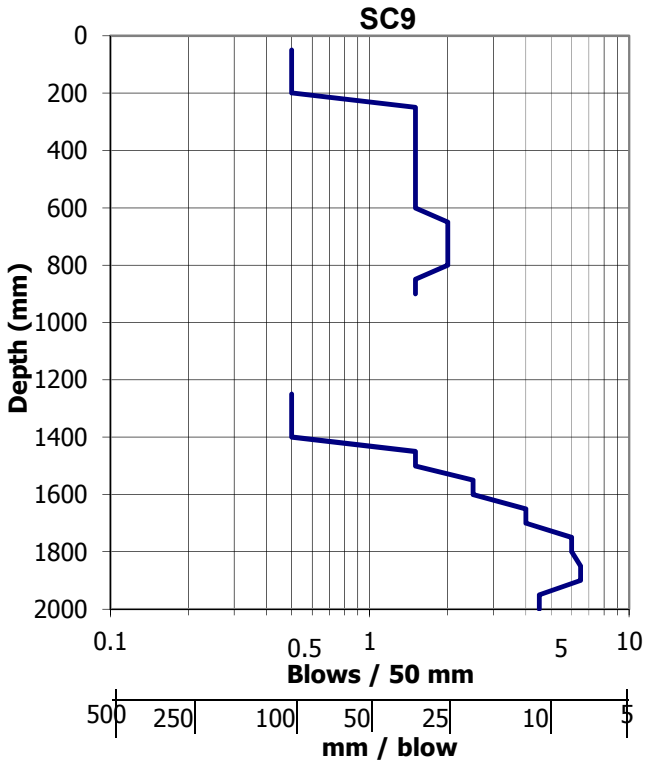
Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

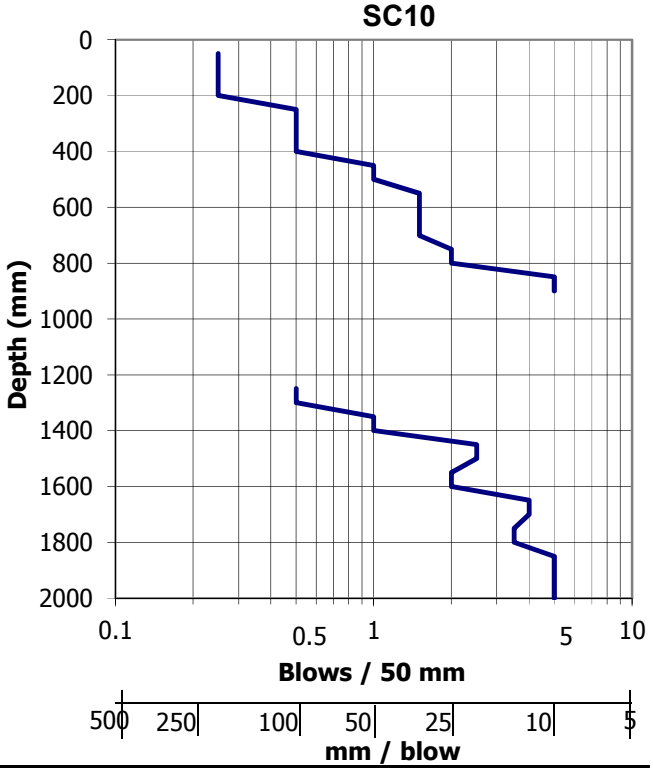
**Test Number** *SC9 & SC10*

**Sheet** *8*
**of** *28*

| SC9 Location: TP9 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 0.5 |
| 200 | 0.5 |
| 250 | 1.5 |
| 300 | 1.5 |
| 350 | 1.5 |
| 400 | 1.5 |
| 450 | 1.5 |
| 500 | 1.5 |
| 550 | 1.5 |
| 600 | 1.5 |
| 650 | 2 |
| 700 | 2 |
| 750 | 2 |
| 800 | 2 |
| 850 | 1.5 |
| 900 | 1.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | 0 |
| 1200 | 0 |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 0.5 |
| 1400 | 0.5 |
| 1450 | 1.5 |
| 1500 | 1.5 |
| 1550 | 2.5 |
| 1600 | 2.5 |
| 1650 | 4 |
| 1700 | 4 |
| 1750 | 6 |
| 1800 | 6 |
| 1850 | 6.5 |
| 1900 | 6.5 |
| 1950 | 4.5 |
| 2000 | 4.5 |
| Inferred Soil Type | |
| Watertable Depth | |

| SC10 Location: TP10 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.25 |
| 100 | 0.25 |
| 150 | 0.25 |
| 200 | 0.25 |
| 250 | 0.5 |
| 300 | 0.5 |
| 350 | 0.5 |
| 400 | 0.5 |
| 450 | 1 |
| 500 | 1 |
| 550 | 1.5 |
| 600 | 1.5 |
| 650 | 1.5 |
| 700 | 1.5 |
| 750 | 2 |
| 800 | 2 |
| 850 | 5 |
| 900 | 5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | 0 |
| 1200 | 0 |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1 |
| 1400 | 1 |
| 1450 | 2.5 |
| 1500 | 2.5 |
| 1550 | 2 |
| 1600 | 2 |
| 1650 | 4 |
| 1700 | 4 |
| 1750 | 3.5 |
| 1800 | 3.5 |
| 1850 | 5 |
| 1900 | 5 |
| 1950 | 5 |
| 2000 | 5 |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

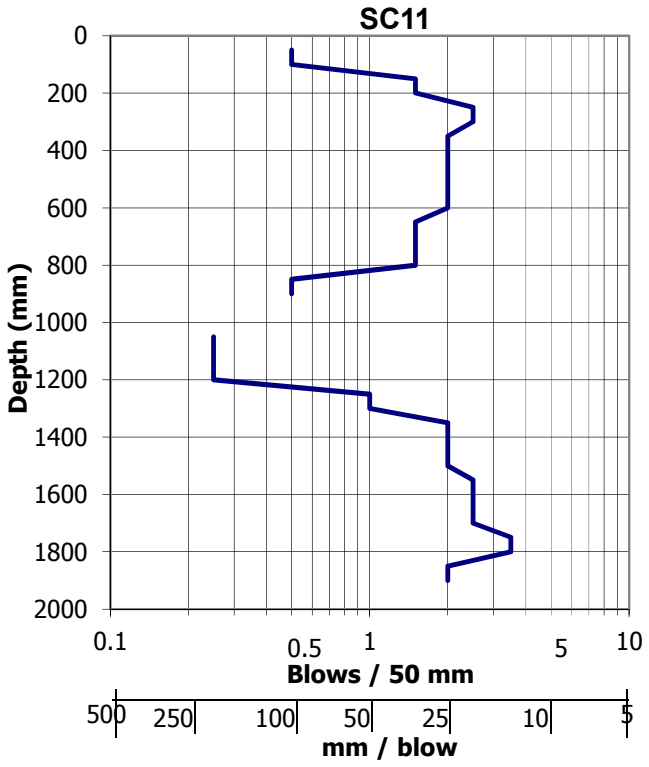
Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

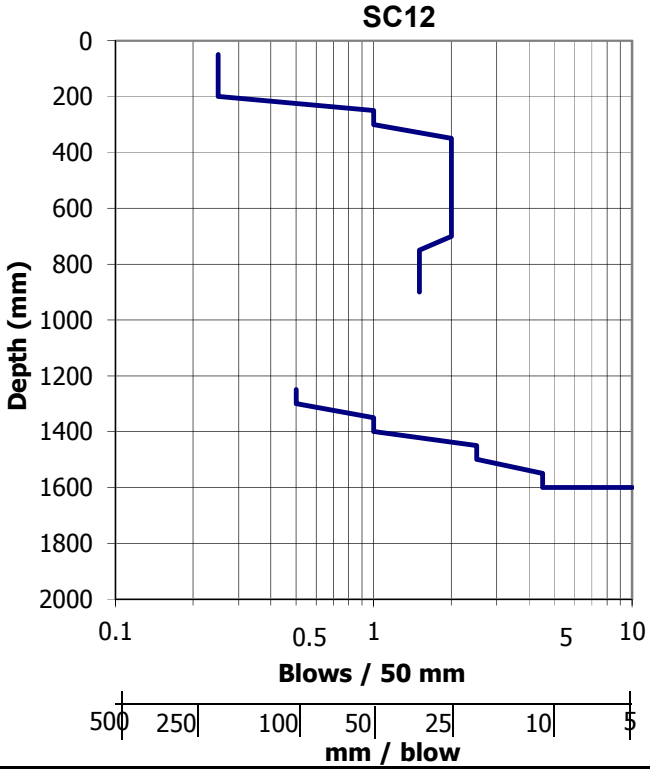
**Test Number** ***SC11 & SC12***

**Sheet** ***9*** **of** ***28***

| **SC11** Location: TP11 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1.5* |
| 200 | *1.5* |
| 250 | *2.5* |
| 300 | *2.5* |
| 350 | *2* |
| 400 | *2* |
| 450 | *2* |
| 500 | *2* |
| 550 | *2* |
| 600 | *2* |
| 650 | *1.5* |
| 700 | *1.5* |
| 750 | *1.5* |
| 800 | *1.5* |
| 850 | *0.5* |
| 900 | *0.5* |
| 950 | |
| 1000 | |
| 1050 | *0.25* |
| 1100 | *0.25* |
| 1150 | *0.25* |
| 1200 | *0.25* |
| 1250 | *1* |
| 1300 | *1* |
| 1350 | *2* |
| 1400 | *2* |
| 1450 | *2* |
| 1500 | *2* |
| 1550 | *2.5* |
| 1600 | *2.5* |
| 1650 | *2.5* |
| 1700 | *2.5* |
| 1750 | *3.5* |
| 1800 | *3.5* |
| 1850 | *2* |
| 1900 | *2* |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC12** Location: TP12 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.25* |
| 100 | *0.25* |
| 150 | *0.25* |
| 200 | *0.25* |
| 250 | *1* |
| 300 | *1* |
| 350 | *2* |
| 400 | *2* |
| 450 | *2* |
| 500 | *2* |
| 550 | *2* |
| 600 | *2* |
| 650 | *2* |
| 700 | *2* |
| 750 | *1.5* |
| 800 | *1.5* |
| 850 | *1.5* |
| 900 | *1.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *1* |
| 1400 | *1* |
| 1450 | *2.5* |
| 1500 | *2.5* |
| 1550 | *4.5* |
| 1600 | *4.5* |
| 1650 | *refusal* |
| 1700 | |
| 1750 | |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GEOSOLVE LTD

