Sada Services Pty Ltd
20-May-2016

Glenlee Precinct Rezoning

Revision of Land Capability Statement - Geotechnical

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Client: Sada Services Pty Ltd

ABN: 48 002 984 447

Prepared by

AECOM Australia Pty Ltd
Level 21, 420 George Street, Sydney NSW 2000, PO Box Q410, QVB Post Office NSW 1230, Australia
T +61 2 8934 0000 F +61 2 8934 0001 www.aecom.com
ABN 20 093 846 925

20-May-2016

Job No.: 60301834

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Quality Information

Document	Glenlee Precinct Rezoning
Ref	60301834
Date	20-May-2016
Prepared by	Toni Berridge, Antony Tam, Richard Rudd
Reviewed by	John Ashley

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	28-Feb-2014	For Client Review	May Pang Project Manager	
B	15-Apr-2014	For Client Review	May Pang Project Manager	
0	11-May-2015	Final - Clients comments incorporated	May Pang Project Manager	
1	12-May-2016	Final - GHD comments (August 2015) incorporated	May Pang Project Manager	
2	20-May-2016	Final	Andy Yung Project Manager	

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Executive Summary

Introduction

AECOM was commissioned on behalf of the Glenlee Consortium[1] to carry out a number of sub-studies including a land capability study associated with the industrial rezoning of the Glenlee Precinct for employment and related purposes. The site is currently a coal washery, but will be rezoned to include a general industrial zone, infrastructure zone and environmental zone.

A land capability report was prepared for the rezoning application lodged with the Local Environmental Study in 2008. However, legislation changes resulted in a need for this study to be reviewed and revised, particularly as the SITA Australia (SITA) lands no longer forms part of the Planning Permit (PP). A geotechnical desktop study uncovered a significant amount of existing geotechnical field investigation and assessment data undertaken by Douglas Partners since the 2008 land capability report. Further review of aerial photography suggests that earthworks are currently being carried out at the Precinct. Existing site conditions are therefore materially different to those at the time of the previous submission. As a result it was identified that the geotechnical information in the existing Land Capability Report may be out of date and should be reviewed and revised.

Mine Subsidence

The Precinct is located in the north of the South Campbelltown Mine Subsidence District, adjacent to the Wilton Mine Subsidence District. The area is underlain by deep coal seams over which mining leases have been issued. We understand that no coal extraction has taken place in the Precinct nor is it planned for several decades. A potential conflict exists between the proposed urban land use of the area and the potential for future coal mining. Future developments in the Precinct will require approval of the Mine Subsidence Board (MSB) which has advised that approval would not necessarily be withheld. Approval would be subject to the proposed development accounting for a number of engineering constraints related to the potential impact of mine subsidence. The primary constraints include allowable height of structures, types of building materials and methods of construction. Items that will require MSB approval include: (a) subdivision of land; (b) multi-storey developments; (c) extensions to homes: and (d) building applications for new homes and structures.

Mine subsidence within The Precinct will be primarily managed and mitigated through engineering solutions or by the selective exclusion of mining. On the basis of well-established subsidence mitigation practices, engineering solutions will likely consist of:

- Selection of appropriate types of development;
- Selection of building materials and building styles that would best cope with subsidence; and
- Ongoing monitoring and maintenance.

Geotechnical Issues

The south west corner of the Precinct is situated on low lying undulating Quaternary alluvial sediments from the Nepean River floodplain. These are composed predominantly of fluvial sands, silts and clays. The balance of the Precinct is underlain by Bringelly Shale and carbonaceous claystone, laminite, and coal. Bringelly Shale is a major formation of the Wianamatta group that outcrops over a large area of Western Sydney.

Much of the Precinct is overlain by fill consisting of washery reject and tailings produced by the former coal washery. This material comprises sequences of very loose to loose deposits of sandy silt and sandy gravels covered in places by a thin silty clay topsoil. The emplacement (coal washery reject) is generally contained by a perimeter earthfill embankment which is between 18 m and 23 m in height. The embankment batter slopes vary, typically from 2H:1V to 2.5H:1V, except at an isolated section located to the north of the eastern embankment, which appears to be steeper at 1.5H:1V.

A number of studies are being carried out to investigate the most efficient way of consolidating the loose sandy silt for use in future developments.

There appears to be a history of erosion of the embankment slopes with minor gully erosion evident on all batters. More prominent erosion gullies have also been noted up to four metres deep in places. These deeper gullies

[1] Sada Services, Glenlee Properties Pty Ltd and J & W Tripodi Holdings Pty Ltd

have produced loose fan deposits of sediment at the toe of the batters. The deeper erosion gullies may have been backfilled as they were not present during the inspection by the AECOM geotechnical engineer in 2014.

The geotechnical issues noted below will need to be addressed and engineering design modification may potentially be required to minimise the potential constraints on the future development of the Precinct:

- Heterogeneous quality of non-engineered fill material;
- Erosion and potential instability of fill batter slopes.

Notwithstanding these issues, the presence of fill materials does not preclude the site from re-zoning or development.

Geotechnical impacts or constraints within The Precinct will be managed and mitigated by ground treatment and appropriate zoning and planning of the development. Where treatment is required, this would generally involve localised ground improvement, drainage measures and/or slope regrading. Methods available for stabilising the emplacement area include consolidation through the application of surcharge (preloading and dynamic compaction.

1.0 Introduction

AECOM was commissioned on behalf of the Glenlee Consortium[2] to carry out a number of sub-studies including a land capability study associated with the Industrial rezoning of the Glenlee Precinct for employment and related purposes. This revised report (Rev 1) addresses review comments provided by the client at the request of Campbelltown City Council.

1.1 The Glenlee Precinct

Glenlee is located near Narellan, approximately 50 km south-west of Sydney, within the Camden and Campbelltown Local Government Areas (LGA). The regional context of the Study Area is shown in Figure 1.

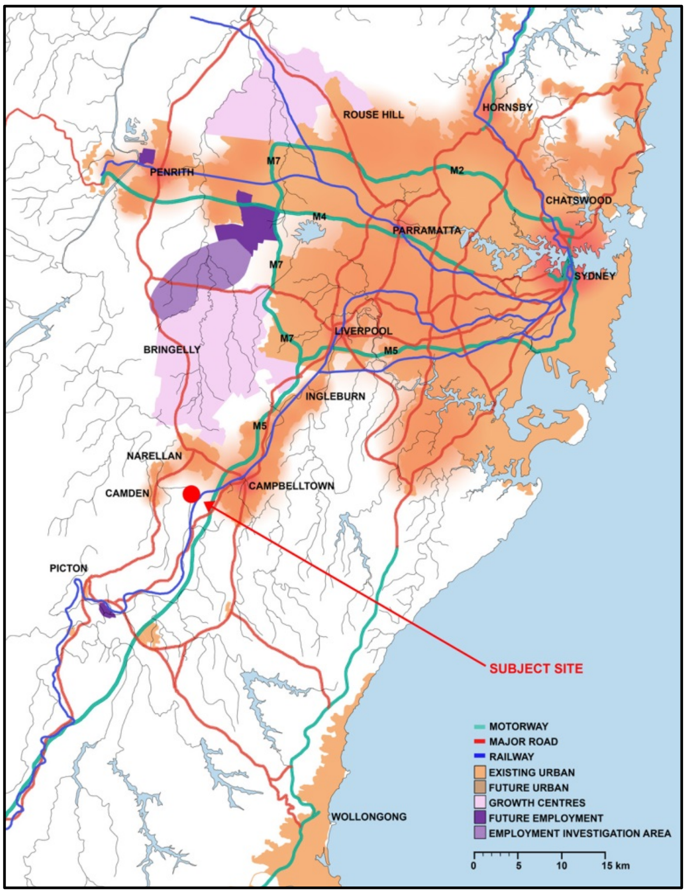


Figure 1: Regional Context of Study Area (Source: Sada Services Pty Ltd, 2008)

The location of Glenlee in relation to major local centres and features is as follows:

- 6 km west of Campbelltown;
- 3.5 km south of Narellan Town Centre;
- 5 km east of Camden Town Centre;
- North and east of the Nepean River and its expansive flood plain.

The Precinct is shown in Figure 2.

The Local Government boundary between Camden Council and Campbelltown City Council traverses the Study, Area.

[2] Sada Services, Glenlee Properties Pty Ltd and J & W Tripodi Holdings Pty Ltd

The Precinct comprises the following holdings and respective ownerships, as shown in Table 1 below:

Table 1: The Site – Property Descriptions

Owner	Property Description	Size
Sada Services	Lot 38 DP 1098588	71.04 Ha
	Lot 1 DP 250033	3,071 m^2
	Part Lot 1 DP 405624	2,800 m^2
J&W Tripodi Holdings Pty Ltd (Camden Soil Mix)	Lot 1102 DP 883495	27.16 Ha
Glenlee Properties Pty Ltd (TRN Group)	Lot 54 DP 864754	8.836 Ha

Source: Planning Proposal – Glenlee Precinct, October 2012

Notwithstanding the current rural zoning of the land the Precinct has been used for a number of years for industrial related purposes. These industrial uses include the Sada Services landholding (truck maintenance and depot, coal washery and reject coal emplacement), Camden Soil Mix (truck maintenance and depot, green waste and recycling facility), and TRN Group (truck maintenance and depot).

Figure 2: Location of Study Area (Glenlee Precinct) – Aerial Photo (Source: Planning Proposal – Glenlee Precinct, October 2012)

1.2 Background

The continually evolving nature of activities in the study area, along with evolution and planning for the locality and service infrastructure provision occasioned a need to review the prevailing planning controls.

In December 2006, Camden Council and Campbelltown City Council resolved to prepare a Local Environmental Study (LES) and Draft Local Environmental Plan (DLEP) for the rezoning of the site. A draft LES was submitted to both Councils in February 2009, which included a number of technical support studies. These studies included:

- Land Capability – AECOM
- Ecology – Hayes Environmental Services
- Noise – AECOM
- Air Quality / Odour - AECOM
- Water Cycle Management – AECOM
- European and Aboriginal Heritage – Historyworks and Cultural Heritage Connections
- Transport / Traffic / Accessibility – AECOM
- Landscape and Visual – Musecape
- Bushfire – Eco Logical
- Civil Infrastructure / Servicing – AECOM
- Masterplanning / Urban Design – Inspire Urban Design & Planning
- Human Service – BBC Consulting

In addition to these studies, a draft Local Environmental Plan (LEP) and a draft Development Control Plan (DCP), were prepared for each Council area, including an Infrastructure Strategy / Section 94 Contributions Plan.

The LES, LEP and DCP were not placed on public exhibition due to a number of issues arising from the technical studies, which required additional information to be provided to Councils.

Since that time, the key issues pertaining to the development have been progressively resolved to the extent which would satisfy the requirements of the planning permit (PP) to gain a Gateway Determination.

On 28 February and 23 April 2013 Campbelltown City Council and Camden Council respectively resolved to provide ‘in principle’ support to the intentions of the PP.

The PP received a Gateway Determination on July 3rd, 2013 to proceed with the rezoning of the Glenlee area, subject to various conditions including additional / updated information for a number of specialist technical studies.

A number of these specialist studies were prepared for the rezoning application lodged with the Local Environmental Study (LES) in 2008. However, legislation has changed in respect of a number of studies, and therefore these studies need to be reviewed and revised, particularly as the SITA Australia (SITA) lands no longer form part of the PP.

With respect to the land capability report, a geotechnical desktop study by AECOM uncovered a significant amount of existing geotechnical field investigation / assessment data undertaken by Douglas Partners since the first land capability report of 2008. Further review of aerial photography suggests that earthworks are currently being carried out around the former coal washery. Existing site conditions are therefore materially and topographically different to those at the time of the previous submission. Hence, it was identified that the existing Land Capability Report may be out of date and should be reviewed and revised accordingly.

In August 2013 a Preliminary Draft Project Plan was submitted to the Councils, including an outline of the various specialist technical study requirements. Camden responded with comments addressing these requirements, therefore forming the basis of the sub-consultant’s brief for the various specialist technical studies. AECOM has since responded to confirm requirement expectation.

1.3 The Proposal

The zoning request is generally in accordance with the proposed zoning map shown in Figure 3, highlighting General Industrial, Infrastructure and Environmental Management zones.

The proposed zones and stated objectives are as follows:

Zone IN1 - General Industrial

Objectives of zone:

- To provide a wide range of industrial and warehouse land uses
- To encourage employment opportunities
- To minimise any adverse effect of industry on other land uses
- To support and protect industrial land for industrial uses
- To enable other land uses that provides facilities or services to meet the day to day needs of workers in the area
- To enable non-industrial land uses that are compatible with and do not detract from the surrounding industrial and warehouse land uses

Zone SP2 - Infrastructure

Objectives of zone:

- To provide for infrastructure and related uses
- To prevent development that is not compatible with or that may detract from the provision of infrastructure

Zone E2 - Environmental Consideration / Management

Objectives of zone:

- To protect, manage and restore areas with special ecological, scientific, cultural or aesthetic values.
- To provide for a limited range of development that does not have an adverse effect on those values.
- To enable the recreational enjoyment or scientific study of the natural environment.