# SCALA PENETROMETER LOG

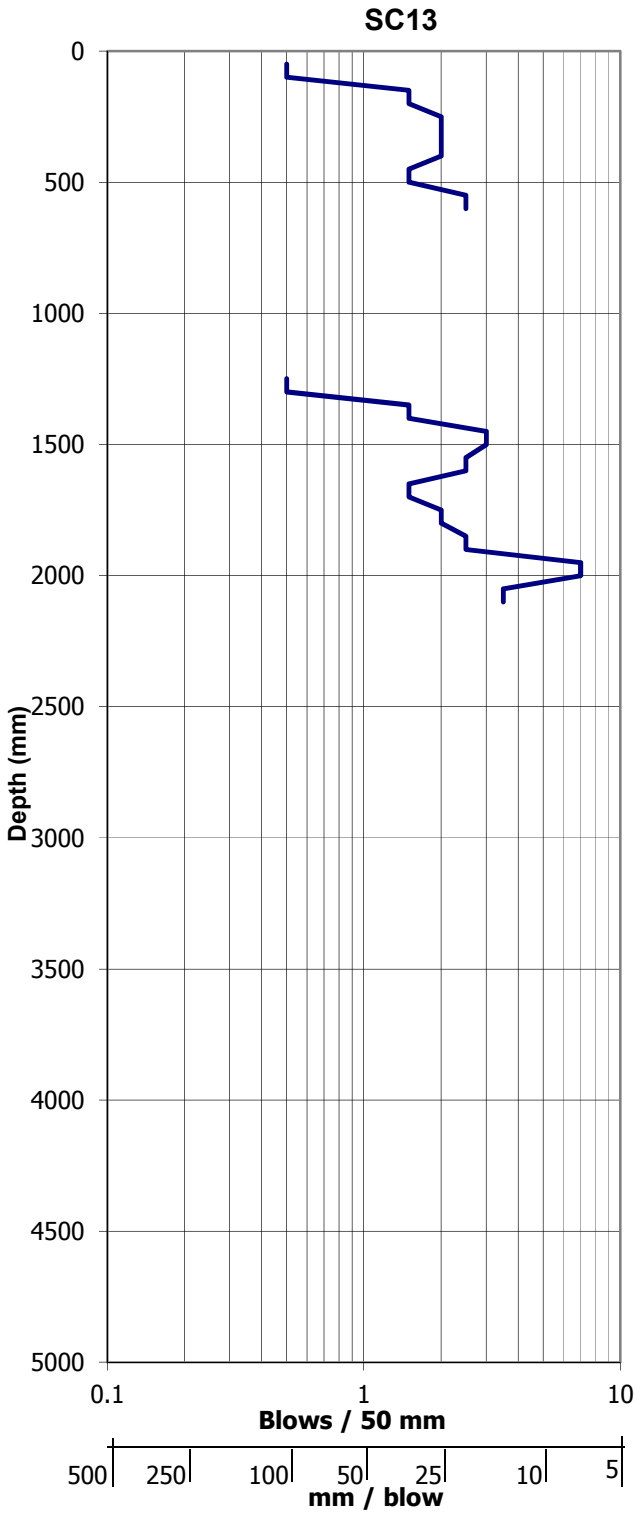
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC13***
**Sheet** ***10***
**of** ***28***

| SC13 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 1.5 |
| 200 | 1.5 |
| 250 | 2 |
| 300 | 2 |
| 350 | 2 |
| 400 | 2 |
| 450 | 1.5 |
| 500 | 1.5 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | |
| 700 | |
| 750 | |
| 800 | |
| 850 | |
| 900 | |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1.5 |
| 1400 | 1.5 |
| 1450 | 3 |
| 1500 | 3 |
| 1550 | 2.5 |
| 1600 | 2.5 |
| 1650 | 1.5 |
| 1700 | 1.5 |
| 1750 | 2 |
| 1800 | 2 |
| 1850 | 2.5 |
| 1900 | 2.5 |
| 1950 | 7 |
| 2000 | 7 |
| 2050 | 3.5 |
| 2100 | 3.5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC13 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

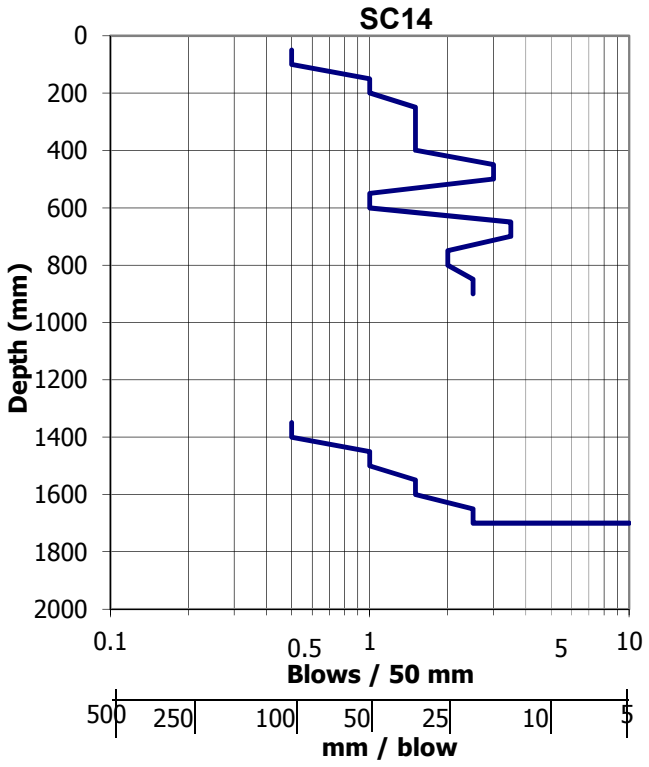
Date: *14/08/2017*
Operated by: *JXS*
Logged by: *JXH*

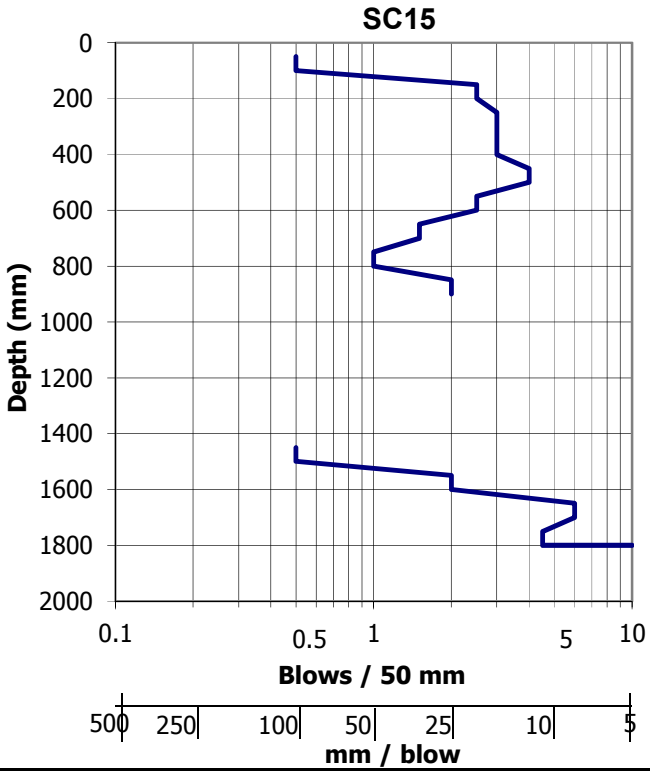
**Test Number** ***SC14 & SC15***

**Sheet** ***11***
**of** ***28***

| **SC14** Location: TP14 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1* |
| 200 | *1* |
| 250 | *1.5* |
| 300 | *1.5* |
| 350 | *1.5* |
| 400 | *1.5* |
| 450 | *3* |
| 500 | *3* |
| 550 | *1* |
| 600 | *1* |
| 650 | *3.5* |
| 700 | *3.5* |
| 750 | *2* |
| 800 | *2* |
| 850 | *2.5* |
| 900 | *2.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | *0.5* |
| 1400 | *0.5* |
| 1450 | *1* |
| 1500 | *1* |
| 1550 | *1.5* |
| 1600 | *1.5* |
| 1650 | *2.5* |
| 1700 | *2.5* |
| 1750 | *refusal* |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC15** Location: TP15 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *2.5* |
| 200 | *2.5* |
| 250 | *3* |
| 300 | *3* |
| 350 | *3* |
| 400 | *3* |
| 450 | *4* |
| 500 | *4* |
| 550 | *2.5* |
| 600 | *2.5* |
| 650 | *1.5* |
| 700 | *1.5* |
| 750 | *1* |
| 800 | *1* |
| 850 | *2* |
| 900 | *2* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | |
| 1400 | |
| 1450 | *0.5* |
| 1500 | *0.5* |
| 1550 | *2* |
| 1600 | *2* |
| 1650 | *6* |
| 1700 | *6* |
| 1750 | *4.5* |
| 1800 | *4.5* |
| 1850 | *refusal* |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

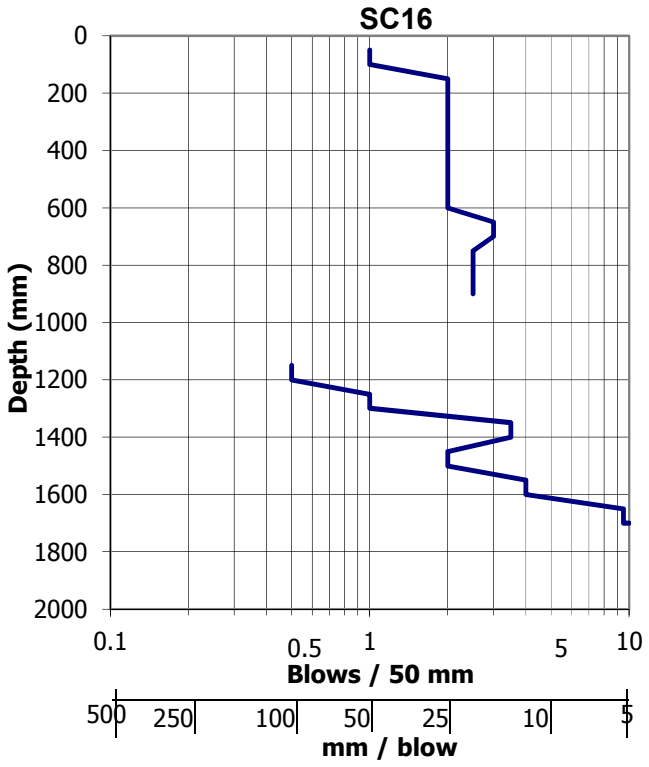
Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*

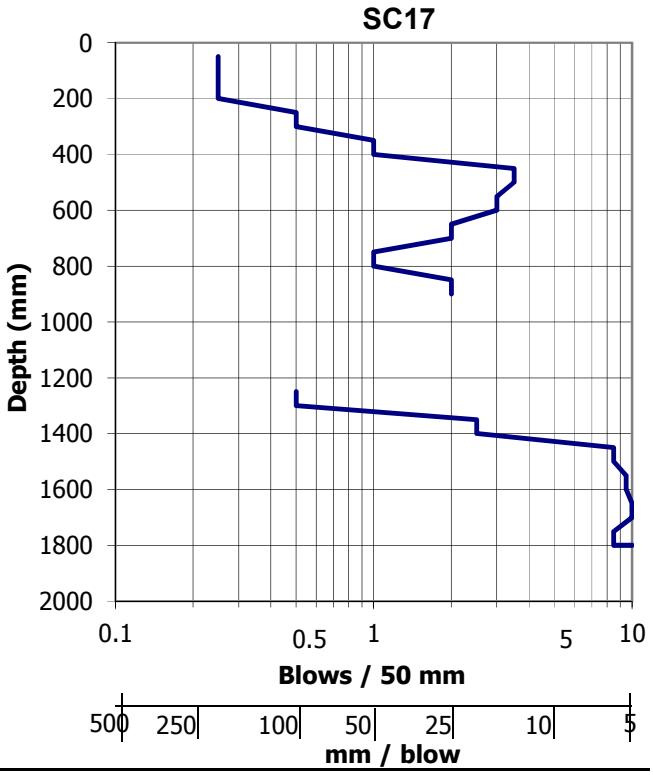
**Test Number** ***SC16 & SC17***

**Sheet** ***12***
**of** ***28***

| **SC16** Location: TP16 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *1* |
| 100 | *1* |
| 150 | *2* |
| 200 | *2* |
| 250 | *2* |
| 300 | *2* |
| 350 | *2* |
| 400 | *2* |
| 450 | *2* |
| 500 | *2* |
| 550 | *2* |
| 600 | *2* |
| 650 | *3* |
| 700 | *3* |
| 750 | *2.5* |
| 800 | *2.5* |
| 850 | *2.5* |
| 900 | *2.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *1* |
| 1300 | *1* |
| 1350 | *3.5* |
| 1400 | *3.5* |
| 1450 | *2* |
| 1500 | *2* |
| 1550 | *4* |
| 1600 | *4* |
| 1650 | *9.5* |
| 1700 | *9.5* |
| 1750 | *refusal* |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC17** Location: TP17 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.25* |
| 100 | *0.25* |
| 150 | *0.25* |
| 200 | *0.25* |
| 250 | *0.5* |
| 300 | *0.5* |
| 350 | *1* |
| 400 | *1* |
| 450 | *3.5* |
| 500 | *3.5* |
| 550 | *3* |
| 600 | *3* |
| 650 | *2* |
| 700 | *2* |
| 750 | *1* |
| 800 | *1* |
| 850 | *2* |
| 900 | *2* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *2.5* |
| 1400 | *2.5* |
| 1450 | *8.5* |
| 1500 | *8.5* |
| 1550 | *9.5* |
| 1600 | *9.5* |
| 1650 | *10* |
| 1700 | *10* |
| 1750 | *8.5* |
| 1800 | *8.5* |
| 1850 | *refusal* |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