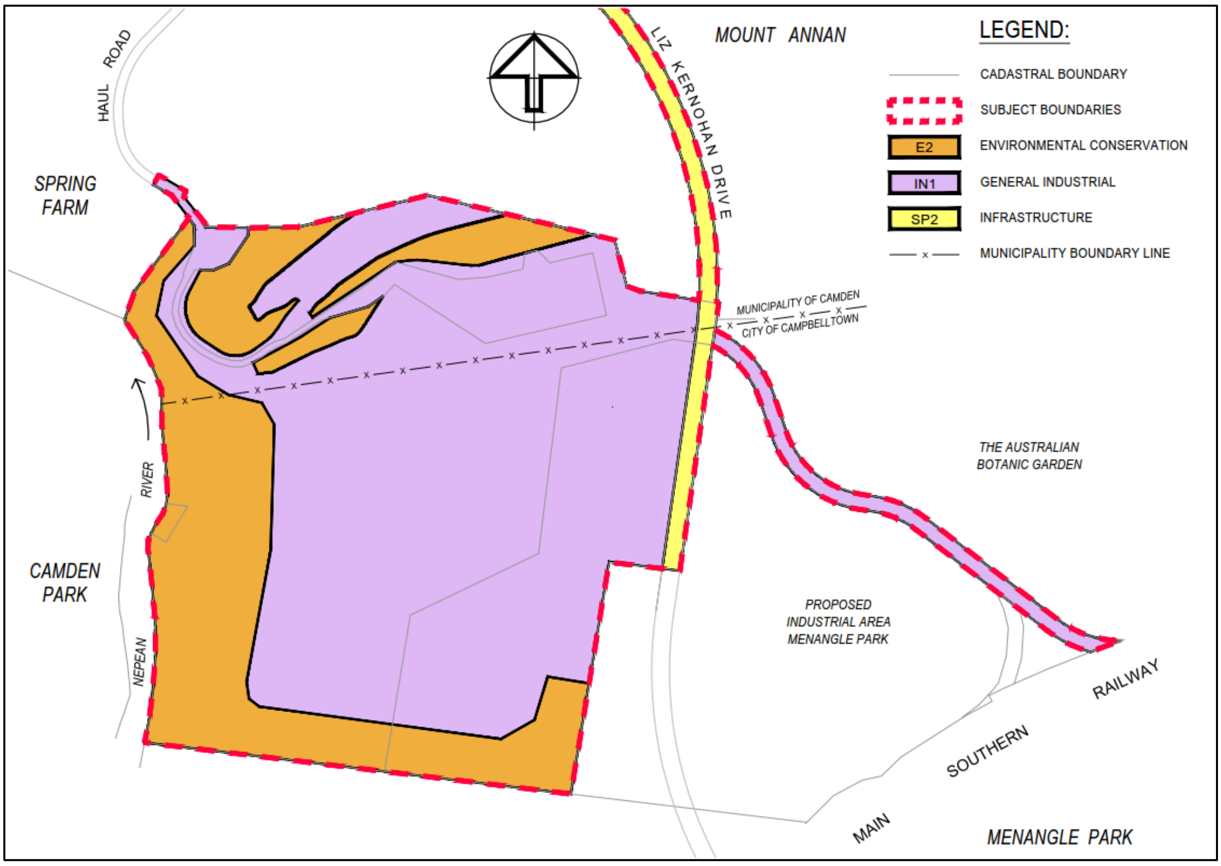


Figure 3 **Proposed Zoning Map**

1.4 Objective of Report

The objective of this report is to revise and update the mining subsidence and geotechnical information made available for the Glenlee Project provided in the July 08 Land Capability Assessment. The additional geotechnical field investigation and assessment was undertaken by Douglas Partners (DP) after submission of the previous report (Rev 0) in May 2015.

Of particular note is the addition of Appendix D (Douglas Partners "*Summary Report on Geotechnical Assessments – Proposed Redevelopment of the Glenlee Emplacement Area, Springs Road, Mt Annan", April 2016*). This geotechnical report specifically addresses the final review comments issued by GHD Geotechnics on behalf of the Campbelltown City Council, and the information provided should be read in conjunction with the DP report, which supplements and supports the information presented.

Minor amendments have also been made to the following sections of this report:

- Section 2.0
- Section 4.2.3.3

The report also incorporates the observations from the site inspection carried out by AECOM Geotechnical Engineers in February 2014 and the preliminary slope stability analysis.

In particular the objectives of this report are to:

- Address mineral resources, extractive minerals and mining subsidence issues
- Identify and document existing geological conditions, including the development of a preliminary design ground model
- Identify and document anticipated risks to future development
- Determine the need for further investigations and potential remediation

Tasks include:

- Liaise with Mine Subsidence Board to confirm that advice has not changed since the previous submission of the Land Capability Report, 2008
- Undertake a detailed geotechnical desktop study of the available geotechnical reports prepared by DP between 2007 and 2015, and include any additional relevant geotechnical information into this report
- Carry out a geotechnical site inspection, including measurement of the existing perimeter slope geometries, using hand held inclinometers at representative sections and carry out a preliminary slope stability analyses of the existing perimeter slopes

This report presents a geotechnical engineering study of the land prepared for rezoning and an assessment of its suitability for industrial development based on information made available from 2008 to the present.

2.0 Information Sources

The following documents have been reviewed in preparation of this report:

- 'A10 Contamination Management Plan', Campbelltown (Sustainable City) DCP, Campbelltown City Council, Campbelltown, viewed October 2007, http://www.campbelltown.nsw.gov.au/RBD/BuildAndDevelop/PlanningPoliciesandControls/DevelopmentControlPlans/CampbelltownSustainableCityDevelopmentControlPlan2015?BestBetMatch=development%20control%20plan|3ba77b09-4cae-4136-bd37-52774df911aa.
- Camden Council, (26 February 2008). 'Management of Contaminated Lands', Policy No. 3.12.
- Camden Council, (8 March 2004). 'Building in Salinity Prone Environments', Policy No. 1.15.
- Campbelltown City Council, (June 2003). Preliminary Geotechnical and Soils Assessment, Camden Soil Mix Composting & Recycling Facility Local Environment Study, p i,1, 3, 4-8, 10, 11, 14-17.
- C.M.Jewell & Associates Pty Ltd for Harvest Scientific Services (November 2001). Assessment of Groundwater Impacts of Coal-Bed Methane Development – Cawdor NSW [Report No AJ01-032.8]
- Coffey Geosciences Pty. Ltd, (November 2005). Glenlee Washery Tailings Dam De-prescribing Assessment of Dam Safety Issues, p 2, 3, 5 and 6.
- Consulting Earth Scientists, (September 2005). Well installations at the Coal Preparation Plant, Mount Annan, NSW, Project ID: CES050803-COL-01-F, pp 2-5.
- Douglas Partners (March 2008). Report on Preliminary Geotechnical Investigation
- Douglas Partners (November 2010). Glenlee Washery Tailings Dam Springs Road, Glenlee. Type 2 Surveillance Report
- Douglas Partners (February 2011). Report on Glenlee Emplacement Area Closure Plan, Glenlee Washery Industrial Complex, Springs Road, Glenlee.
- Douglas Partners (April 2011). Report on Additional Geotechnical Investigation, Proposed Area 1 Glenlee Emplacement, Springs Road, Glenlee
- Douglas Partners (October 2011). Report on Geotechnical Assessment, Compaction Trial and Additional Testing Glenlee Emplacement, Springs Road, Glenlee.
- Douglas Partners (February 2012). Proposed Surcharge Trial - Glenlee Emplacement, Springs Road, Glenlee.
- Douglas Partners (May 2012). Proposed Redevelopment of a Coalwash Emplacement, Part Lot 1102 Springs Road, Spring Farm
- Douglas Partners (August 2012). Report on Phase 1 Contamination Assessment with Limited Sampling, Part Lot 1192 Deposited Plan 883495 Glenlee Road, Menangle Park.
- Douglas Partners (September 2013). Summary Report on Geotechnical assessments.
- Douglas Partners (April 2015). Report on Glenlee Precinct Rezoning, Springs Road, Glenlee.
- Douglas Partners (April 2016). Final Summary Report on Geotechnical Assessments - Proposed Redevelopment of the Glenlee Emplacement Area, Springs Road, Mt Annan.
- GHD (2002), Landfill Gas Assessment, Spring Farm Estate, Narellan Vale
- GHD (July 2003), Camden Soil Mix Composting and Recycling Facility, Menangle Park, Local Environmental Study.
- Hayes Environmental, (February 2008). Draft Glenlee Precinct Rezoning Industrial and Employment Lands Ecological Assessment;
- International Environmental Consultants, (February 2006). Glenlee Industrial Complex Redevelopment Preliminary Assessment Report, p1, 2, 8, 11,12, 14, 16, 20, 22, 26 and 27.
- International Environmental Consultants, (1998). Glenlee Washery Rehabilitation Plan, p 1, 2, 7, 9, 12, 14, 38, 39 and 43.

- International Environmental Consultants, (August 2004). Glenlee Industrial Complex Environmental Issues Paper, p 3,4 7, 10, 16-18.
- International Environmental Consultants, (June 2003). Glenlee Industrial Complex Environmental Liability Assessment, p 2, 3 and 6-10.
- mg Planning, (September 2004). Menangle Park Preliminary Local Environmental Study, p vi, 5.7, 5.67. 5.68 and 5.72.
- Michael Brown Planning Strategies (October 2006). Rezoning Request, p 14 and 27, Fig. 1-4.
- NSW Department of Planning, Metropolitan Strategy (2005).
- NSW Department of Planning, Draft South West Sydney Subregional Strategy (2007).
- NSW Department of Planning, (5 May 2006). Menangle Park, letter;
- NSW Department of Planning, Locational Guidelines for Development in the Vicinity of Operating Coal Seam Methane Wells.
- Parsons Brinckerhoff, (June 2006), Preliminary Investigations and Limited Soil Sampling – Jacks Gully, Camden, NSW
- Waters Historical Consultancy (Waters, K., & Letters, M., August 2004). Draft Desktop Indigenous Heritage Report – proposed Alternative Waste Treatment Facility at Jacks Gully Waste Management Centre;
- Western Sydney Regional Organisation of Councils Ltd, (2003). Western Sydney Salinity Code of Practice
- WSN Environmental Solutions (30 January 2007). Landfill Environmental Management Plan., p10, 33 and 38.
- SMEC Urban Consulting Group (March 2014). Glenlee Washery Campbelltown City Council Contours over Stockpile as at May 2012, Drawing no. 67844.28.D02

3.0 Existing Condition

3.1 Mine Subsidence

The proposed Glenlee Development is located in the northern portion of the South Campbelltown Mine Subsidence District, adjacent to the Wilton Mine Subsidence District, as shown in Figure 4.

Campbelltown City Council State of the Environment Report 2003 states the following:

The LGA is underlain by deep coal seams and the South Campbelltown Mine Subsidence District has been proclaimed over the south western section of the LGA. Coal mining leases have been issued for the area, although to date there has not been any coal extraction. The seams are relatively thick and have been identified as a high value resource, and make a significant contribution to Campbelltown's natural resource base. A potential conflict exists between possible urban and mining land uses in the area, an issue that would require clarification before Council is to proceed with further investigations relating to urban development in the area.

The following guidance was obtained from the NSW Mine Subsidence Board (MSB) and the Department of Primary Industries (DPI) in October and November 2007 with respect to coal seam gas and the potential for mining beneath The Precinct:

- DPI advised that The Precinct is the subject of Petroleum Production Leases 4 and 5 held by Sydney Gas (Camden) Operations Pty Ltd and AGL Gas Production (Camden) Pty Ltd;
- MSB advised that The Precinct is likely to be mined, given the quality of the coal seam in the area. However, the MSB further advised that mining was unlikely to occur for another 25 to 30 years; and
- Development in The Precinct will require the approval of the MSB. Approval will not be withheld subject to engineering constraints relating to the potential impacts of mine subsidence being accounted for in the proposed development. The primary constraints include allowable height of structures, types of building materials and methods of construction. Items that will require MSB approval include: (a) subdivision of land; (b) multi-storey developments; (c) extensions to homes: and (d) building applications for new homes and structures.

The DoP issued a letter to Campbelltown City Council, dated 5 May 2006, regarding Menangle Park. The letter details the outcome of investigations and consultations by a working group into whether urban development or coal mining should be allowed to proceed at Menangle Park. While debate on this subject continues, it is understood that the currently agreed position is that mining of coal beneath Menangle Park should be restricted to enable urban development at the scale and form necessary to make that development viable. Further, the letter states that the design parameters for the South Campbelltown Mine Subsidence District should be able to be modified to allow development of additional areas that may include Glenlee in the event that there is agreement between the DPI and DoP that the development is desirable. Mining can then be limited to minimise subsidence in these areas.