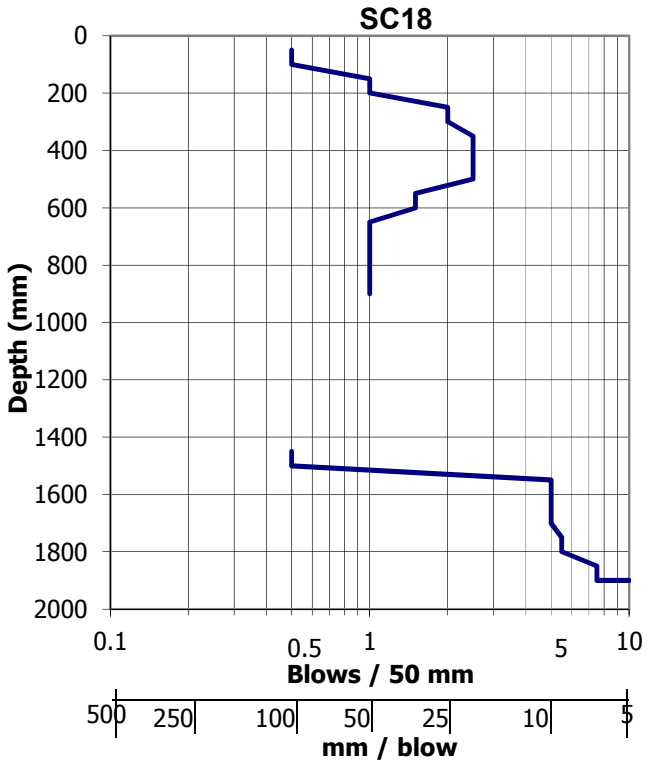
Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*

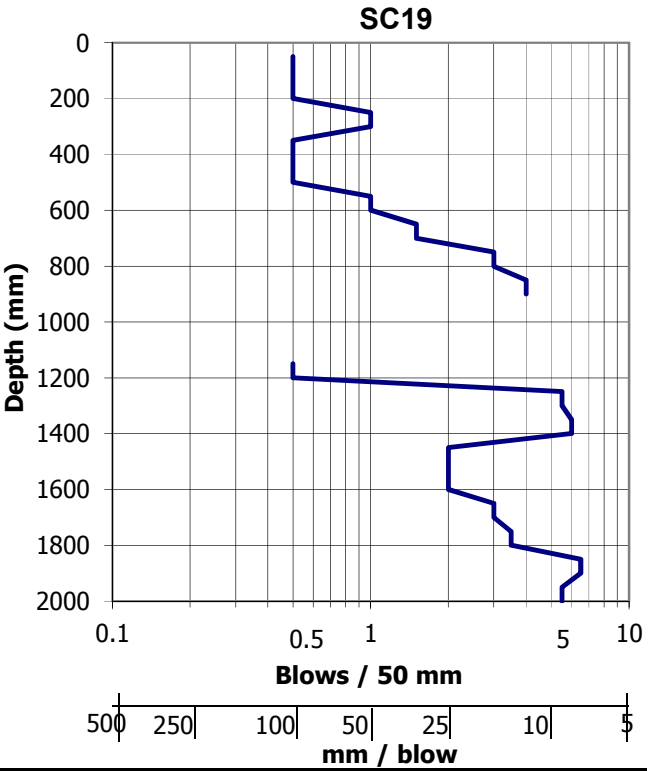
**Test Number** ***SC18 & SC19***

**Sheet** ***13***
**of** ***28***

| **SC18** Location: TP18 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1* |
| 200 | *1* |
| 250 | *2* |
| 300 | *2* |
| 350 | *2.5* |
| 400 | *2.5* |
| 450 | *2.5* |
| 500 | *2.5* |
| 550 | *1.5* |
| 600 | *1.5* |
| 650 | *1* |
| 700 | *1* |
| 750 | *1* |
| 800 | *1* |
| 850 | *1* |
| 900 | *1* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | |
| 1400 | |
| 1450 | *0.5* |
| 1500 | *0.5* |
| 1550 | *5* |
| 1600 | *5* |
| 1650 | *5* |
| 1700 | *5* |
| 1750 | *5.5* |
| 1800 | *5.5* |
| 1850 | *7.5* |
| 1900 | *7.5* |
| 1950 | *refusal* |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC19** Location: TP19 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *0.5* |
| 200 | *0.5* |
| 250 | *1* |
| 300 | *1* |
| 350 | *0.5* |
| 400 | *0.5* |
| 450 | *0.5* |
| 500 | *0.5* |
| 550 | *1* |
| 600 | *1* |
| 650 | *1.5* |
| 700 | *1.5* |
| 750 | *3* |
| 800 | *3* |
| 850 | *4* |
| 900 | *4* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *5.5* |
| 1300 | *5.5* |
| 1350 | *6* |
| 1400 | *6* |
| 1450 | *2* |
| 1500 | *2* |
| 1550 | *2* |
| 1600 | *2* |
| 1650 | *3* |
| 1700 | *3* |
| 1750 | *3.5* |
| 1800 | *3.5* |
| 1850 | *6.5* |
| 1900 | *6.5* |
| 1950 | *5.5* |
| 2000 | *5.5* |
| Inferred Soil Type | |
| Watertable Depth | |



GEOSOLVE LTD

# SCALA PENETROMETER LOG

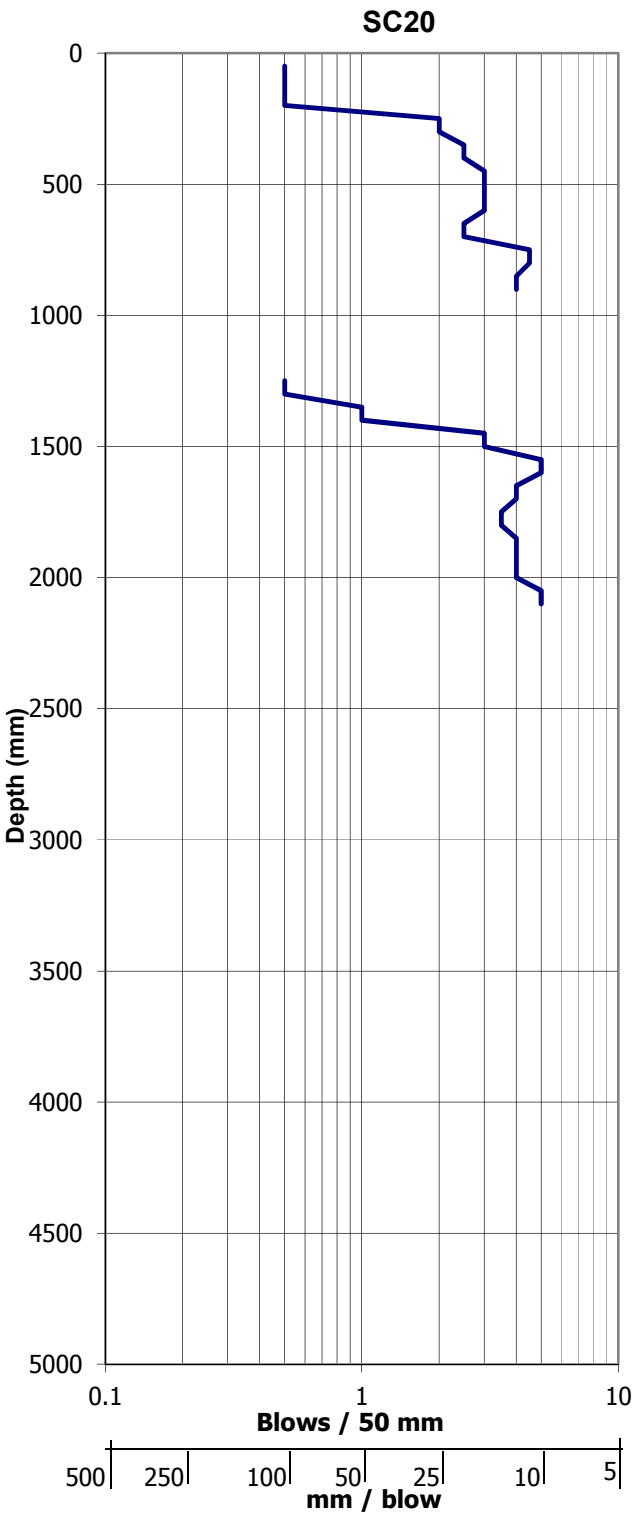
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC20***
**Sheet** ***14***
**of** ***28***

| SC20 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 0.5 |
| 200 | 0.5 |
| 250 | 2 |
| 300 | 2 |
| 350 | 2.5 |
| 400 | 2.5 |
| 450 | 3 |
| 500 | 3 |
| 550 | 3 |
| 600 | 3 |
| 650 | 2.5 |
| 700 | 2.5 |
| 750 | 4.5 |
| 800 | 4.5 |
| 850 | 4 |
| 900 | 4 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1 |
| 1400 | 1 |
| 1450 | 3 |
| 1500 | 3 |
| 1550 | 5 |
| 1600 | 5 |
| 1650 | 4 |
| 1700 | 4 |
| 1750 | 3.5 |
| 1800 | 3.5 |
| 1850 | 4 |
| 1900 | 4 |
| 1950 | 4 |
| 2000 | 4 |
| 2050 | 5 |
| 2100 | 5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC20 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

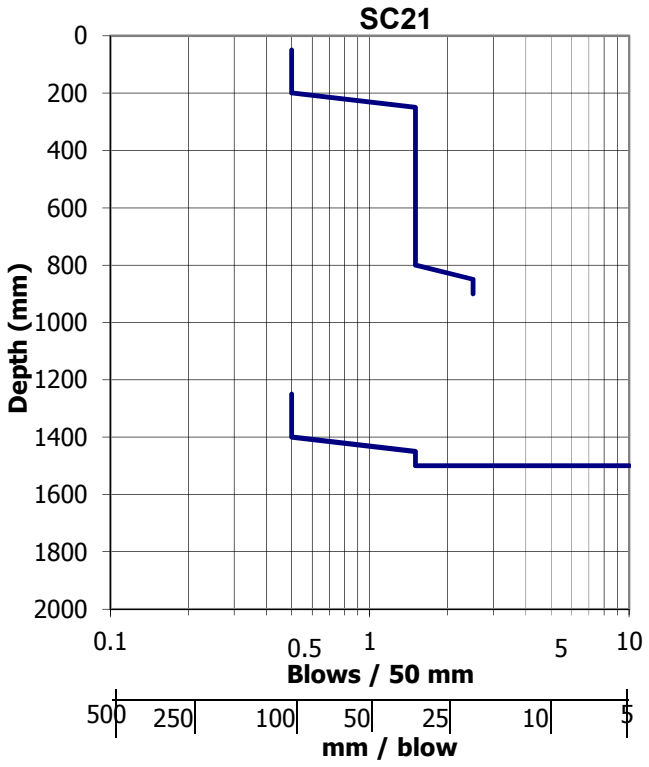
Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*