Updated advice from the NSW MSB obtained in October 2013 suggests the following:

- The proposed site lies over two mining leases. The northern side of the site is currently held by Director General NSW Dept of TIRIS on behalf of the Crown. The southern side of the site is held by BHPIC
- Mining is possible in the future; however is not on the 30 year plan as yet
- Development on the property is subject to conditions set out in the MSB guidelines

This land capability assessment has identified, based on a review of coal resources beneath the site that:

- The possibility of mine subsidence is a potential constraint to development of The Precinct
- The impacts of mine subsidence can be managed through conventional engineering design measures

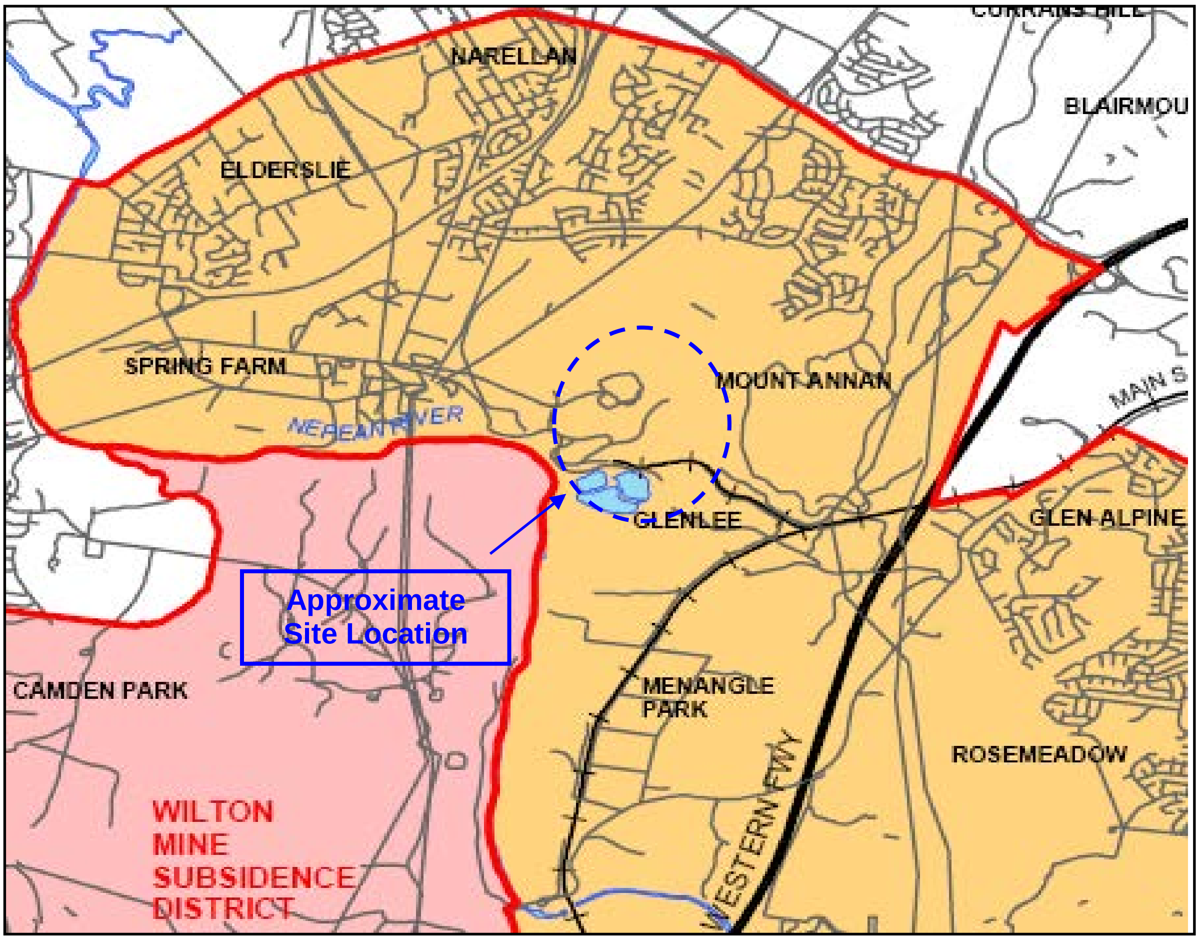


Figure 4: Part Plan of South Campbelltown Mine Subsidence District

3.2 Geotechnical

3.2.1 Geology

The Wollongong - Port Hacking 1:100 000 Geological Map Sheet (9585) indicates that the south western corner of The Precinct is situated on low lying undulating Quaternary alluvial sediments from the Nepean River floodplain, composed of fluvial sands, silts and clays. The balance of The Precinct is underlain by Bringelly Shale and carbonaceous claystone, laminite, and coal in places. Bringelly Shale is a major formation of the Wianamatta group that outcrops over a large area of Western Sydney. The shale is comprised predominantly of claystones and siltstones with occasional sandstone layers. It is highly compacted, weakly cemented, and contains significant amounts of swelling minerals. The shale also presents as an unnamed Triassic sandstone member of the Wianamatta Group.

The geological map (Sheet 9585) also indicates the presence of Tertiary alluvium located south and north west of the site, as well as Jurassic age volcanic deposits comprising basalt, dolerite and volcanic breccia that outcrop to the north east. The site geology is presented in Figure 7.

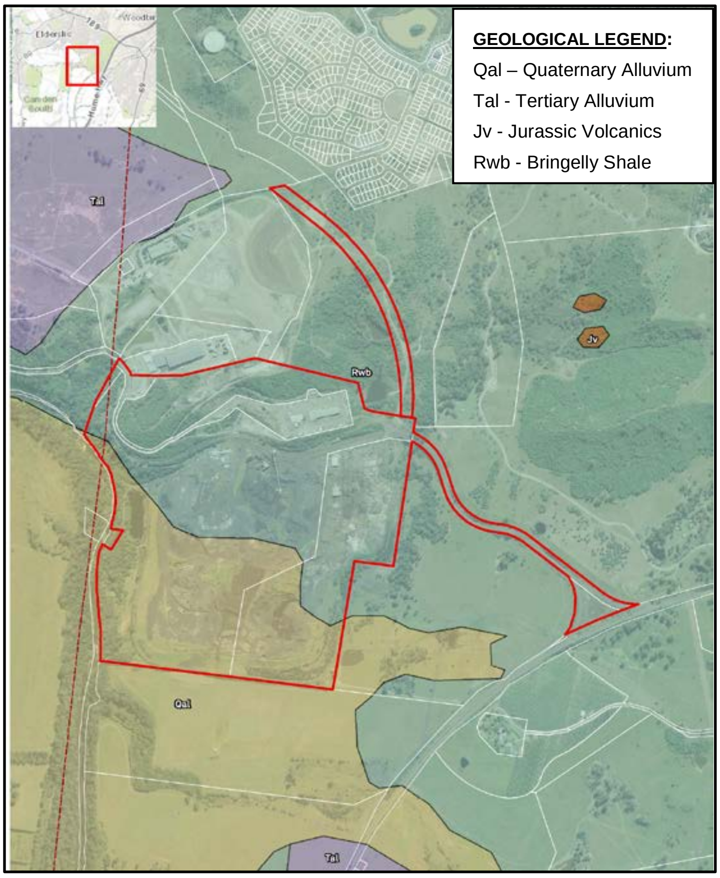


Figure 5: Site Geology (Wollongong - Port Hacking 1:100 000 Geological Map Sheet 9585)

The Quaternary alluvium, residual soil and Bringelly Shale have not been subject to detailed subsurface examination in investigations to date, however, the descriptions of these units can be found in the report by Consulting Earth Scientists (CES, 2005) in which they describe the alluvium and residual soils together as very stiff, orange brown sandy (fine to medium grained) clay, with moisture content below the plastic limit.

3.2.2 Existing Fill

Much of The Precinct is overlain by fill consisting of coarse reject and tailings arising from the coal washery's former activities. This material comprises sequences of soft sandy silt and very loose to loose deposits of sandy gravels covered in places by a thin silty clay topsoil. The filled area extends to the eastern and southern limits of The Precinct and is bound to the west by the Nepean River and to the north by the existing railway spur (the *Glenlee Colliery Siding*) off the Main South Up Line.

3.2.3 Perimeter Embankments

Douglas Partners (2008) state that emplacement (of coal washery reject) is generally contained by a perimeter earthfill embankment constructed on the eastern, southern and western sides. The height of the embankment is between 10 m and 23 m. Internal embankments were also constructed and either added to or removed depending on the operations of the time, which varied between wet and dry emplacement methods.

Coffey Geosciences (2005) adds that:

- The western and southern embankments are approximately 600 m long
- The eastern embankment is approximately 850 m long
- The embankments are typically battered at 2H:1V to 2.5H:1V
- The faces of the embankments are generally vegetated with grasses, however such cover is sparse or absent on some sections of the southern and western faces
- Upper faces of embankments consist of loose coarse reject with little or no grass cover

The embankment slopes vary, with sections in the northern part of the eastern embankment being relatively gently sloped at 4.5H:1V.

Coffey and CES reported that the loose fill is eroding on the batter slopes with minor gully erosion on all batters. More prominent erosion gullies have been observed up to four metres deep in places. These larger gullies are producing loose fan deposits of sediment at the toe of the batters. Coffey (2005) noted evidence of tension cracking at a few locations along the down-slope edge of the core berm. However, neither such deep erosion gullies nor tension cracks could be located on site during the recent geotechnical site inspection carried out by AECOM Geotechnical Engineers on 7 February 2014. The following observations were made based on the current condition at each embankment:

Western Embankment

- Measured batter slopes were up to approximately 2(H):1(V), see Plate 1;
- Minor surface erosion scars and rills were observed near the crest of the embankment. These were approximately 200 mm deep, 150 mm wide and 2 to 3 m long
- Erosion scarps up to 1 m high were visible at the base of the upslope on the existing slope bench (see Plate 2)
- The embankment material visible at the surface comprised fine to coarse grained sands and fine grained angular gravels
- The face of the embankment is generally vegetated with grass, however, some bare patches were observed

Plate 1: General View of the Western Embankment

Plate 2: Close up view of existing erosion scarps

Southern Embankment

- Two intermediate benches, approximately 5 m wide, were observed , see Plates 3 and 4;
- Measured batter slopes were up to approximately 3(H):1(V)
- The existing down slope (below the lower bench) is covered by dense vegetation / shrubs. The upslope (above the lower bench) is generally vegetated with grass and mulching materials;
- The embankment material visible at the surface comprised fine to coarse grained sands and fine grained angular gravels;
- Signs of a shallow slip surface (or possibly backfill of a previous erosion scar) was noted at the upslope (above the lower bench), see Plate 4.

Plate 3: General View of the Southern Embankment – Upper Bench

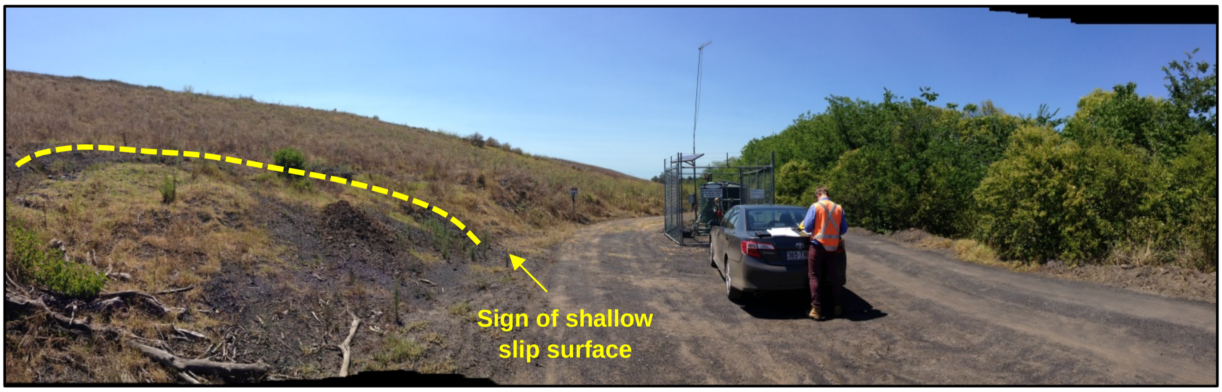


Plate 4: General View of the Southern Embankment – Lower Bench

Eastern Embankment

- The majority of the batter slope was measured to be about 3(H):1(V) and the conditions were similar to the Southern Embankment at the time of inspection, see Plate 5
- A localised section near the northern section was measured up to approximately 1.5 (H):1(V), see Plate 6
- This localised section has sparse vegetation coverage with patches of bare earth visible and appeared to include green waste and general waste, see Plate 7
- Evidence of a shallow slip surface (or possibly backfill of a previous erosion scar) was noted upslope of the slope bench.

Plate 5: General View of the Eastern Embankment - taken from the Southern end

Plate 6: Eastern Embankment – a localised section near the Northern end

Plate 7: Eastern Embankment - Close up view of the embankment surface materials - taken at the Northern end

3.2.4 Subsurface Conditions and Preliminary Design Ground Model

A preliminary design ground model has been developed based on the subsurface information collected from borehole (BH), test pit (TP) and cone penetration test (CPT) investigations, published geological records, together with observations made on site. These indicate that the ground conditions at the site typically comprise four major units - fill, alluvial soil, residual soil and bedrock.

Based on the results of the intrusive investigations undertaken by DP across the emplacement area, the preliminary design ground model comprises coal wash rejects of various strength, consistency and composition to depths of up to 25 m. This material is underlain by alluvium and residual soils that typically increase in strength with depth until rock is encountered (up to approximately 40 m depth).