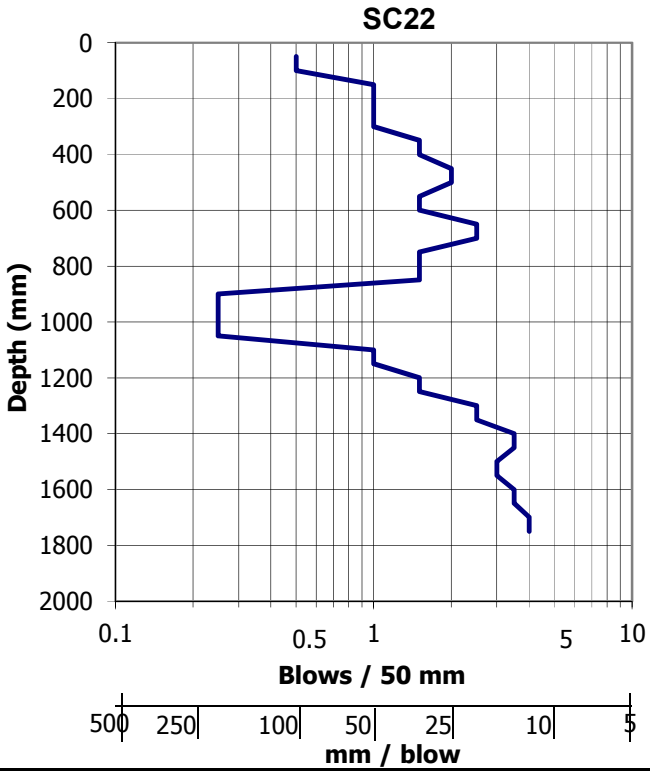
**Test Number** ***SC21 & SC22***

**Sheet** ***15***
**of** ***28***

| **SC21** Location: TP21 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *0.5* |
| 200 | *0.5* |
| 250 | *1.5* |
| 300 | *1.5* |
| 350 | *1.5* |
| 400 | *1.5* |
| 450 | *1.5* |
| 500 | *1.5* |
| 550 | *1.5* |
| 600 | *1.5* |
| 650 | *1.5* |
| 700 | *1.5* |
| 750 | *1.5* |
| 800 | *1.5* |
| 850 | *2.5* |
| 900 | *2.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0* |
| 1200 | *0* |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *0.5* |
| 1400 | *0.5* |
| 1450 | *1.5* |
| 1500 | *1.5* |
| 1550 | *refusal* |
| 1600 | |
| 1650 | |
| 1700 | |
| 1750 | |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC22** Location: TP22 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1* |
| 200 | *1* |
| 250 | *1* |
| 300 | *1* |
| 350 | *1.5* |
| 400 | *1.5* |
| 450 | *2* |
| 500 | *2* |
| 550 | *1.5* |
| 600 | *1.5* |
| 650 | *2.5* |
| 700 | *2.5* |
| 750 | *1.5* |
| 800 | *1.5* |
| 850 | *1.5* |
| 900 | *0.25* |
| 950 | *0.25* |
| 1000 | *0.25* |
| 1050 | *0.25* |
| 1100 | *1* |
| 1150 | *1* |
| 1200 | *1.5* |
| 1250 | *1.5* |
| 1300 | *2.5* |
| 1350 | *2.5* |
| 1400 | *3.5* |
| 1450 | *3.5* |
| 1500 | *3* |
| 1550 | *3* |
| 1600 | *3.5* |
| 1650 | *3.5* |
| 1700 | *4* |
| 1750 | *4* |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

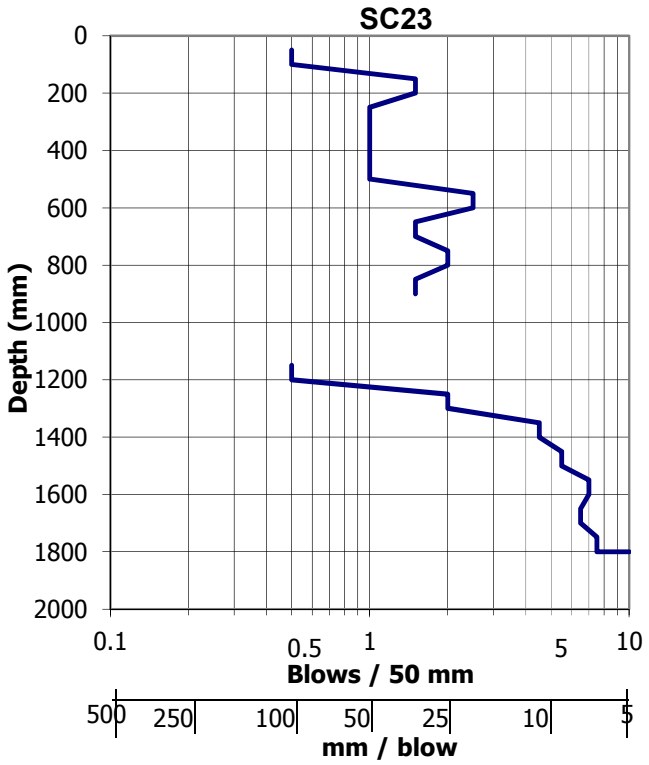
Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*

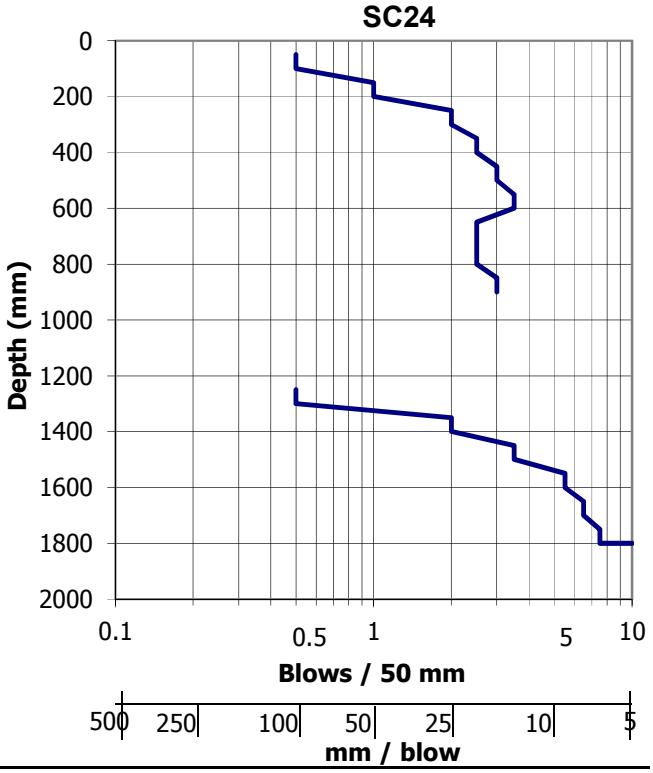
**Test Number** ***SC23 & SC24***

**Sheet** ***16***
**of** ***28***

| **SC23** Location: TP23 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1.5* |
| 200 | *1.5* |
| 250 | *1* |
| 300 | *1* |
| 350 | *1* |
| 400 | *1* |
| 450 | *1* |
| 500 | *1* |
| 550 | *2.5* |
| 600 | *2.5* |
| 650 | *1.5* |
| 700 | *1.5* |
| 750 | *2* |
| 800 | *2* |
| 850 | *1.5* |
| 900 | *1.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *2* |
| 1300 | *2* |
| 1350 | *4.5* |
| 1400 | *4.5* |
| 1450 | *5.5* |
| 1500 | *5.5* |
| 1550 | *7* |
| 1600 | *7* |
| 1650 | *6.5* |
| 1700 | *6.5* |
| 1750 | *7.5* |
| 1800 | *7.5* |
| 1850 | *refusal* |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC24** Location: TP24 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1* |
| 200 | *1* |
| 250 | *2* |
| 300 | *2* |
| 350 | *2.5* |
| 400 | *2.5* |
| 450 | *3* |
| 500 | *3* |
| 550 | *3.5* |
| 600 | *3.5* |
| 650 | *2.5* |
| 700 | *2.5* |
| 750 | *2.5* |
| 800 | *2.5* |
| 850 | *3* |
| 900 | *3* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *2* |
| 1400 | *2* |
| 1450 | *3.5* |
| 1500 | *3.5* |
| 1550 | *5.5* |
| 1600 | *5.5* |
| 1650 | *6.5* |
| 1700 | *6.5* |
| 1750 | *7.5* |
| 1800 | *7.5* |
| 1850 | *refusal* |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

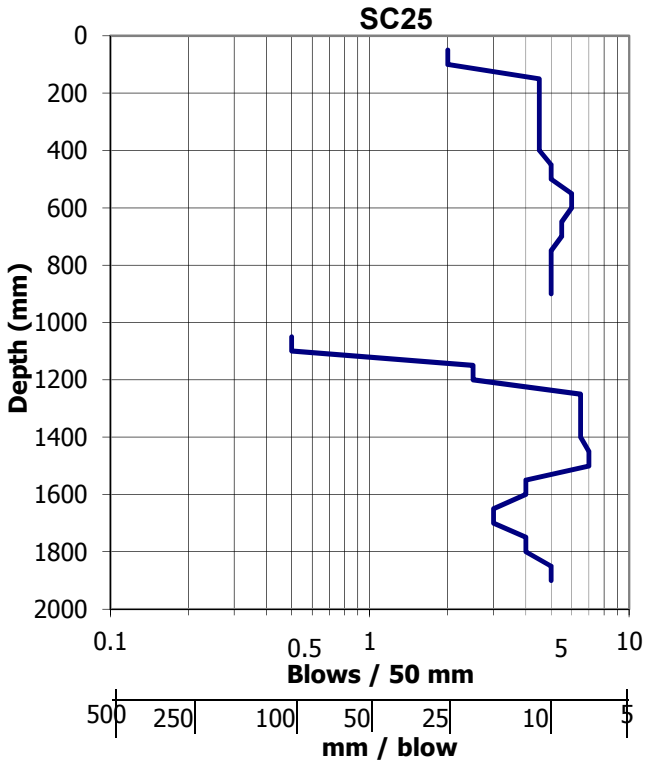
# SCALA PENETROMETER LOG

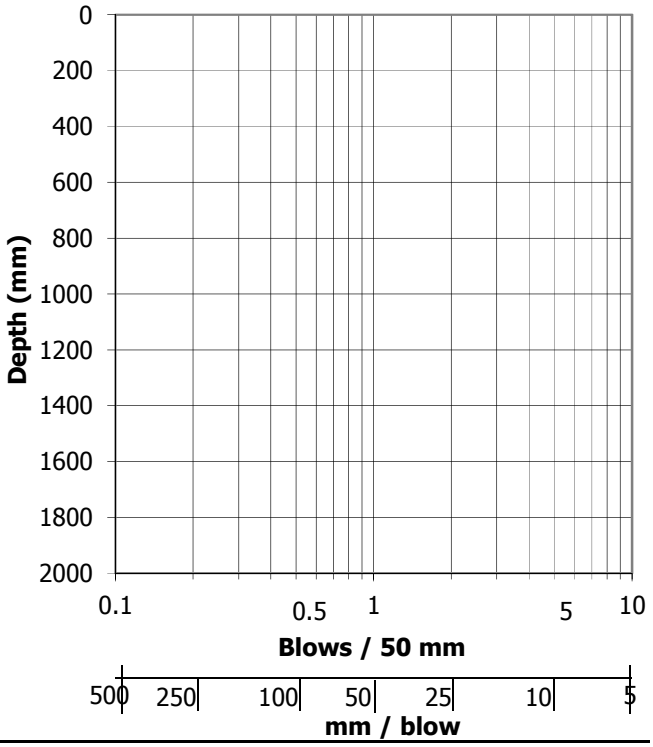
Job No: *170574*
Project: *Sandflat Rd*

Date: *15/08/2017*
Operated by: *JXS*
Logged by: *JXH*

| Test Number | *SC25* |
|---|---|
| Sheet | *17* |
| of | *28* |

| SC25 Location: TP25 RL: gl | | Location: RL: | |
|---|---|---|---|
| mm Driven | No. of Blows | mm Driven | No. of Blows |
| 50 | *2* | 50 | |
| 100 | *2* | 100 | |
| 150 | *4.5* | 150 | |
| 200 | *4.5* | 200 | |
| 250 | *4.5* | 250 | |
| 300 | *4.5* | 300 | |
| 350 | *4.5* | 350 | |
| 400 | *4.5* | 400 | |
| 450 | *5* | 450 | |
| 500 | *5* | 500 | |
| 550 | *6* | 550 | |
| 600 | *6* | 600 | |
| 650 | *5.5* | 650 | |
| 700 | *5.5* | 700 | |
| 750 | *5* | 750 | |
| 800 | *5* | 800 | |
| 850 | *5* | 850 | |
| 900 | *5* | 900 | |
| 950 | | 950 | |
| 1000 | | 1000 | |
| 1050 | *0.5* | 1050 | |
| 1100 | *0.5* | 1100 | |
| 1150 | *2.5* | 1150 | |
| 1200 | *2.5* | 1200 | |
| 1250 | *6.5* | 1250 | |
| 1300 | *6.5* | 1300 | |
| 1350 | *6.5* | 1350 | |
| 1400 | *6.5* | 1400 | |
| 1450 | *7* | 1450 | |
| 1500 | *7* | 1500 | |
| 1550 | *4* | 1550 | |
| 1600 | *4* | 1600 | |
| 1650 | *3* | 1650 | |
| 1700 | *3* | 1700 | |
| 1750 | *4* | 1750 | |
| 1800 | *4* | 1800 | |
| 1850 | *5* | 1850 | |
| 1900 | *5* | 1900 | |
| 1950 | | 1950 | |
| 2000 | | 2000 | |
| Inferred Soil Type | | Inferred Soil Type | |
| Watertable Depth | | Watertable Depth | |