Appendix A presents the geotechnical cross-sections, together with a test location plan (DP 2016), that graphically represent and support the ground model developed for the site.

- Three geotechnical cross-sections (A – A’ to C – C’) show the inferred subsurface conditions across the emplacement site, including soil type, soil consistency / density, soil and rock interfaces, groundwater levels and general geological origin of the materials (i.e. – fill / natural ground / rock)
- The test location plan presents the location of exploratory tests (BH, TP and CPT) undertaken to-date at the site by DP, together with the alignment of the interpretive geotechnical cross-sections

Additional details of the subsurface conditions and ground model are summarised below.

Fill

Episodes of material emplacement over time have led to variable sequences of coal reject fill comprising loosely to moderately compacted coarse rejects, soft / saturated fine grained coal tailings and clay capping layers to depths of up to approximately 23 m (DP 2013).

Previous investigations carried out in 2007 and 2011 indicated a significant variability in soil strength. Such heterogeneity is not unexpected given:

- length of time and breadth of area over which the emplacement has taken place
- day-to-day variance in material types
- alternating wet and dry emplacement methods

Table 2 presents the results of the laboratory testing carried out by DP (2016) to establish the physical properties of the coal wash rejects.

Table 2: Laboratory Test Results Summary - Physical Properties

Parameter	Test Result
Liquid Limit (%)	25 – 35
Plastic Limit (%)	17 – 25
Plasticity Index (%)	17 – 15
Linear Shrinkage (%)	4 – 8
CBR (%)	9 – 35
Cohesion (kPa)	20[1]
Angle of Friction (degrees)	36[1]
Maximum Dry Density (t / m^3)	1.65 – 1.90
Optimum Moisture Content (%)	9 - 11

Note: 1 - As measured in Direct Shear.

A summary of the chemical test results undertaken by DP (2016) is provided in Table 3. Major element chemical composition is presented in Table 4, with a detailed ash analysis given in Table 5.

In addition to available published data, environmental test results collected by Douglas Partners and BHP Billiton - Illawarra Coal (producers of coal wash rejects primarily through the Dendrobium and West Cliff washeries) have found coal rejects to be slightly alkaline, containing relatively low levels of heavy metals and with low sulphur concentrations.

Accordingly, the presence of these fill materials does not preclude the site from re-zoning or future development.

Table 3: Summary of Chemical Test Results (Douglas Partners, 2016)

Analysis	Unit	Test Results	
		Range	Mean
Combustibles	% Dry Weight	26.9 – 34.8	27.7
Mercury	mg / kg	0.1 – 0.5	0.2
Cadmium	mg / kg	0.1 – 1.0	0.2
Lead	mg / kg	12 – 76	16.5
Arsenic	mg / kg	<4 – 11.4	4.8
Chromium	mg / kg	<1 – 55	3.6
Copper	mg / kg	10 – 46	14.3
Nickel	mg / kg	3 – 28	2.7
Selenium	mg / kg	<2 – 5	1.1
Zinc	mg / kg	19 – 90	42.0
Electrical Conductivity	Ds / m	0.07 – 0.78	0.19
Total Sulphur	%	0.1 – 0.4	0.16
Calorific value	Kcal / kg	1596 – 2200	1887
pH		7.0 – 10.4	9.7
Total Ash Content	%	66.1 – 71.9	68.3

Table 4: Summary of Major Element Chemical Composition (Douglas Partners, 2016)

Ultimate Analysis	% (by weight)
Carbon	24.33
Hydrogen	1.90
Sulphur	0.23
Nitrogen	0.55
Phosphorus	0.02

Table 5: Summary of Ash Analysis (Douglas Partners, 2016)

Chemical Composition	Total (%)
SiO_2	65.0
Al_2O_3	24.1
Fe_2O_3	6.5
CaO	0.4
MgO	0.7
Na_2O	0.3
K_2O	1.2
T_2O	0.7
Mn_3O	0.2
P_2O_5	0.1
SO_3	0.2
BaO	0.1
SrO	0.02
ZnO	<0.02
V_2O_5	<0.02

Alluvial Soils

Limited investigation has been completed in the alluvium, however, the available data indicates that the alluvial material predominantly comprises clays and silts ranging in strength from soft to hard, but typically firm to stiff.

Residual Soils

Limited investigation has been completed in the residual soil, however, the available data indicates that these comprise predominantly stiff to very stiff clays.

Bedrock

Limited investigation has been completed within the bedrock (Bringelly Shale). Rock levels have been inferred based on CPT refusal depths which vary from 8 m to 43 m below ground level. Recorded rock levels are extremely variable, however, and appear to fall in a south to south easterly direction, with locally elevated levels in some areas.

3.2.5 Preliminary Slope Stability Analysis

Preliminary slope stability analyses have been undertaken to provide some indicative information on the global stability of the existing embankments.

Based on a review of the proposed final contour plan prepared by SMEC Urban Consulting Group in March 2014 (reproduced in Appendix A), and site observations undertaken in Feb 2014, the highest embankments and steepest embankment slopes were identified around the Western Embankment and Southern Embankment respectively.

On this basis, three representative cross-sections (two at the Western Embankment and one at the Southern Embankment) were selected for slope stability analysis. Refer to the contour plot attached in Appendix B. The subsurface profile at each of the respective cross-sections has been inferred from the nearest available CPT locations, previously undertaken by DP.

For the purpose of the slope stability analysis, the groundwater table was assumed to be at one third of the embankment height to simulate a localised perched groundwater table.

The propriety geotechnical computer software Slope/W was used to assess the critical factor of safety (FoS) of the embankment slopes. The graphical analysis output results are enclosed in Appendix B. The adopted parameters for each soil type are presented in Table 6. The assessed FoS against global slope stability for each geotechnical model is summarised in Table 7 .

Table 6: Summary of Soil/Fill Properties adopted for Slope Stability Analyses

Material Description	Unit Weight, γ (kN/m^3)	Cohesion c' (kPa)	Angle of Friction Ø' (degrees)
Southern Embankment			
FILL – Clayey Sand	19	0	35
FILL – Silty Sand	18	0	30
FILL – Sandy Silt	18	0	28
Silty Sand (L – MD)	18	0	32
Silty Sand (L – MD)	18	0	28
Clay (F – VSt)	19	3	28
Organic Clay (St – H)	19	5	28
Western Embankment – Northern Section			
FILL – Coarse Granular	18	0	35
FILL – Coarse Granular	20	0	32
Silty Clay	19	3	28
Clay	20	5	28
Western Embankment – Southern Section			
FILL – Silty Sand	20	0	32
FILL – Organic Clay (S – St)	18	4	25
FILL – Organic Clay (VS)	18	2	25
FILL Silty Clay (VSt – H)	19	3	28
Clay (F – St)	19	3	28

Table 7 Summary of Assessed Critical Slip Surfaces

Assessed Geotechnical Section	Reference Geotechnical CPT Results	Minimum Allowable FoS for Global Slope Stability Analysis	Calculated FoS for Global Slope Stability Analysis	
			Potential Shallow Slip (<1m deep)	Potential Deep-Seated Slip (>1m deep)
Western Embankment – Northern Section	CPT02 (DP Project 40950.00)	1.5	1.411	1.607
Western Embankment – Southern Section	CPT104 (DP Project 40950.05)	1.5	1.523	1.576
Southern Embankment	CPT207 (DP Project 78371)	1.5	1.586	1.655

The results of the above embankment slope stability analysis indicate that the existing embankment slopes are generally acceptable with respect to the current design standard FOS of 1.5. However, this preliminary slope stability analysis was undertaken based on limited existing geotechnical data, and with the assumption that there was no additional surcharge applied at the slope crest.

Hence, the assessed FoS should be considered preliminarily and for indicative purpose only. Further detailed engineering assessment shall be carried out to confirm the embankment stability at the next stage of the project. This will enable taking account of the proposed development layout, the design loading conditions and any other relevant geotechnical investigation records.

The referenced CPT results are enclosed in Appendix B of Appendix D. A supporting test location plan (DP 2016) is provided in Appendix A of Appendix D.

3.2.6 Preliminary Settlement Analysis

Settlement analysis of the emplacement area has been undertaken by DP to assess the rate and magnitude of potential settlements. The settlement analysis has been based on the results of the CPT and CPT_U testing carried out at the site and included in Appendix B of Appendix D.

Pore pressure dissipation tests were undertaken during the CPT_U testing mainly in the upper fine grained filling materials, however, some tests were also undertaken in deeper natural clay layers. In general, pore pressure dissipation was monitored until at least 50% reduction in the excess pore pressure was achieved, relative to the peak pore pressure observed. Following completion of each CPT and CPT_U test, the remnant cone hole was dipped to measure the depth to the water table at the time of testing (DP 2016).

The cones and monitors used during the investigation are purpose built and calibrated by A.P Van Den Berg, and specified in accordance with EN ISO 22476-1 (Douglas Partners 2016). The accuracy of recording the typical parameters is presented in Table 8.

Table 8: Accuracy of A. P Van Den Berg

1000 m^2 Cone	Nominal MPa	Maximum MPa	Accuracy Class 2	Accuracy Class 1
Tip Resistance (q_c)	75	150	100 kPa or 5 %	35 kPa or 5 %
Local (sleeve) Friction (f_s)	1	1.5	15 kPa or 15 %	5 kPa or 10 %
Pore Water Pressure ($_U$)	2 or 10	3 or 15	25 or 3 %	10 or 2 %
Inclination (I)	20°	25°	2°	2°
Depth			0.1 m or 1 %	0.1 m or 1 %

All CPT traces were reviewed by a DP geotechnical engineer as the CPT was pushed, then again by the reporting engineer when the soil behaviour type was determined using Robertson's normalised charts.

The data recovered using the CPT equipment is considered suitable to provide an assessment of the variable materials encountered on the coal washery rejects site. Further details of the CPT equipment, means and methods are provided in Appendix A of Appendix D.

In order to model the settlement characteristics of the emplacement area, DP (2008) divided the area into three zones (refer to Appendix C), based on the investigation findings. A preliminary review of the additional investigation data suggests that this division of the site is reasonable.

These three zones consist of:

- Zone A (West) - primarily tailings and coarse reject
- Zone B (West) - primarily coarse reject
- Zone C (East) - primarily coarse reject but with a greater thickness of underlying alluvium

To estimate the settlement potential of the variable subsurface conditions, DP calculations were based on the specific ground conditions encountered at each CPT test location, together with the respective material properties derived from laboratory testing. The material parameters used in the calculations are presented in Table 9 for the 2008 report and Appendix D of Appendix D for the 2011 report. Tables 10 to 12 summarise the settlements anticipated based on the additional filling and final industrial loads detailed in the previous DP reports (as outlined in DP 2015 and DP 2016). The detailed results from the 2011 report are reproduced in Appendix D of Appendix D.

Table 9: Site Models used during Settlement Analysis (Douglas Partners Project 40950, 14 March 2008)

Zone	Description	Strata	Depth (m)	E (MPa)	M_v (m^2 / MN)
A	West Area with Tailing Beds CPT 5 and 10 (SADA)	Coarse Reject	0 – 2	10	0.080
		Tailings	2 – 4	1.5	0.533
		Coarse Reject	4 – 7	12	0.067
		Tailings	7 – 11	1.5	0.533
		Coarse Reject	11 – 12	15	0.053
		Tailings	12 – 14	2	0.400
		Coarse Reject	14 – 18	12	0.067
		Tailings	18 – 20	2.5	0.320
		Stiff Clay	20 - 34	8	0.100
B	West Area with only Coarse Reject CPT 7 and 9 (SADA)	Dense	0 – 1	12	0.067
		Very Loose	1 – 3	5	0.160
		Dense	3 – 7	10	0.080
		Loose	7 – 9	8	0.100
		Dense	9 – 20	15	0.059
		Firm to Stiff Clay	20 – 29	6	0.133
		Stiff Clay	29 – 35	12	0.067
C	East Area CPT 7 and 12 (CAMDEN)	Medium Dense	0 – 1	15	0.050
		Very loose	1 – 3	3	0.133
		Loose	3 – 6	9	0.073
		Medium Dense	6 – 12	15	0.050
		Loose	12 – 22	12	0.067
		Firm to Stiff Clay	22 - 25	7	0.114

Table 10: Estimate of Time – Consolidation Relationship (Douglas Partners Project 40950, 14 March 2008)

Zone	% Consolidation	Consolidation Settlement under Filling Loads and Typical Long Term Industrial Loads (mm)	Time (years) without Surcharge or other Consolidation Acceleration Techniques
A	10	85	0.15
	20	170	1.8
	25	213	2
	50	425	7
	90	765	30
B	10	45	0.1
	20	90	0.8
	25	113	1
	50	225	3
	90	405	10
C	10	28	0.2
	20	56	0.8
	25	70	1
	50	140	4
	90	252	25

Table 11: Summary of Settlement Calculations (Douglas Partners Project 40950.05 Draft, 20 April 2011)

CPT	Initial Filling Depth (m)	Estimated Additional Settlement under Filling and Industrial Loads (mm)	Time for 90% Settlement No Surcharge (years)	Time for 50% Settlement No Surcharge (years)	Depth of Surcharge required to achieve 90 % Settlement in 2 Years (m)	Settlement under 5 m Surcharge for 2 Years (mm)
101	5.3	41	0.5	0	0	68
102	13.0	91	15	1	9	70
103	2.9	32	1	0.2	0	66
104	10.3	966	10	3	13	618
105	9.6	561	50	6	25	242
106	7.8	84	20	1.5	5	74
107	9.4	257	25	1.5	8	194
108	7.1	493	40	3	12	305
109	9.8	283	20	1.5	5.5	243
110	18.6	25	1	0	0	300

Table 12: Summary of Settlement Calculations (Douglas Partners Project 40950.05-2, 20 October 2011)

CPT	Initial Filling Depth (m)	Estimated Additional Settlement under Filling and Industrial Loads (mm)	Time for 90% Settlement No Surcharge (years)	Time for 50% Settlement No Surcharge (years)	Depth of Surchargerequired to achieve 90 % Settlement in 2 Years (m)	Settlement under 5 m Surcharge for 2 Years (mm)
216	8.47	70	10	0.2	3	64
217	2.67	50	15	2.5	5	42
218	1.67	110	40	2	3	120
219	0.02	170	40	3	2.5	250
220	3.02	850	20	5	10	478
221	-2.18 (cut)	0	0	0	0	0
222	3.37	20	1	0.2	0	NA

The results of the settlement calculations undertaken by DP vary. The calculated long term consolidation and creep settlements range from 25 mm up to approximately 1 m once the finished surface level is reached and typical industrial infrastructure and operating loads are applied. Surcharging to accelerate settlement and in effect, test load the development area is currently being trialled on site (DP 2016).