GEOSOLVE LTD

# SCALA PENETROMETER LOG

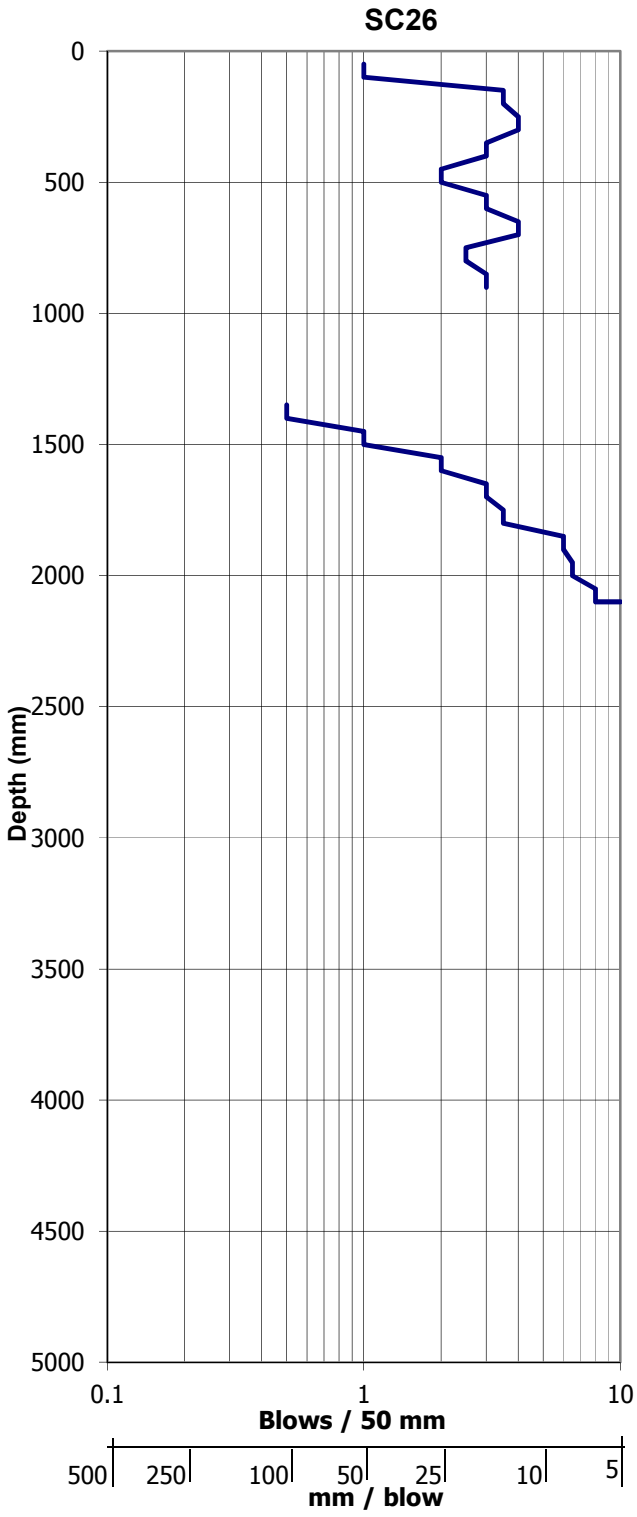
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *15/08/2017*
Operated by: *XXX*
Logged by: *XXX*
Inferred Soil Type:

**Test No.** ***SC26***
**Sheet** ***18***
**of** ***28***

| SC26 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 3.5 |
| 200 | 3.5 |
| 250 | 4 |
| 300 | 4 |
| 350 | 3 |
| 400 | 3 |
| 450 | 2 |
| 500 | 2 |
| 550 | 3 |
| 600 | 3 |
| 650 | 4 |
| 700 | 4 |
| 750 | 2.5 |
| 800 | 2.5 |
| 850 | 3 |
| 900 | 3 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | |
| 1300 | |
| 1350 | 0.5 |
| 1400 | 0.5 |
| 1450 | 1 |
| 1500 | 1 |
| 1550 | 2 |
| 1600 | 2 |
| 1650 | 3 |
| 1700 | 3 |
| 1750 | 3.5 |
| 1800 | 3.5 |
| 1850 | 6 |
| 1900 | 6 |
| 1950 | 6.5 |
| 2000 | 6.5 |
| 2050 | 8 |
| 2100 | 8 |
| 2150 | refusal |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC26 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

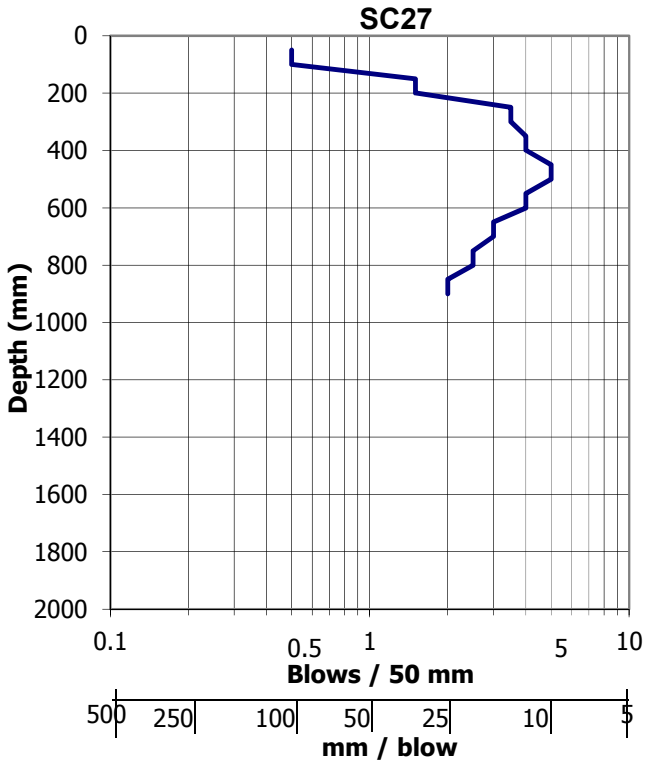
Date: *16/08/2017*
Operated by: *JXS*
Logged by: *JXH*

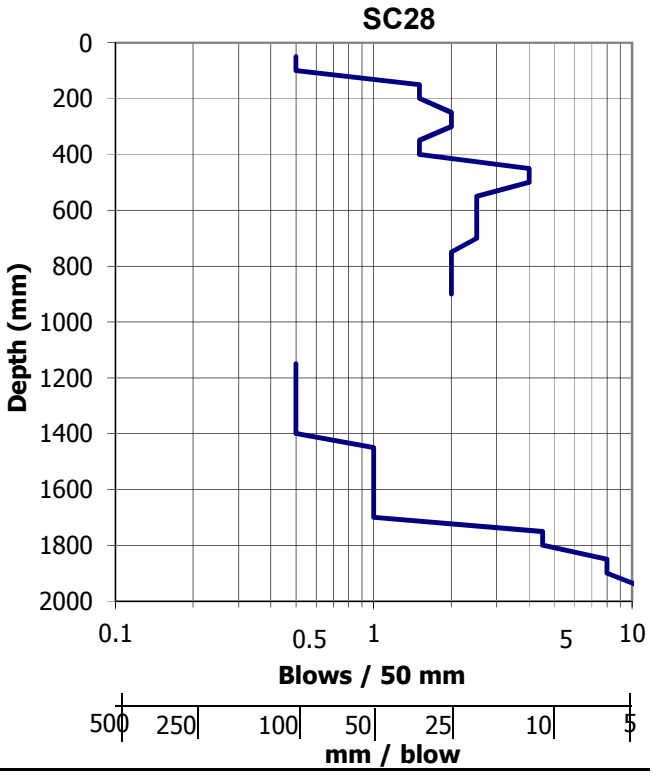
**Test Number** ***SC27 & SC28***

**Sheet** ***19***
**of** ***28***

| **SC27** Location: TP27 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1.5* |
| 200 | *1.5* |
| 250 | *3.5* |
| 300 | *3.5* |
| 350 | *4* |
| 400 | *4* |
| 450 | *5* |
| 500 | *5* |
| 550 | *4* |
| 600 | *4* |
| 650 | *3* |
| 700 | *3* |
| 750 | *2.5* |
| 800 | *2.5* |
| 850 | *2* |
| 900 | *2* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | *refusal* |
| 1300 | |
| 1350 | |
| 1400 | |
| 1450 | |
| 1500 | |
| 1550 | |
| 1600 | |
| 1650 | |
| 1700 | |
| 1750 | |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC28** Location: TP28 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1.5* |
| 200 | *1.5* |
| 250 | *2* |
| 300 | *2* |
| 350 | *1.5* |
| 400 | *1.5* |
| 450 | *4* |
| 500 | *4* |
| 550 | *2.5* |
| 600 | *2.5* |
| 650 | *2.5* |
| 700 | *2.5* |
| 750 | *2* |
| 800 | *2* |
| 850 | *2* |
| 900 | *2* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *0.5* |
| 1400 | *0.5* |
| 1450 | *1* |
| 1500 | *1* |
| 1550 | *1* |
| 1600 | *1* |
| 1650 | *1* |
| 1700 | *1* |
| 1750 | *4.5* |
| 1800 | *4.5* |
| 1850 | *8* |
| 1900 | *8* |
| 1950 | *11* |
| 2000 | *11* |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

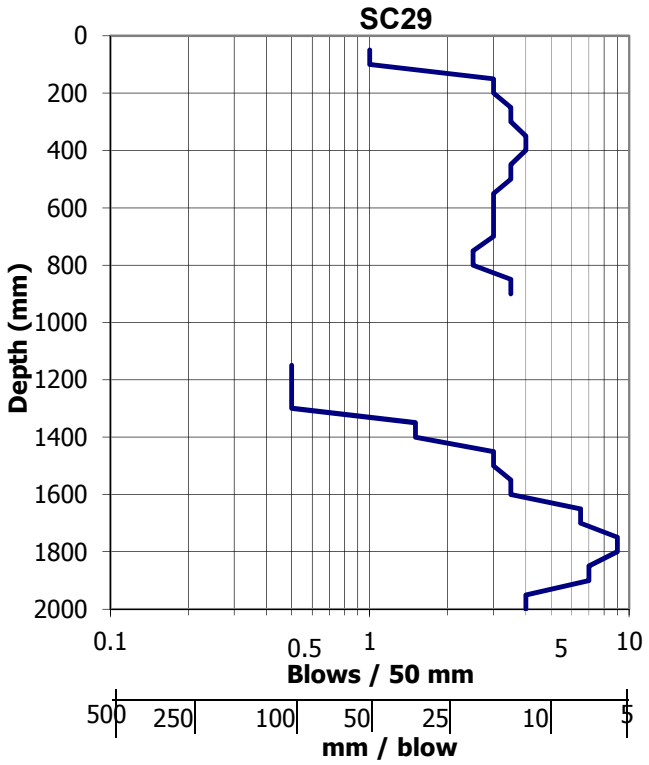
Date: *16/08/2017*
Operated by: *JXS*
Logged by: *JXH*