Results to date are variable, with up to 100 mm of settlement measured by settlement plates installed and monitored by DP. The results have not yet been analysed in detail by DP (DP 2016). Based on these results, the derived material parameters should be verified (or modified) for use during re-profiling and site improvement works on the rest of the site (DP 2015).

4.0 Impact Assessment and Management Strategies

4.1 Mine Subsidence

Longwall mining is a form of underground coal mining where a seam or body of coal is mined in a single slice (typically 1 m to 2 m thick). The longwall "panel" (the block of coal being mined) is typically 3 km to 4 km long. After removal of the block of coal, the roof of the panel is allowed to collapse. The collapse is seen at ground level as a surface subsidence.

In discussions between AECOM and the MSB, longwall mining is the likely method for extraction of coal beneath The Precinct.

Ground subsidence due to longwall mining is a geotechnical issue that has the potential to affect The Precinct. It is understood that underground mining that could impact The Precinct may not commence for several decades. Longwall-initiated settlement has occurred in the region, with varying impacts. Potential impacts of mining subsidence on future infrastructure and buildings in The Precinct may cause structural damage and require ongoing maintenance relating to ground movement.

4.1.1 Impact on Existing Operations

No current impacts from mine subsidence exist, as mining is yet to commence near The Precinct.

4.1.2 Impact on Proposed Development

If mining occurs, the ground subsidence due to longwall mining of coal beneath The Precinct may limit certain types of development of the area. The investment required to develop and utilise the site prior to mining commencing may be recovered during this initial period, but this would be subject to a cost-benefit and risk analysis outside the scope of this assessment.

Mining may be excluded from beneath or near The Precinct, however, and on this basis, the potential impacts have been considered against two scenarios, as follows:

Mining Proceeding Beneath The Precinct

The MSB has advised that any development of the area, not subject to the recommendations of the Working Group set up in 2005 by the Planning Minister, would need to accommodate the site specific design parameters listed below in the event that longwall mining occurs in zones that could adversely impact The Precinct.

The engineer will need to demonstrate that building components have been designed to cater for predicted subsidence parameters of:

- Up to 1550 mm anticipated subsidence;
- Up to 2.5 mm/m ground strain;
- Up to 6 mm/m tilt; and
- Potential radius of curvature of 10km

Potential subsidence resulting from the longwall mining will be unpredictable in terms of the timing of the subsidence and the possibility of incremental subsidence occurring over subsequent years in both the vertical and horizontal planes.

Mining Excluded Beneath The Precinct

Mining may be excluded from beneath The Precinct under two scenarios:

1. DoP may determine that the social benefit of the development outweighs the benefits to be gained from mining. This is similar to the precedent set for the mining of coal beneath Narellan. It is understood that mining may still occur in the vicinity but at a reduced intensity, or only tunnelling might occur. It should be noted that some degree of subsidence (up to 200 mm) is anticipated due to mining beneath the Narellan Town Centre. While this scenario may not preclude development, management of the site for subsidence will still be required.
2. The scenario where a ban on mining exists beneath the Nepean River with a yet-to-be-determined buffer zone around the Nepean River. Given the proximity of The Precinct to the Nepean, this area could fall within the buffer zone. In this scenario, management may consist of revised design parameters to be

determined for a development occurring adjacent to, but not directly above longwall mining influence zones.

4.1.3 Management Plan – Mine Subsidence

Mine subsidence within The Precinct will be primarily managed and mitigated through engineering solutions or by the selective exclusion of mining.

On the basis of well-established subsidence mitigation practices, engineering solutions will likely consist of:

- Selection of appropriate types of development
- Selection of building materials and building styles that would best cope with subsidence
- Ongoing monitoring and maintenance

The MSB has adopted the following surface development guidelines subject to these improvements being erected on reinforced concrete footings and/or slabs that comply with AS 2870. The following improvements are limited to a maximum length of 30 m and maximum width of 18 m:

1. Single or two storey timber or steel framed improvements clad with weatherboards or other similar materials.
2. Single or two storey brick veneer improvements.
3. Full masonry and other types of improvements will be considered under the Board's 'Graduated Guidelines for Residential Construction'. The improvements will be subject to length restriction and may require engineering design.

Any structure not meeting these guidelines will require an engineering certification to demonstrate that the building components cater for the predicted subsidence parameters in Section 4.1.

4.2 Geotechnical

4.2.1 Impact on Existing Operations

The Precinct is suitable for continued current land uses; coal preparation and emplacement of reject. There are few geotechnical hazards associated with the current conditions. The embankments of the coal washery reject require maintenance, stabilisation and mitigation of current erosion processes. Continuation of these processes may result in reduced slope stability, environmental harm due to increased silt run-off and incremental loss of developable land.

4.2.2 Impact on Proposed Development

4.2.2.1 **Earthworks**

In order to achieve the concept design surface levels for the emplacement area, between 2 m and 11 m depth of fill will be required and cuts of 1.5 m and 3.5 m made in the south-west and north-east corners, respectively.

The southern platform section of the proposed development is dominated by the emplaced coal washery reject material. The emplaced material presents variable settlement constraints to the industrial precincts and will affect any infrastructure placed on the site including roads, underground services and any permanent building constructed on the emplacement platform .

Settlement estimates indicate that the total consolidation is variable and in areas underlain by former ponds containing deep fine grained sediment could result in total settlement at the surface of the emplacement in the order of 1 m under the new embankment loads and final working loads (DP, 2011).

It will be necessary to improve the engineering properties of the loose and irregularly consolidated fill to minimise and control the adverse effects of differential settlement on infrastructure and the development. This is required if The Precinct is to be made suitable for long term development, prolonged loading and traffic. In the absence of ground improvement works the platform will settle variably as the new filling is placed and new development working loads applied. Such settlement, if not addressed, will affect any structures such as warehouses, pavement and other linear structures, possibly rendering the site unsuitable for the proposed use.

The alluvium that underlies the southern part of The Precinct is also subject to settlement. The susceptibility of the alluvium to settlement is less than that of the body of washery reject; however, has similar impacts on the development.

Residual soils derived from weathering of the Bringelly Shale would be expected to exhibit reactive and dispersive behaviour if present at / or near to design level. Due to the depositional environment of the Bringelly Shale, groundwater would be expected to be slightly saline, but comparatively lower than sites underlain by the more transitional Ashfield Shale.

Given the proposed landform, the likelihood of exposing significant areas of the Bringelly Shale is low; however, if present, would most likely be encountered in the north-eastern corner of the Precinct.

4.2.2.2 Embankment Slopes

Non-engineered fill material present at some of the slopes is undesirable for permanent development due to its unknown, variable and unpredictable nature. It will be necessary to investigate the areas of fill during the planning and design phases of the development and to locate structures such that they are not founded within these materials. Remediation would involve localised ground improvement, drainage measures and / or slope regrading.

4.2.2.3 Pavements and Foundations

It is anticipated that new pavements will be required between proposed buildings to provide site access. In areas of proposed pavements, treatment of poorly compacted fill may be required to provide a suitable sub-grade.

Flexible pavements built for lighter traffic loads are appropriate for the emplacement area following adequate consolidation. Heavy or rigid pavements designed for forklifts, container storage or gantry cranes are susceptible to damage due to settlement related deformation and therefore may not be suitable for the Precinct.

Shallow foundations within uncontrolled fill material should be designed in accordance with AS2870 adopting site class P at this stage.

4.2.2.4 Proposed Landform

The proposed land profile across the emplacement area is represented by SMEC Drawing No. 67844.29.P01 (refer Appendix A). The profile indicates approximately 8 m of relief across the proposed development area, bounded by earthfill embankments up to 20 m high to the south, east and west. The embankment slopes range between 2(H):1(V) to the west and 3(H):1(V) to the east.

Due to the proposed land profile and likely spatial extent of paved areas within the Precinct, particular attention to surface water management will be required to effectively drain the site and minimise excessive surface flows down the embankment slopes.

4.2.2.5 Environment

The coal rejects are considered to be chemically benign and pose no contamination risk to the environment or to public health. The results of the environmental assessment indicate that the coal wash has a low potential to generate acid, and any surface water which may infiltrate through the emplacement material (coal rejects) to the groundwater system is unlikely to pose a risk to surface water quality in the Nepean River.

Current literature also indicates ignition temperatures for coal wash is greater than 200°C. Laboratory testing indicated ignition temperatures of around 210°C for coal wash compacted to 75% standard (i.e. very low compaction with high air voids), and up to 430°C for coal wash compacted to 100% standard (i.e. compaction to a standard acceptable for construction sites with low air voids). Ignition temperatures of this magnitude mean that temperatures within the coal wash mass must be (almost unrealistically) high to initiate spontaneous combustion (DP 2016). Further detail on combustion analysis carried out by CB3 for DP on selected samples is provided in Appendix E of Appendix D.

4.2.2.6 Seismic Conditions

The liquefaction or significant soil strength reduction caused by cyclic loading would be a potential issue during earthquake events depending on the depth of groundwater in relation to liquefaction susceptible materials. The sudden loss of support strength may result in significant movements of utilities and surface structures. Preliminary analysis undertaken by DP of liquefaction potential based on CPT results is provided in Appendix G of Appendix D. The variably compacted emplacement fill area and other areas of relatively soft foundation materials would likely be subject to extensive ground improvement works prior to commencement of the site development works which would reduce the risk of liquefaction related damage. The ground improvement works may comprise as an example those techniques outlined in Section 4.2.3 below.

Improving the strength and stiffness of the foundation materials would also mitigate the potential effects caused by seismic loading. Therefore the potential risk associated with seismic loading is considered to be primarily a design requirement and would not be considered as placing a constraint on the eventual layout of the development.

4.2.3 Management Plan - Geotechnical

It is anticipated that geotechnical impacts or constraints within The Precinct can be managed and mitigated by ground treatment and appropriate zoning and planning of the development.

4.2.3.1 Earthworks

Where the site surface level is below design level conventional earthworks should be carried out to raise the site to design levels. DP (2011) describes a site filling methodology using coarse reject materials. This process should include a capping layer of controlled granular filling at least 2 m thick over the site to assist in mitigating the effects of differential settlement due to the underlying variable fill and deep soft alluvial sediments.

Filling operations should be carried out under Level 2 geotechnical supervision to the requirements of AS 3798 "Guidelines on Earthworks for Commercial and Residential Developments".

It is necessary to stabilise the loose and irregularly consolidated fill in the emplacement area. The following ground improvement methods may be considered to stabilise the emplacement area:

- Excavate and replace
- Surcharging
- Surcharging with vertical wick drains
- Vibroflotation
- Dynamic compaction
- Dynamic replacement

4.2.3.2 Excavate and Replace

The “excavate and replace” method requires the removal of problematic materials and replacement with compacted engineered fill. It is very effective for ground stabilisation; however, it is not practical for areas where unsuitable material extends to significant depths. The cost depends on the volumes involved, depth from which it is necessary to recover the unsuitable material, price and availability of a suitable backfill and the costs of disposal of the excavated unsuitable material. Excavate and replace is unlikely to be a cost effective treatment for the area as a whole. It is expected to be suitable for any discreet areas of poor material. The coarse granular washery reject material may be a suitable backfill material.

4.2.3.3 Surcharging

Surcharging involves the application of a predetermined amount of fill to induce and / or accelerate settlement as a function of its weight. The technique is more effective in fine grained materials. It is a relatively inexpensive method of ground improvement but can be a protracted technique that requires time of a number of months up to several years to achieve the desired settlement. It is understood that durations of this order are not a constraint to development.