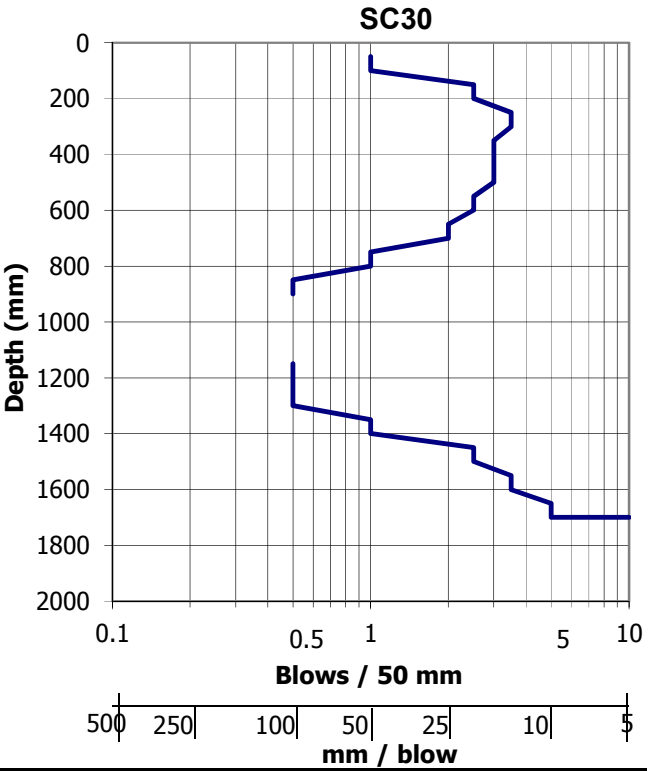
**Test Number** ***SC29 & SC30***

**Sheet** ***20***
**of** ***28***

| **SC29** Location: TP29 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *1* |
| 100 | *1* |
| 150 | *3* |
| 200 | *3* |
| 250 | *3.5* |
| 300 | *3.5* |
| 350 | *4* |
| 400 | *4* |
| 450 | *3.5* |
| 500 | *3.5* |
| 550 | *3* |
| 600 | *3* |
| 650 | *3* |
| 700 | *3* |
| 750 | *2.5* |
| 800 | *2.5* |
| 850 | *3.5* |
| 900 | *3.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *1.5* |
| 1400 | *1.5* |
| 1450 | *3* |
| 1500 | *3* |
| 1550 | *3.5* |
| 1600 | *3.5* |
| 1650 | *6.5* |
| 1700 | *6.5* |
| 1750 | *9* |
| 1800 | *9* |
| 1850 | *7* |
| 1900 | *7* |
| 1950 | *4* |
| 2000 | *4* |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC30** Location: TP30 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *1* |
| 100 | *1* |
| 150 | *2.5* |
| 200 | *2.5* |
| 250 | *3.5* |
| 300 | *3.5* |
| 350 | *3* |
| 400 | *3* |
| 450 | *3* |
| 500 | *3* |
| 550 | *2.5* |
| 600 | *2.5* |
| 650 | *2* |
| 700 | *2* |
| 750 | *1* |
| 800 | *1* |
| 850 | *0.5* |
| 900 | *0.5* |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *0.5* |
| 1300 | *0.5* |
| 1350 | *1* |
| 1400 | *1* |
| 1450 | *2.5* |
| 1500 | *2.5* |
| 1550 | *3.5* |
| 1600 | *3.5* |
| 1650 | *5* |
| 1700 | *5* |
| 1750 | *refusal* |
| 1800 | |
| 1850 | |
| 1900 | |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



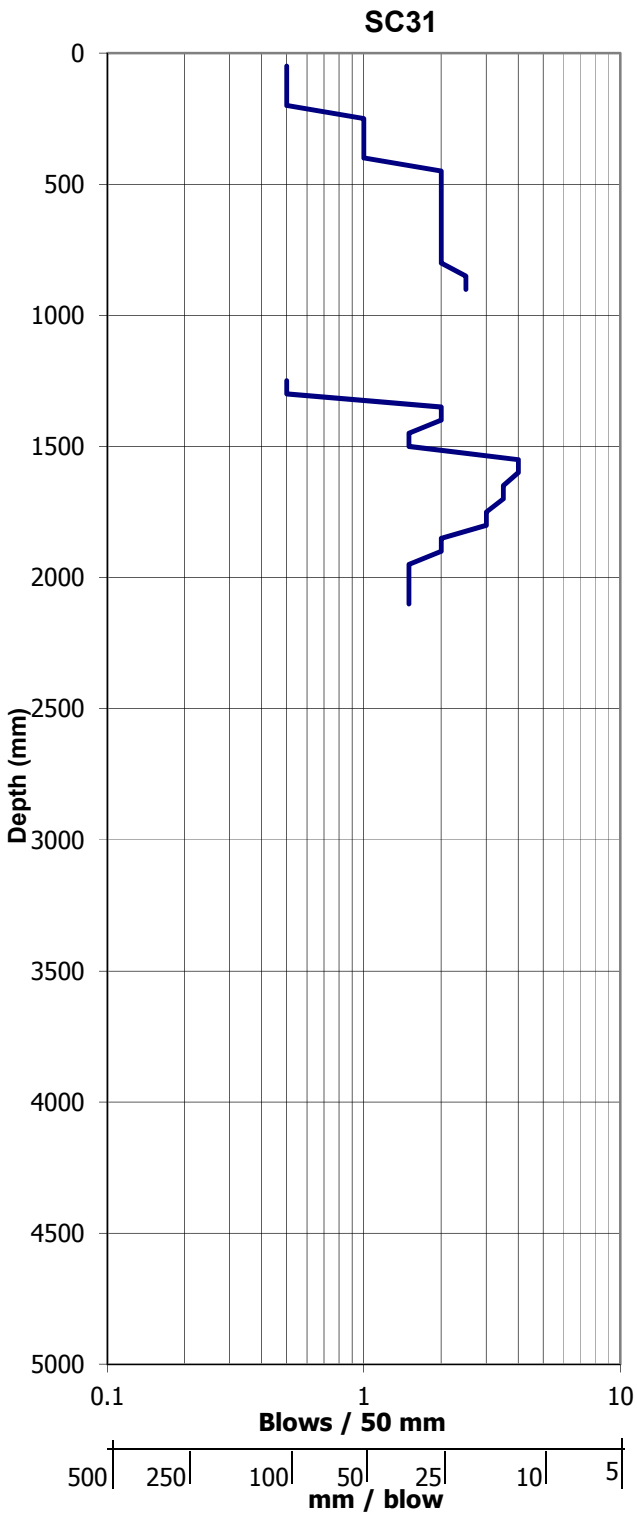
GEOSOLVE LTD

# SCALA PENETROMETER LOG

| | | | | | |
|---|---|---|---|---|---|
| Job No: | *170574* | Date: | *16/08/2017* | **Test No.** | ***SC31*** |
| Project: | *Sandflat Rd* | Operated by: | *JXS* | | |
| Location: | *Cromwell* | Logged by: | *JXH* | **Sheet** | ***21*** |
| RL: | *gl* | Inferred Soil Type: | | **of** | ***28*** |

| SC31 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 0.5 |
| 200 | 0.5 |
| 250 | 1 |
| 300 | 1 |
| 350 | 1 |
| 400 | 1 |
| 450 | 2 |
| 500 | 2 |
| 550 | 2 |
| 600 | 2 |
| 650 | 2 |
| 700 | 2 |
| 750 | 2 |
| 800 | 2 |
| 850 | 2.5 |
| 900 | 2.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 2 |
| 1400 | 2 |
| 1450 | 1.5 |
| 1500 | 1.5 |
| 1550 | 4 |
| 1600 | 4 |
| 1650 | 3.5 |
| 1700 | 3.5 |
| 1750 | 3 |
| 1800 | 3 |
| 1850 | 2 |
| 1900 | 2 |
| 1950 | 1.5 |
| 2000 | 1.5 |
| 2050 | 1.5 |
| 2100 | 1.5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC31 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

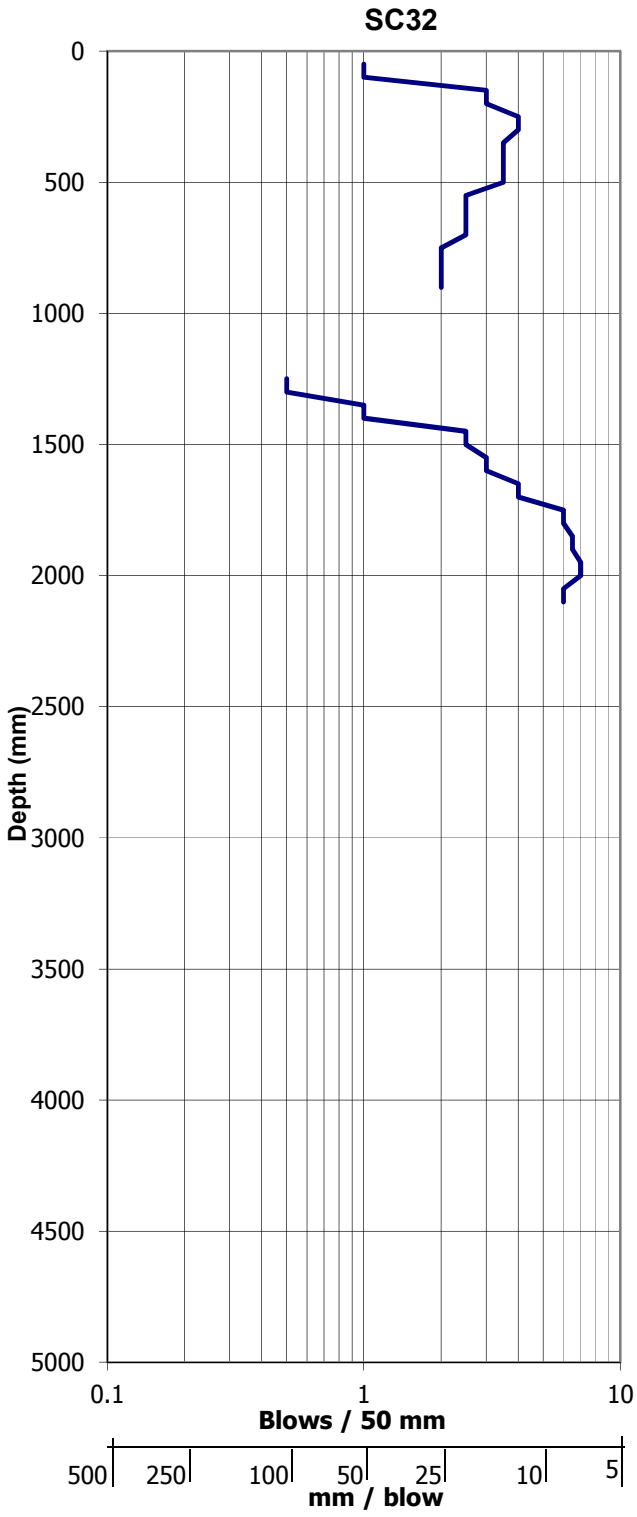
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *16/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** *SC32*
**Sheet** *22*
**of** *28*

| SC32 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 3 |
| 200 | 3 |
| 250 | 4 |
| 300 | 4 |
| 350 | 3.5 |
| 400 | 3.5 |
| 450 | 3.5 |
| 500 | 3.5 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | 2.5 |
| 700 | 2.5 |
| 750 | 2 |
| 800 | 2 |
| 850 | 2 |
| 900 | 2 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1 |
| 1400 | 1 |
| 1450 | 2.5 |
| 1500 | 2.5 |
| 1550 | 3 |
| 1600 | 3 |
| 1650 | 4 |
| 1700 | 4 |
| 1750 | 6 |
| 1800 | 6 |
| 1850 | 6.5 |
| 1900 | 6.5 |
| 1950 | 7 |
| 2000 | 7 |
| 2050 | 6 |
| 2100 | 6 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC32 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

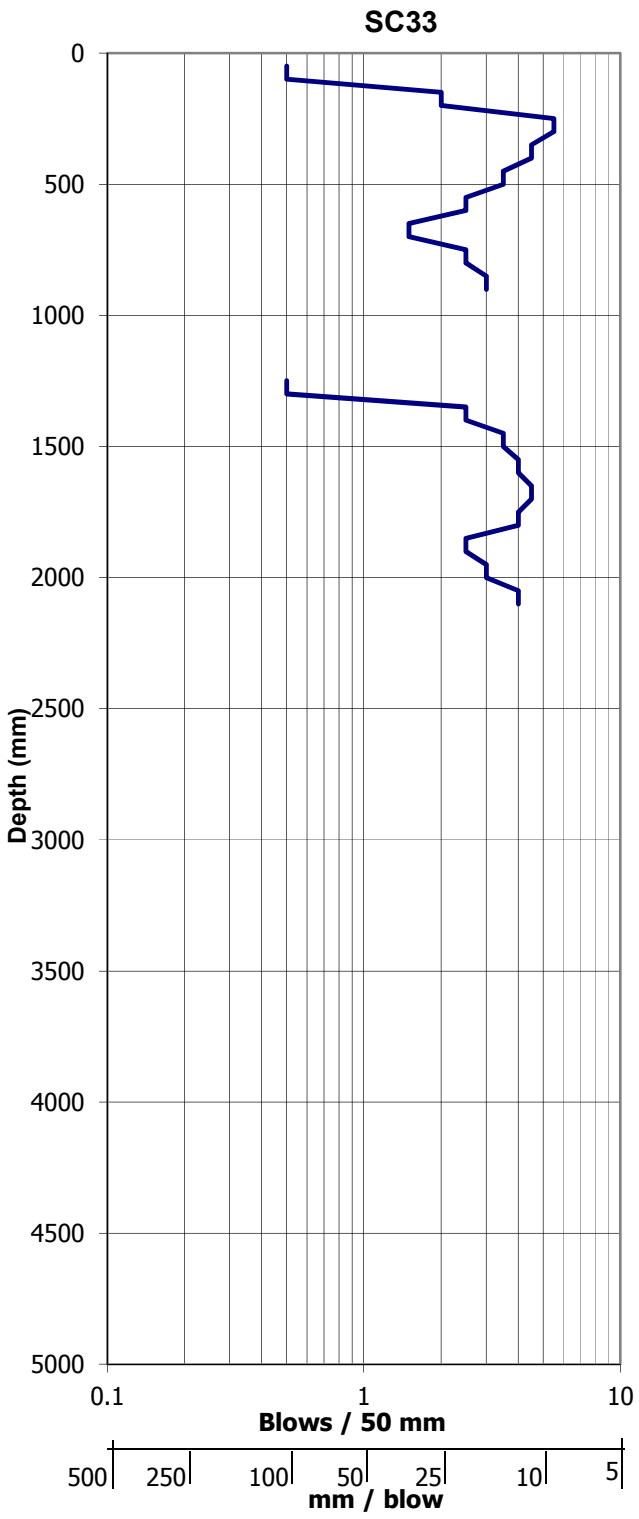
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *16/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC33***
**Sheet** ***23***
**of** ***28***

| SC33 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 0.5 |
| 100 | 0.5 |
| 150 | 2 |
| 200 | 2 |
| 250 | 5.5 |
| 300 | 5.5 |
| 350 | 4.5 |
| 400 | 4.5 |
| 450 | 3.5 |
| 500 | 3.5 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | 1.5 |
| 700 | 1.5 |
| 750 | 2.5 |
| 800 | 2.5 |
| 850 | 3 |
| 900 | 3 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 2.5 |
| 1400 | 2.5 |
| 1450 | 3.5 |
| 1500 | 3.5 |
| 1550 | 4 |
| 1600 | 4 |
| 1650 | 4.5 |
| 1700 | 4.5 |
| 1750 | 4 |
| 1800 | 4 |
| 1850 | 2.5 |
| 1900 | 2.5 |
| 1950 | 3 |
| 2000 | 3 |
| 2050 | 4 |
| 2100 | 4 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC33 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

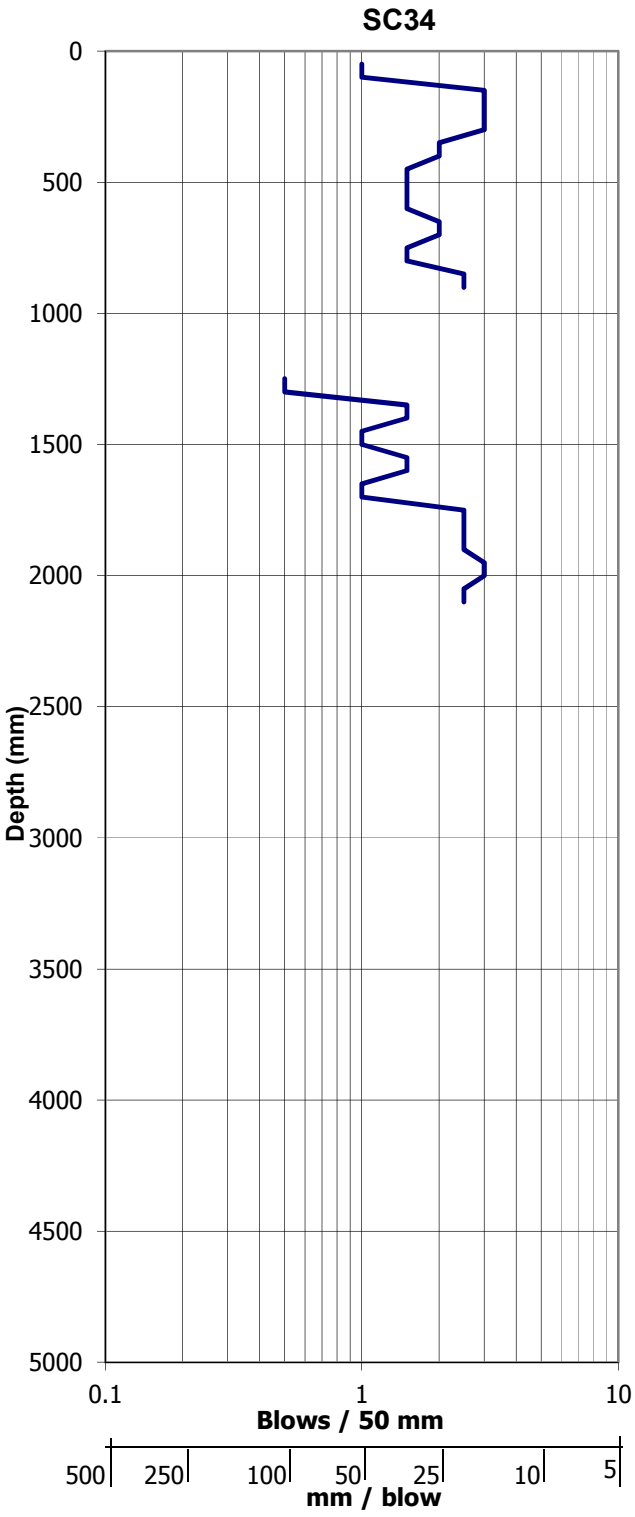
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *16/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC34***
**Sheet** ***24***
**of** ***28***

| SC34 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 3 |
| 200 | 3 |
| 250 | 3 |
| 300 | 3 |
| 350 | 2 |
| 400 | 2 |
| 450 | 1.5 |
| 500 | 1.5 |
| 550 | 1.5 |
| 600 | 1.5 |
| 650 | 2 |
| 700 | 2 |
| 750 | 1.5 |
| 800 | 1.5 |
| 850 | 2.5 |
| 900 | 2.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1.5 |
| 1400 | 1.5 |
| 1450 | 1 |
| 1500 | 1 |
| 1550 | 1.5 |
| 1600 | 1.5 |
| 1650 | 1 |
| 1700 | 1 |
| 1750 | 2.5 |
| 1800 | 2.5 |
| 1850 | 2.5 |
| 1900 | 2.5 |
| 1950 | 3 |
| 2000 | 3 |
| 2050 | 2.5 |
| 2100 | 2.5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC34 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

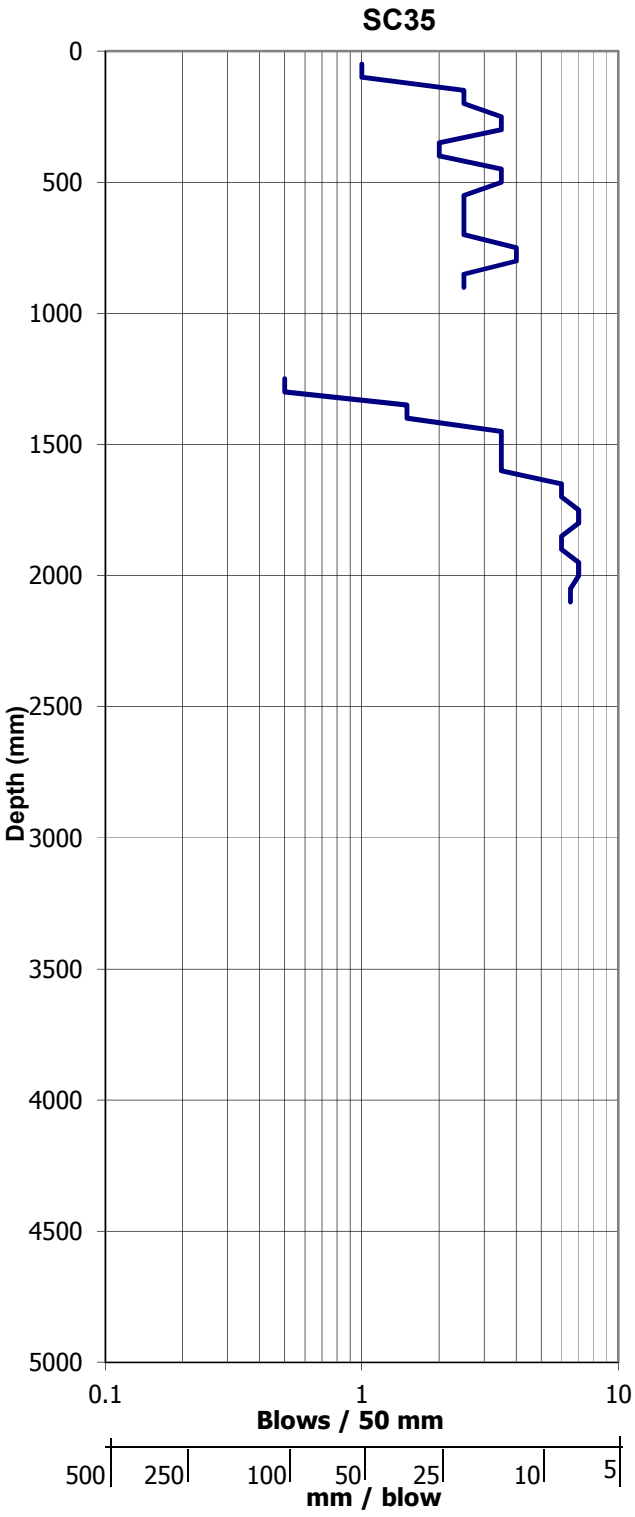
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *17/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** *SC35*
**Sheet** *25*
**of** *28*

| SC35 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 2.5 |
| 200 | 2.5 |
| 250 | 3.5 |
| 300 | 3.5 |
| 350 | 2 |
| 400 | 2 |
| 450 | 3.5 |
| 500 | 3.5 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | 2.5 |
| 700 | 2.5 |
| 750 | 4 |
| 800 | 4 |
| 850 | 2.5 |
| 900 | 2.5 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1.5 |
| 1400 | 1.5 |
| 1450 | 3.5 |
| 1500 | 3.5 |
| 1550 | 3.5 |
| 1600 | 3.5 |
| 1650 | 6 |
| 1700 | 6 |
| 1750 | 7 |
| 1800 | 7 |
| 1850 | 6 |
| 1900 | 6 |
| 1950 | 7 |
| 2000 | 7 |
| 2050 | 6.5 |
| 2100 | 6.5 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC35 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GEOSOLVE LTD