Investigation and analysis completed by DP (2016) indicates that the height of surcharge required to achieve 90% consolidation in 2 years is generally less than 6m, with 50% of projected settlement typically reached within 2 to 3 years. Construction of a surcharging trial is currently in progress.

4.2.3.4 Surcharging with Vertical Drains

Using the same methodology as surcharging, vertical, perforated or slotted drains are installed to the depth of compressible material to increase the rate of dissipation of pore pressures. This accelerates the overall consolidation within the deposit. Vertical drains increase the cost of ground improvement. DP (2008) consider that vertical drains would be suitable within Zone A and possibly Zone B (refer to Appendix C). Where coarse grained and relatively free draining fill requires consolidation, the application of vertical drains would provide minimal benefit.

4.2.3.5 Vibroflotation

Vibroflotation involves penetrating poorly consolidated ground with a vibrating probe. The vibration of the probe causes rearrangement and consolidation of the soil particles into a more dense state. The method can achieve improvement at depths of up to 20m to 25m and is most appropriate in coarser grained materials. It is generally not as effective in materials with greater than 20% fines. This is an effective albeit more expensive ground improvement technique compared to surcharging, but achieves much quicker results.

4.2.3.6 **Dynamic Compaction**

Dynamic compaction involves dropping a large weight from height (a crane) in a number of passes over the entire area requiring compaction. Alternatively, rolling dynamic compaction (RDC) involves towing a heavy non-circular drum which impacts the ground as it progresses. These methods will achieve compaction quickly and effectively, however the depths for which it is effective are limited.

The method is unsuitable for areas of shallow groundwater; however, this is not expected within the emplacement area. The crane method (and to a lesser extent the RDC method) is more expensive than surcharging and requires additional measures to stabilise embankment slopes, including the formation of working platforms to gain access to sections of the fill. Vibration induced by the compaction effort can be a potential source of nuisance to people or damage to surrounding structures.

Impact rolling will not significantly reduce the magnitude or duration of the long term settlements where these are mainly governed by the deep layers of soft soil, located well below the zone of influence of the impact roller.

DP (2011) has undertaken a rolling dynamic compaction trial to assess suitability of the method for compaction of the emplacement. The trial indicated that significant modulus increases in the upper 1 m of the coalwash were achieved. This indicates that the method is suitable for preparing a working platform on the emplacement for constructing the capping layer and could be used to target sensitive areas beneath structures and in areas where no engineering fill is to be placed.

4.2.3.7 **Dynamic Replacement**

Dynamic replacement differs from dynamic compaction in that compaction zones are spaced apart either as linear passes or as a patchwork pattern in which soil is compacted and the void/depression backfilled with engineered fill in order to create pillars of improved material. This technique increases stability to slightly greater depths than dynamic compaction and is a relatively quick method of ground improvement. It is not suitable for embankments and is typically more costly than dynamic compaction.

4.2.3.8 **Recommendations**

It is recommended that the existing loose non-engineered fill near the surface is compacted using dynamic compaction methods. This will create a suitable working platform for the placement of engineered fill.

A capping layer of controlled granular fill at least 2 m thick should be placed over the site to assist in mitigating the effects of differential settlement due to the underlying variable fill and deep soft alluvial sediments.

New fill shall be placed in layers and compacted in accordance with the following methodology developed by Douglas Partners (2011).

- Inspect and test roll all areas to be filled and nominate areas that may need remedial works. At least 2m of engineered fill must be placed over the existing emplacement.
- Where weak subgrade conditions are present, excavate and replace with a minimum 500 mm thick coarse reject bridging layer.
- Placement of coarse reject in layers not more than 300 mm loose thickness compacted to a dry density ratio of 98% relative to standard compaction (AS 1289 5.1.1). Moisture contents should be maintained within the range OMC ± 2% (where OMC = optimum moisture content for standard compaction).

Testing should be carried out under geotechnical control to the requirements of AS 3798 “Guidelines on Earthworks for Commercial and Residential Developments” for Level 2 testing.

Soft soils, where encountered, should be surcharged to achieve settlement targets. As the investigation locations with the greatest expected settlements are located in the south section of the site it is recommended that a zoned approach be taken to the surcharging and filling operations with surcharging to be progressed in this area first.

In order to reduce material handling, uncompacted coarse reject materials used for site filling may be used as surcharge material. It is recommended that a staged approach be adopted where once the surcharging on site is completed, the surcharge material is used for the final site filling at a location where surcharging is not necessary.

Installation and monitoring of settlement plates must be undertaken during the surcharging of the emplacement to inform the duration and ensure that the desired settlement is achieved. These should be installed at different levels in the fill. Continued monitoring after the removal of the surcharging is recommended to confirm the performance of the fill material.

To minimise the potential for uncompacted surcharge to be exposed on the surface once the surcharge material is removed, the design levels for the top of the engineered fill, should include a provision for the maximum amount of long term settlement expected in each area.

The preloading trial (currently being monitored) by DP (2016) will better inform design and ground improvement recommendations.

Investigations of the extent and properties of the alluvium and residual soils will be required in order to inform detailed development planning efforts. The stabilisation methods for the fill materials are also applicable to the alluvial and residual soils.

If Bringelly Shale is encountered, select construction materials and foundation design may be required to mitigate the effects of expansive soil behaviour, and preventative soil erosion measures during construction may be required.

4.2.4 Drainage System

A well planned and comprehensive drainage system must be installed, especially in the emplacement and shallow fill areas of the Precinct. The drainage system will serve to manage potential risks associated with the environmental and engineering issues across the development. The drainage system should be configured to:

- Efficiently manage the perched water table and any recharge
- Be designed and constructed to limit slope erosion, run off and loss of debris from the site
- Form part of the integrated water cycle

Stormwater should be reticulated offsite with appropriate dissipation devices in place to minimise significant erosion at the point of discharge.

4.2.5 Embankment Slopes and Proposed Landform

Where shallow creep and slump flow movement is encountered, it is expected that such areas would be successfully remediated through the implementation of various drainage measures, slope regrading, and erosion protection.

The embankment slopes of the reject emplacement area should also be locally stabilised, including erosion prevention. The ground improvement recommendations of the emplacement fill will improve any potential global stability issues .

Improvement of drainage to reduce erosion and assist in stability is best achieved by:

- Installation of drains at the crest and toe of the slope
- Benching the slope and installing drains at the toe of the benches

The slopes should be dressed with topsoil and hessian matting (or similar) and revegetated in accordance with a vegetation management plan to eliminate or minimise erosion and to reduce maintenance requirements.

4.2.6 Pavements and Foundations

The capping layer and rectification works should provide sufficient support for pavements and lightly loaded flexible structures such as light industrial buildings.

Specific testing of the pavement subgrade soils must be carried out to allow detailed design of new pavements.

Heavily loaded, settlement sensitive structures may need to be piled to the underlying natural soil or rock strata. Piles are driven or augered through sub-optimal material in order to avoid the effects of settlement. If undertaken over broad areas piling is costly. In the case of piling through loose material, complex issues arise associated with both vertical and lateral movements imposing significant loadings on the piles.

4.2.7 Environmental

Where earthworks are to be carried out, appropriate dust control measures will be required to limit airborne concentrations of SiO_2.

5.0 Summary and Conclusions

5.1 Mine Subsidence Issues

The Precinct is located in the northern portion of the South Campbelltown Mine Subsidence District, adjacent to the Wilton Mine Subsidence District. The area is underlain by deep coal seams over which mining leases have been issued. No coal extraction has taken place to date nor is it planned for several decades. A potential conflict exists between possible urban and mining land use in the area. Development in The Precinct will require the approval of the Mine Subsidence Board (MSB) which has advised that approval would not be withheld subject to a number of engineering constraints relating to the potential impacts of mine subsidence being accounted for in the proposed development. The primary constraints include allowable height of structures, types of building materials and methods of construction. Items that will require MSB approval include: (a) subdivision of land; (b) multi-storey developments; (c) extensions to homes: and (d) building applications for new homes and structures.

Based on a review of coal mineral resources beneath the site and associated regulations:

- The possibility of mine subsidence is a potential constraint to development; and
- The impacts of mine subsidence can be managed through conventional engineering design measures.

5.2 Geotechnical Issues

The Precinct is located at the boundary / transitional zone between Bringelly Shale and Quaternary deposits including sand and clay alluviums. Much of The Precinct is overlain by fill consisting of reject and tailings arising from the coal washery's former activities. The filled area extends to the east and south limits of the Precinct and is bound to the west by the Nepean River and to the north by the existing railway spur (the *Glenlee Colliery Siding*) off the Main South Up Line. The emplacement is contained by a perimeter earthfill embankment constructed on the eastern, southern and western sides.

The primary geotechnical-related hazards are:

- long term and differential settlement; and
- erosion and slope stability of the existing fill embankments

Geotechnical impacts or constraints within The Precinct will be managed and mitigated by ground treatment and appropriate zoning and planning of the development.

The results of this assessment indicate that the redevelopment of the emplacement for commercial or industrial land use is considered feasible from a geotechnical perspective. Ongoing detailed geotechnical investigation and analysis will be required to confirm the earthworks methodology for the construction. Surcharging of the emplacement and soft soils is expected to be effective to achieve settlement targets. This combined with a compacted capping to the engineered fill will mitigate deferential settlements. Erosion and stability risks around the existing fill embankment slopes can be mitigated with the following potential engineering solutions:

- Installation of appropriate surface protection, drainage measures and vegetation;
- Replacement of loose fill with compacted engineered fill or rock fill or cement stabilised soil;
- Soil nail stabilisation;
- Various ground improvement schemes, including installation of mini-piles, soil cement / lime columns, grouting, dynamic compaction or displacement piles.

Appendix A

Douglas Partners Test Location Plan and Geotechnical Cross-Sections & SMEC Proposed Landform Profile

Locality Plan

0 20 40 60 80 100 150 200 300 400m

1:4000 @ A3

NOTE: Aerial image taken from nearmap.com

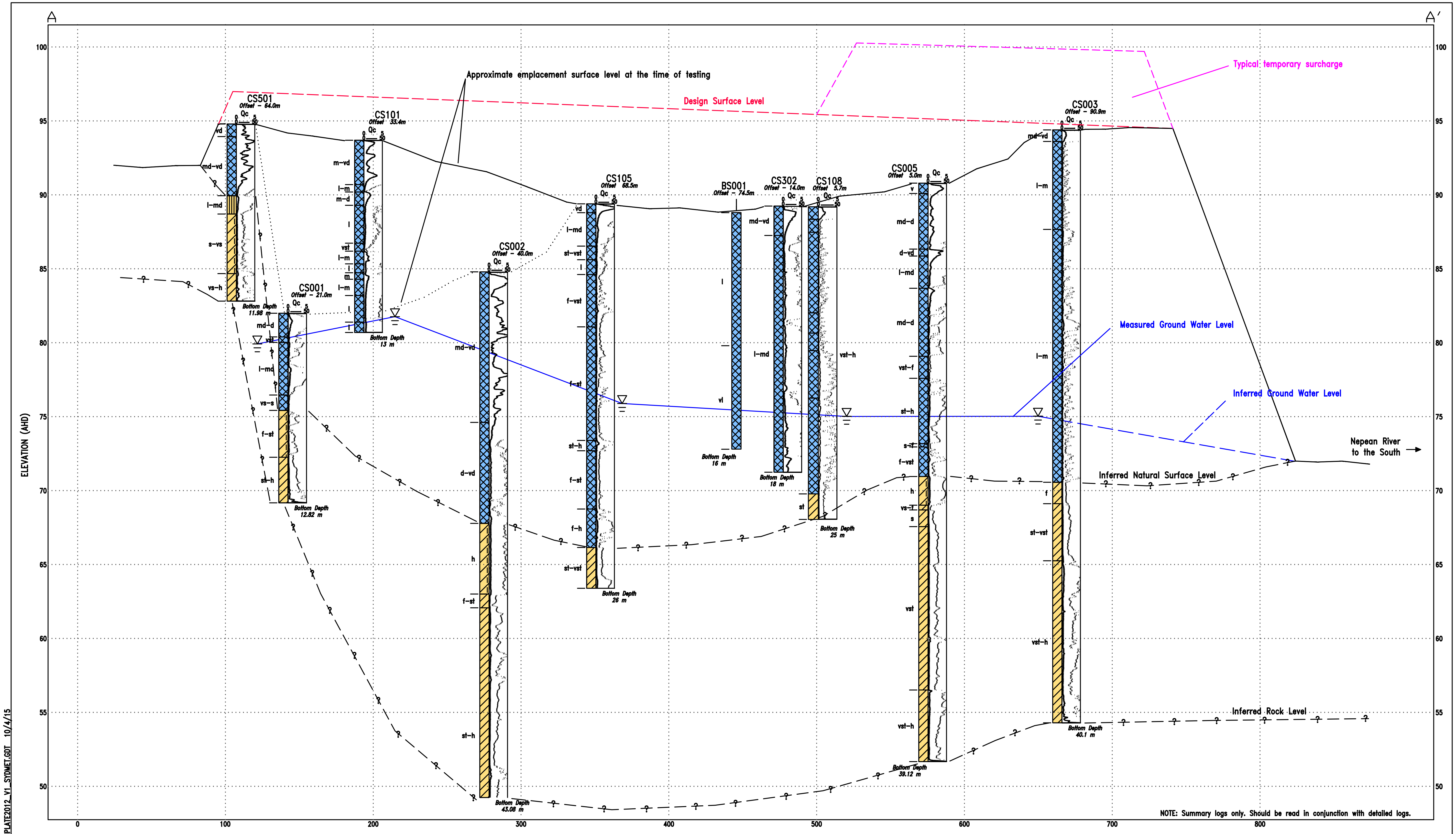
LEGEND

- Test Pit Location (DP Project 40950.09 dated November 2015)
- Test Pit Location (DP Project 40950.09 dated September 2015)
- Cone Penetration Test Location (78371)
- Test Pit Location (DP Project 78371.01 dated August 2012)
- Borehole Location (DP Project 78371.01 dated 2012)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.05)
- CPT Location (DP Project 40950.05)
- Borehole Location (DP Project 40950.01)
- CPT Location (DP Project 40950.00)
- CPT and Test Pit Location (DP Project 40950.00)
- Test Pit Location (DP Project 40950.00)