# SCALA PENETROMETER LOG

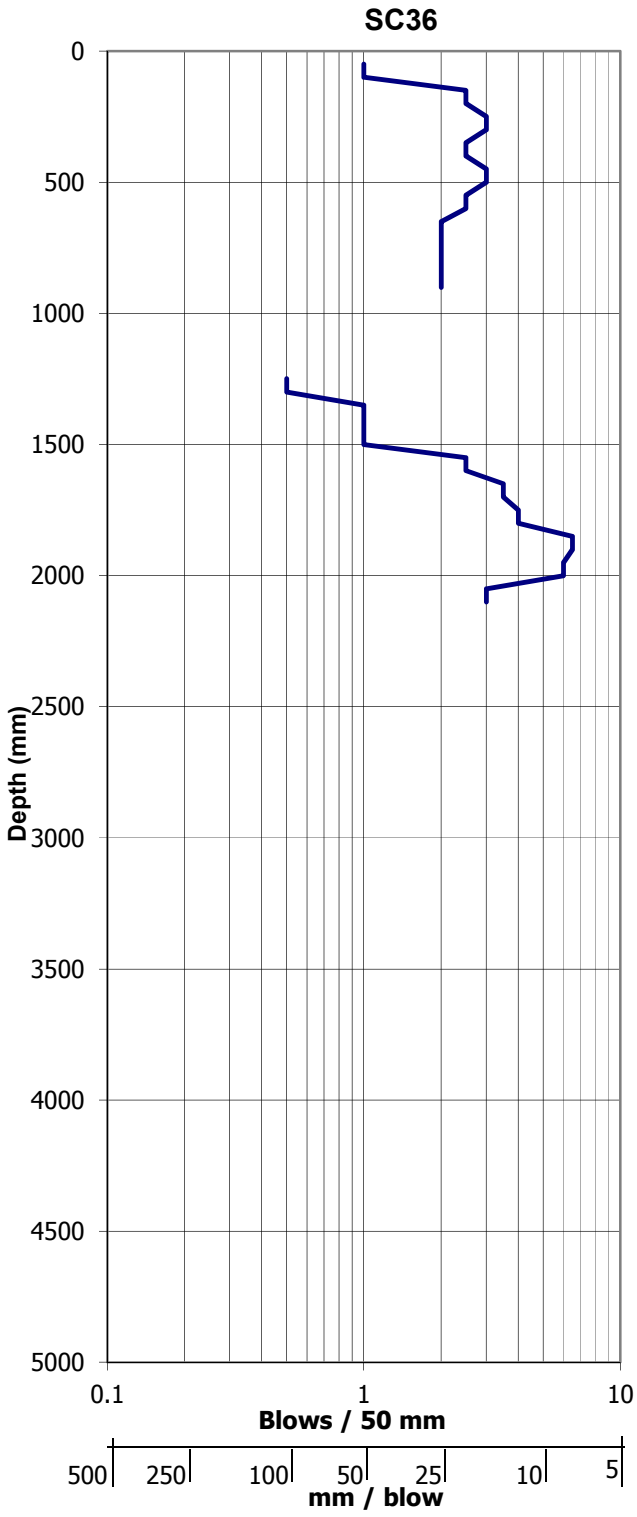
Job No: *170574*
Project: *Sandflat Rd*
Location: *Cromwell*
RL: *gl*

Date: *17/08/2017*
Operated by: *JXS*
Logged by: *JXH*
Inferred Soil Type:

**Test No.** ***SC36***
**Sheet** ***26***
**of** ***28***

| SC36 | |
|---|---|
| mm Driven | No. of Blows |
| 50 | 1 |
| 100 | 1 |
| 150 | 2.5 |
| 200 | 2.5 |
| 250 | 3 |
| 300 | 3 |
| 350 | 2.5 |
| 400 | 2.5 |
| 450 | 3 |
| 500 | 3 |
| 550 | 2.5 |
| 600 | 2.5 |
| 650 | 2 |
| 700 | 2 |
| 750 | 2 |
| 800 | 2 |
| 850 | 2 |
| 900 | 2 |
| 950 | |
| 1000 | |
| 1050 | |
| 1100 | |
| 1150 | |
| 1200 | |
| 1250 | 0.5 |
| 1300 | 0.5 |
| 1350 | 1 |
| 1400 | 1 |
| 1450 | 1 |
| 1500 | 1 |
| 1550 | 2.5 |
| 1600 | 2.5 |
| 1650 | 3.5 |
| 1700 | 3.5 |
| 1750 | 4 |
| 1800 | 4 |
| 1850 | 6.5 |
| 1900 | 6.5 |
| 1950 | 6 |
| 2000 | 6 |
| 2050 | 3 |
| 2100 | 3 |
| 2150 | |
| 2200 | |
| 2250 | |
| 2300 | |
| 2350 | |
| 2400 | |
| 2450 | |
| 2500 | |

| SC36 cont... | |
|---|---|
| mm Driven | No. of Blows |
| 2550 | |
| 2600 | |
| 2650 | |
| 2700 | |
| 2750 | |
| 2800 | |
| 2850 | |
| 2900 | |
| 2950 | |
| 3000 | |
| 3050 | |
| 3100 | |
| 3150 | |
| 3200 | |
| 3250 | |
| 3300 | |
| 3350 | |
| 3400 | |
| 3450 | |
| 3500 | |
| 3550 | |
| 3600 | |
| 3650 | |
| 3700 | |
| 3750 | |
| 3800 | |
| 3850 | |
| 3900 | |
| 3950 | |
| 4000 | |
| 4050 | |
| 4100 | |
| 4150 | |
| 4200 | |
| 4250 | |
| 4300 | |
| 4350 | |
| 4400 | |
| 4450 | |
| 4500 | |
| 4550 | |
| 4600 | |
| 4650 | |
| 4700 | |
| 4750 | |
| 4800 | |
| 4850 | |
| 4900 | |
| 4950 | |
| 5000 | |




Test Method Used: NZS 4402:1988 Test 6.5.2 Dynamic Cone Penetrometer

GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

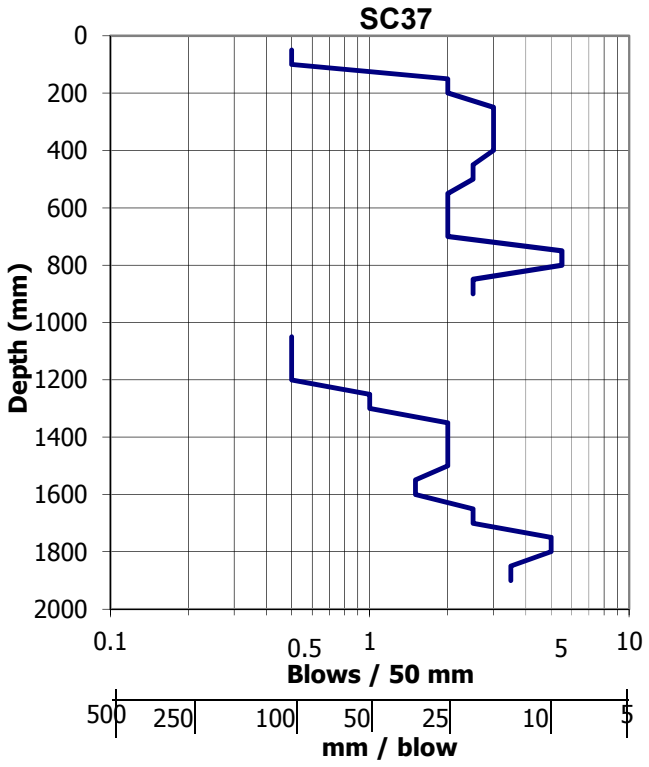
Date: *17/08/2017*
Operated by: *JXS*
Logged by: *JXH*

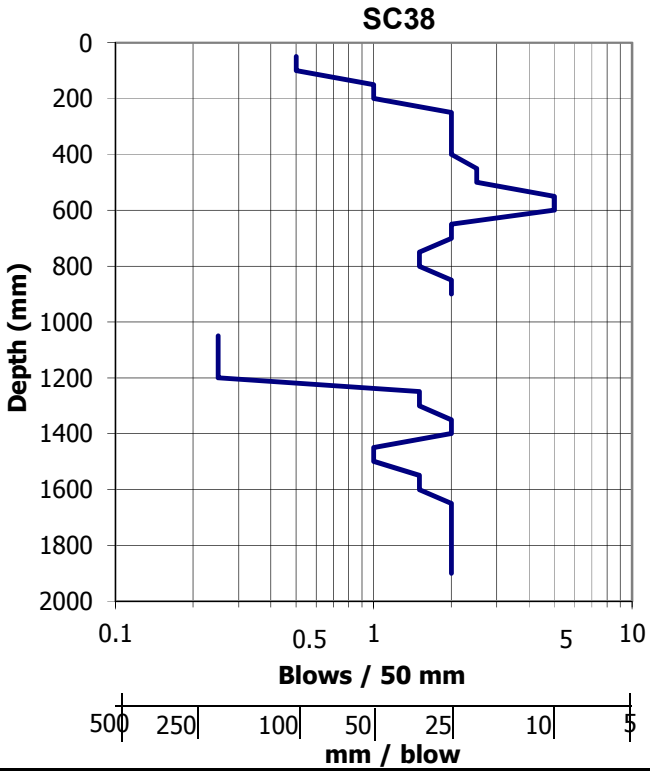
**Test Number** ***SC37 & SC38***

**Sheet** ***27***
**of** ***28***

| **SC37** Location: TP37 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *2* |
| 200 | *2* |
| 250 | *3* |
| 300 | *3* |
| 350 | *3* |
| 400 | *3* |
| 450 | *2.5* |
| 500 | *2.5* |
| 550 | *2* |
| 600 | *2* |
| 650 | *2* |
| 700 | *2* |
| 750 | *5.5* |
| 800 | *5.5* |
| 850 | *2.5* |
| 900 | *2.5* |
| 950 | |
| 1000 | |
| 1050 | *0.5* |
| 1100 | *0.5* |
| 1150 | *0.5* |
| 1200 | *0.5* |
| 1250 | *1* |
| 1300 | *1* |
| 1350 | *2* |
| 1400 | *2* |
| 1450 | *2* |
| 1500 | *2* |
| 1550 | *1.5* |
| 1600 | *1.5* |
| 1650 | *2.5* |
| 1700 | *2.5* |
| 1750 | *5* |
| 1800 | *5* |
| 1850 | *3.5* |
| 1900 | *3.5* |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |

| **SC38** Location: TP38 RL: gl | |
|---|---|
| mm Driven | No. of Blows |
| 50 | *0.5* |
| 100 | *0.5* |
| 150 | *1* |
| 200 | *1* |
| 250 | *2* |
| 300 | *2* |
| 350 | *2* |
| 400 | *2* |
| 450 | *2.5* |
| 500 | *2.5* |
| 550 | *5* |
| 600 | *5* |
| 650 | *2* |
| 700 | *2* |
| 750 | *1.5* |
| 800 | *1.5* |
| 850 | *2* |
| 900 | *2* |
| 950 | |
| 1000 | |
| 1050 | *0.25* |
| 1100 | *0.25* |
| 1150 | *0.25* |
| 1200 | *0.25* |
| 1250 | *1.5* |
| 1300 | *1.5* |
| 1350 | *2* |
| 1400 | *2* |
| 1450 | *1* |
| 1500 | *1* |
| 1550 | *1.5* |
| 1600 | *1.5* |
| 1650 | *2* |
| 1700 | *2* |
| 1750 | *2* |
| 1800 | *2* |
| 1850 | *2* |
| 1900 | *2* |
| 1950 | |
| 2000 | |
| Inferred Soil Type | |
| Watertable Depth | |



GeoSolve Ltd

# SCALA PENETROMETER LOG

Job No: *170574*
Project: *Sandflat Rd*

Date: *17/08/2017*
Operated by: *JXS*
Logged by: *JXH*

| Test Number | *SC39* |
|---|---|
| Sheet | *28* |
| of | *28* |

| SC39 Location: TP39 RL: gl | | Location: RL: | |
|---|---|---|---|
| mm Driven | No. of Blows | mm Driven | No. of Blows |
| 50 | *1* | 50 | |
| 100 | *1* | 100 | |
| 150 | *2* | 150 | |
| 200 | *2* | 200 | |
| 250 | *3* | 250 | |
| 300 | *3* | 300 | |
| 350 | *2.5* | 350 | |
| 400 | *2.5* | 400 | |
| 450 | *3* | 450 | |
| 500 | *3* | 500 | |
| 550 | *2* | 550 | |
| 600 | *2* | 600 | |
| 650 | *3.5* | 650 | |
| 700 | *3.5* | 700 | |
| 750 | *2* | 750 | |
| 800 | *2* | 800 | |
| 850 | *2* | 850 | |
| 900 | *2* | 900 | |
| 950 | | 950 | |
| 1000 | | 1000 | |
| 1050 | | 1050 | |
| 1100 | | 1100 | |
| 1150 | *0.5* | 1150 | |
| 1200 | *0.5* | 1200 | |
| 1250 | *2* | 1250 | |
| 1300 | *2* | 1300 | |
| 1350 | *2.5* | 1350 | |
| 1400 | *2.5* | 1400 | |
| 1450 | *3* | 1450 | |
| 1500 | *3* | 1500 | |
| 1550 | *1.5* | 1550 | |
| 1600 | *1.5* | 1600 | |
| 1650 | *3.5* | 1650 | |
| 1700 | *3.5* | 1700 | |
| 1750 | *4* | 1750 | |
| 1800 | *4* | 1800 | |
| 1850 | *3.5* | 1850 | |
| 1900 | *3.5* | 1900 | |
| 1950 | | 1950 | |
| 2000 | | 2000 | |
| Inferred Soil Type | | Inferred Soil Type | |
| Watertable Depth | | Watertable Depth | |