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: SADA Services Pty Ltd		TITLE: **Test Locations**	PROJECT No: 40950.09
OFFICE: Wollongong	DRAWN BY: CMcD	**Glenlee Emplacement Area**	DRAWING No: 1
SCALE: 1: 4000 @ A3	DATE: 30.11.2015	**Glenlee Road, Menangle Park**	REVISION: A

N
MGA



LEGEND

- Clay
- Filling
- Silty Clay
- Silt
- Natural Soil

ROCK STRENGTH
EL – Extremely Low
VL – Very Low
L – Low
M – Medium
H – High
VH – Very High

SOIL CONSISTENCY
vs – very soft
s – soft
f – firm
st – stiff
vst – very stiff
h – hard

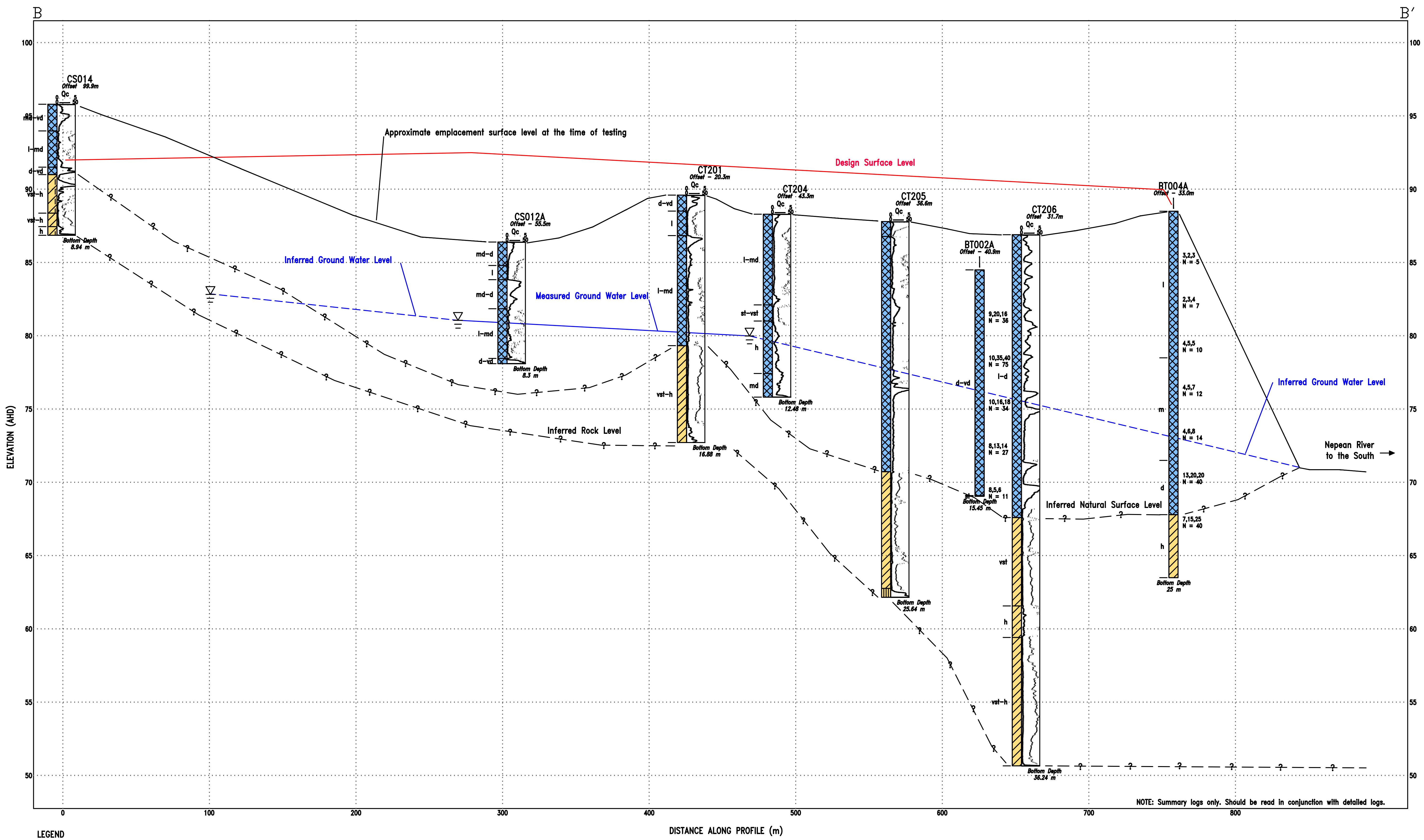
vl – very loose
l – loose
md – medium dense
d – dense
vd – very dense

TESTS / OTHER
N – Standard penetration test value
– Water level

0 50
Horizontal Scale (metres)
Vertical Exaggeration = 10.0

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: SADA Services Pty Ltd	TITLE: Cross-section A–A' Glenlee Precinct Rezoning Springs Road, Glenlee, NSW	PROJECT No: 40950.09
	OFFICE: Wollongong — DRAWN BY: CMcD		DRAWING No: 2
	SCALE: 1:2500 (H) 1:250 (V) @ A3 — DATE: 30.11.2015		REVISION: A

CPT LONG SECTION 40950.05 ALL FIELD DATA.GPJ DPTEMPLATE2012_V1_SYDMET.GDT 10/4/15



LEGEND

- Clay
- Filling
- Silty Clay
- Silt
- Natural Soil

ROCK STRENGTH
EL – Extremely Low
VL – Very Low
L – Low
M – Medium
H – High
VH – Very High

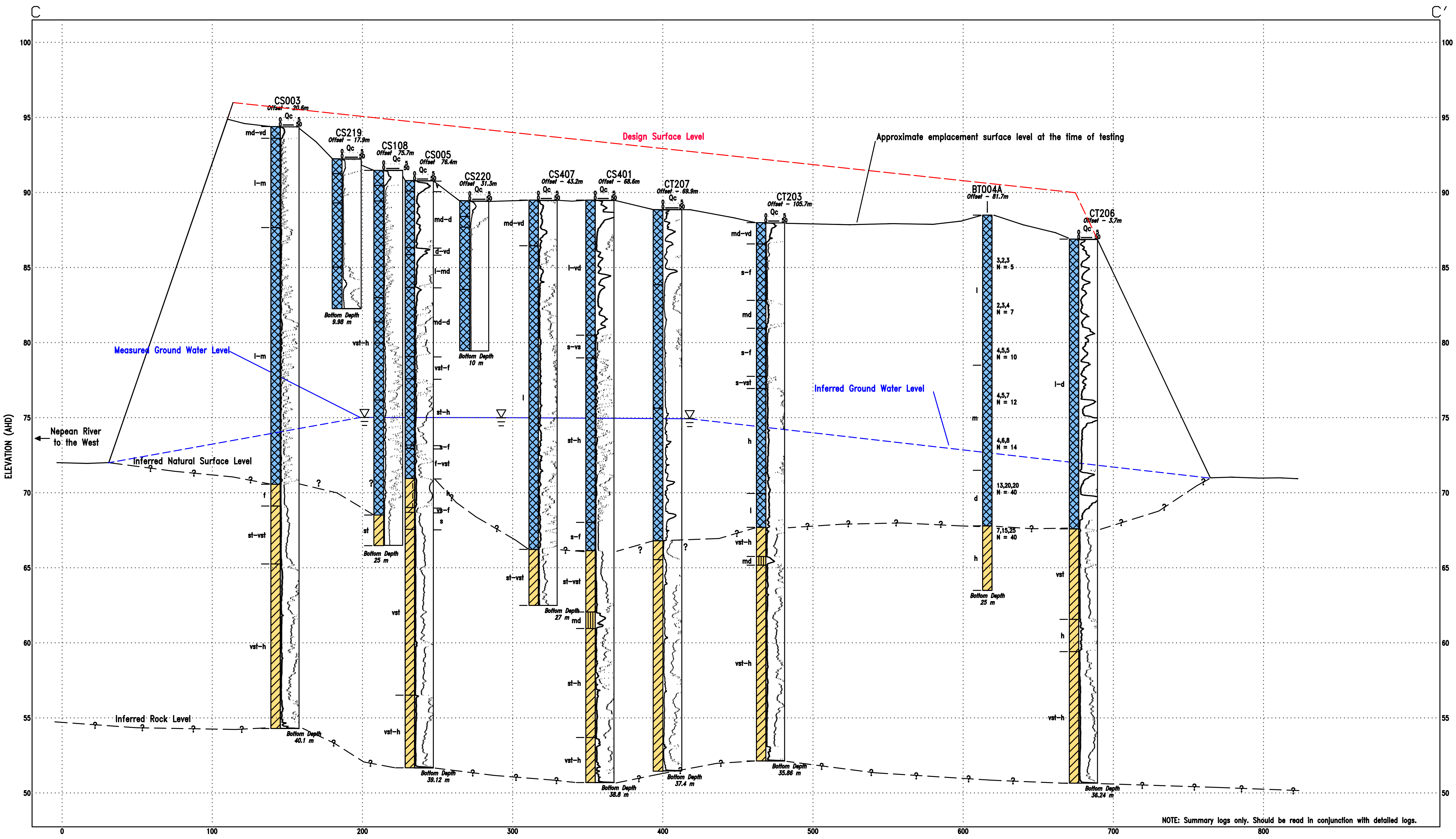
SOIL CONSISTENCY
vs – very soft
s – soft
f – firm
st – stiff
vst – very stiff
h – hard
vl – very loose
l – loose
md – medium dense
d – dense
vd – very dense

TESTS / OTHER
N – Standard penetration test value
▽ – Water level

Horizontal Scale (metres) 0 50
Vertical Exaggeration = 10.0

Douglas Partners Geotechnics / Environment / Groundwater	CLIENT: SADA Services Pty Ltd	TITLE: Cross-section B-B′	PROJECT No: 40950.09
	OFFICE: Wollongong — DRAWN BY: CMcD	Glenlee Precinct Rezoning	DRAWING No: 3
	SCALE: 1:2500 (H) 1:250 (V) @ A3 — DATE: 30.11.2015	Springs Road, Glenlee, NSW	REVISION:

CPT LONG SECTION 40950.05 ALL FIELD DATA.GPJ DPTEMPLATE2012_V1_SYDMET.GDT 10/4/15



LEGEND

- Filling
- Clay
- Silty Clay
- Silt
- Natural Soil

ROCK STRENGTH	SOIL CONSISTENCY		TESTS / OTHER
EL - Extremely Low	vs - very soft	vl - very loose	N - Standard penetration test value
VL - Very Low	s - soft	l - loose	▽ - Water level
L - Low	f - firm	md - medium dense	
M - Medium	st - stiff	d - dense	
H - High	vst - very stiff	vd - very dense	
VH - Very High	h - hard		

0 50
Horizontal Scale (metres)
Vertical Exaggeration = 10.0

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: SADA Services Pty Ltd		TITLE: Cross-section C - C′		PROJECT No:	40950.09
OFFICE: Wollongong	DRAWN BY: CMcD	Glenlee Precinct Rezoning		DRAWING No:	4
SCALE: 1:2500 (H) 1:250 (V) @ A3	DATE: 30.11.2015	Springs Road, Glenlee, NSW		REVISION:	

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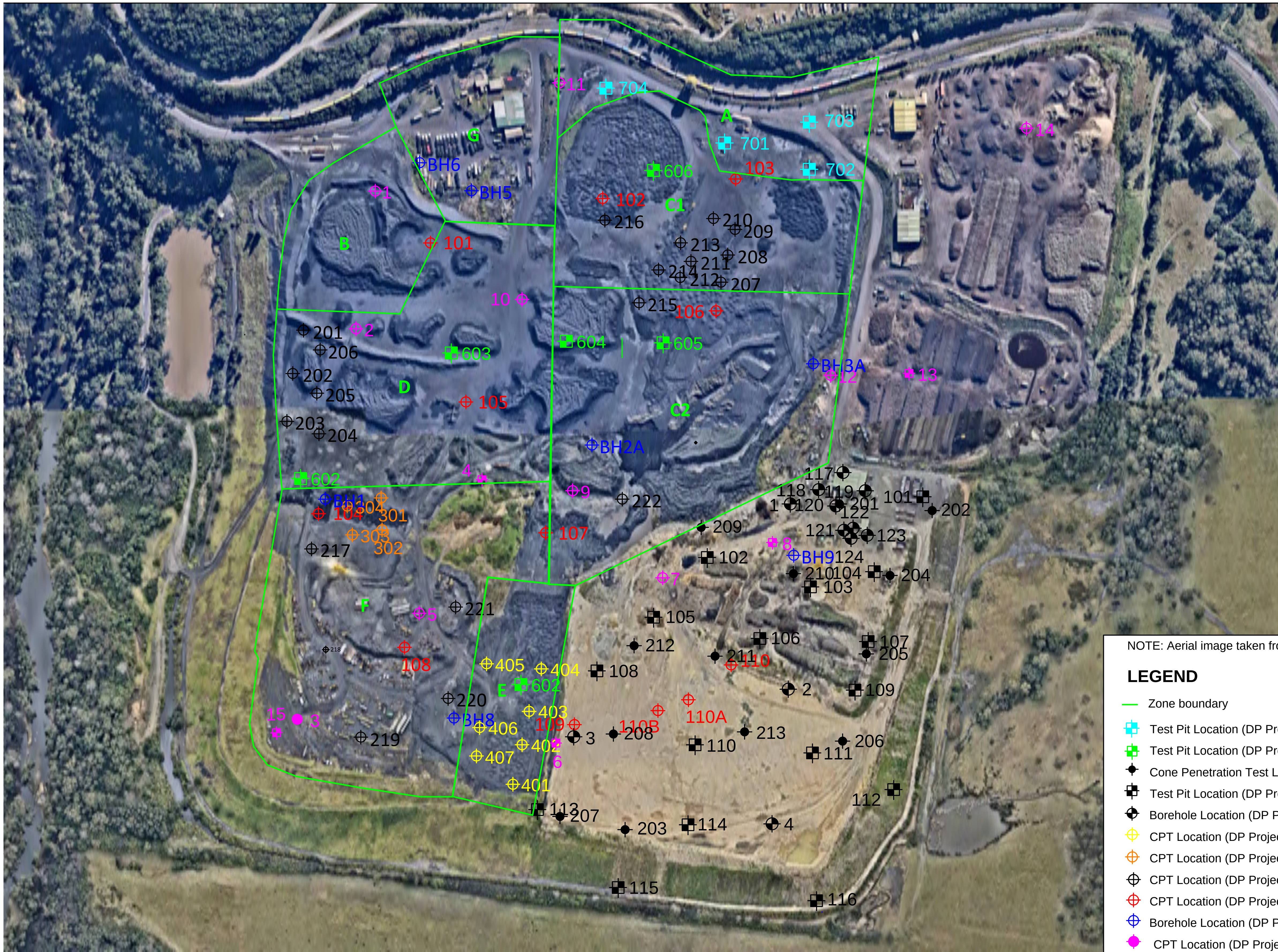


0 20 40 60 80 100 150 200 300 400m

1:4000 @ A3

Locality Plan

NOTE: Aerial image taken from nearmap.com

LEGEND

- Zone boundary
- Test Pit Location (DP Project 40950.09 dated November 2015)
- Test Pit Location (DP Project 40950.09 dated September 2015)
- Cone Penetration Test Location (78371)
- Test Pit Location (DP Project 78371.01 dated August 2012)
- Borehole Location (DP Project 78371.01 dated 2012)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.05)
- CPT Location (DP Project 40950.05)
- Borehole Location (DP Project 40950.01)
- CPT Location (DP Project 40950.00)
- CPT and Test Pit Location (DP Project 40950.00)
- Test Pit Location (DP Project 40950.00)

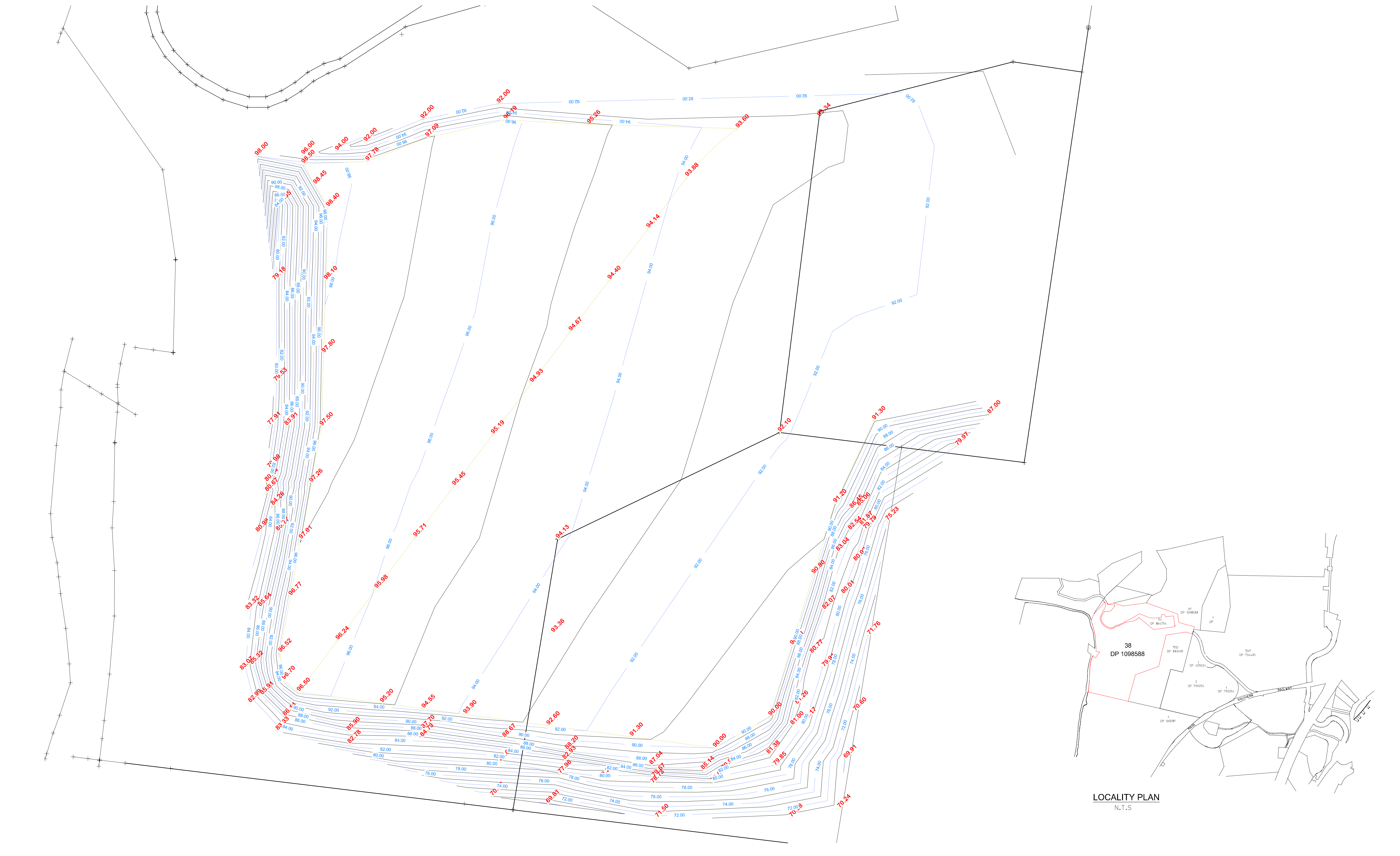
Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: SADA Services Pty Ltd		TITLE: **Test Locations**
OFFICE: Wollongong	DRAWN BY: CMcD	**Glenlee Emplacement Area**
SCALE: 1: 4000 @ A3	DATE: 30.11.2015	**Glenlee Road, Menangle Park**

N

MGA

PROJECT No:	40950.09
DRAWING No:	5
REVISION:	A



-	INITIAL ISSUE	12/03/15	MS	LW

REVISION	DATE	DES/DFT	APP'D
- INITIAL ISSUE	12/03/15	MS	LW

Principal
SADA SERVICES PTY LTD

Origin of Levels
RM 33441
RL 88.35

Datum
AHD

Property Description
LOT 38 DP 1098588
GLENLEE
CAMPBELLTOWN

Surveyed/Designed
D.G.M

Drawn
M.SMITH

Checked
L.WARD

Authorised
L.WARD

Date
FEB 2015

N

Scale @ A1
1:2000
0 20 40 80

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Level 1, 178-180 Queen Street, Campbelltown, NSW, 2560
p +61 2 4640 8222 | **f** +61 2 4628 1056 | www.smu.com.au

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Canberra	+61 2 6126 1900	Perth	+61 8 9323 5900
Geelong	+61 3 5228 3100	Traralgon	+61 3 5173 0100

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GLENLEE WASHERY

CAMPBELLTOWN CITY COUNCIL
DESIGN SURFACE
OPTION 3

Drawing No. **67844.29.P01** **Rev --**

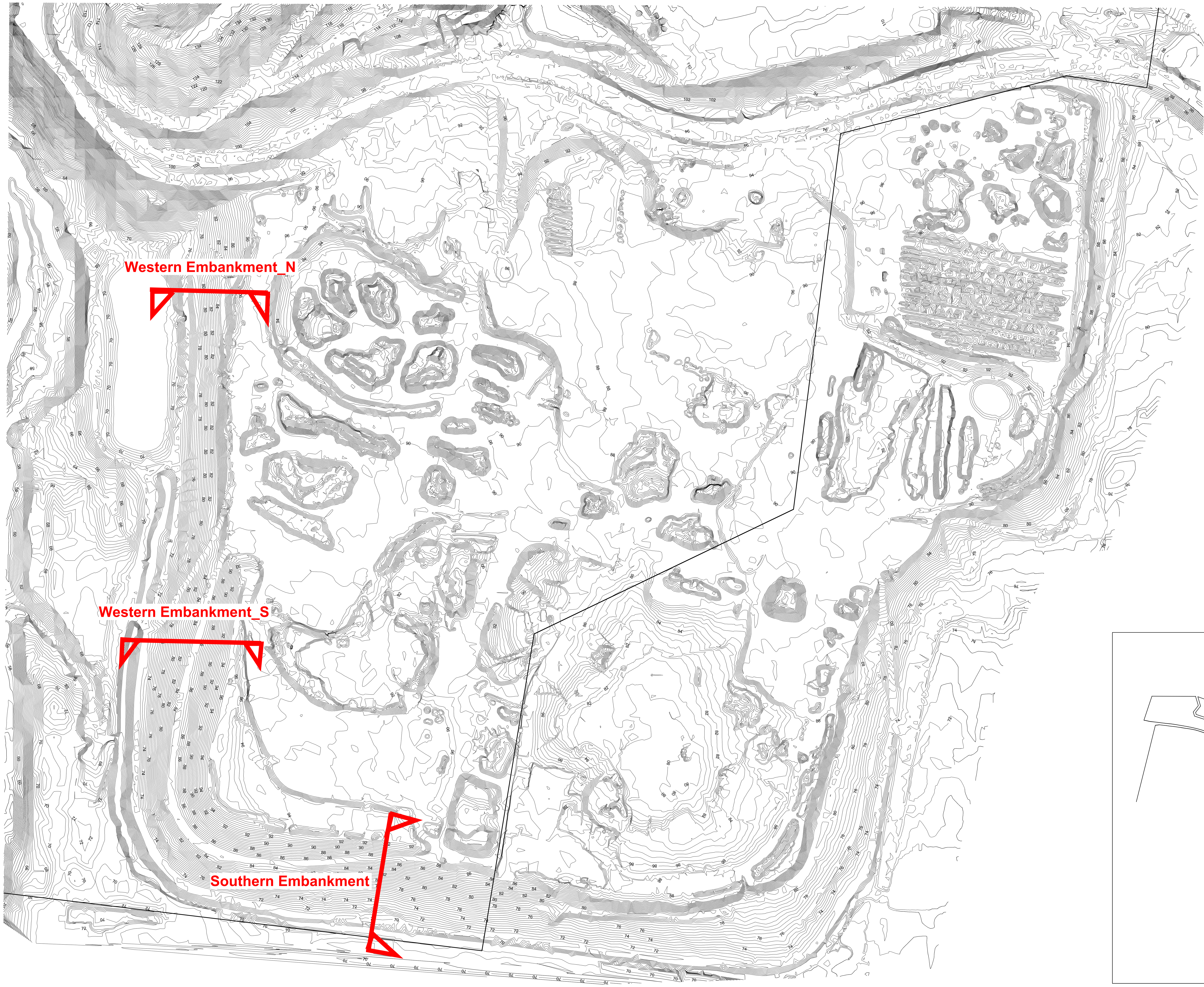
Sheet No. 1 of 1

Preliminary Plan
Not to be used for construction

j:\60thousands\67844.29\cad\dwg\survey\67844.29.p01

Appendix B

Slope/W Analysis



N

THIS PLAN IS PREPARED FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS FOR THE PURPOSE OF NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.
THE TITLE BOUNDARIES AS SHOWN HEREON WERE NOT MARKED AT THE TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY AND NOT BY FIELD SURVEY.
SERVICES HAVE NOT BEEN LOCATED BY FIELD SURVEY.

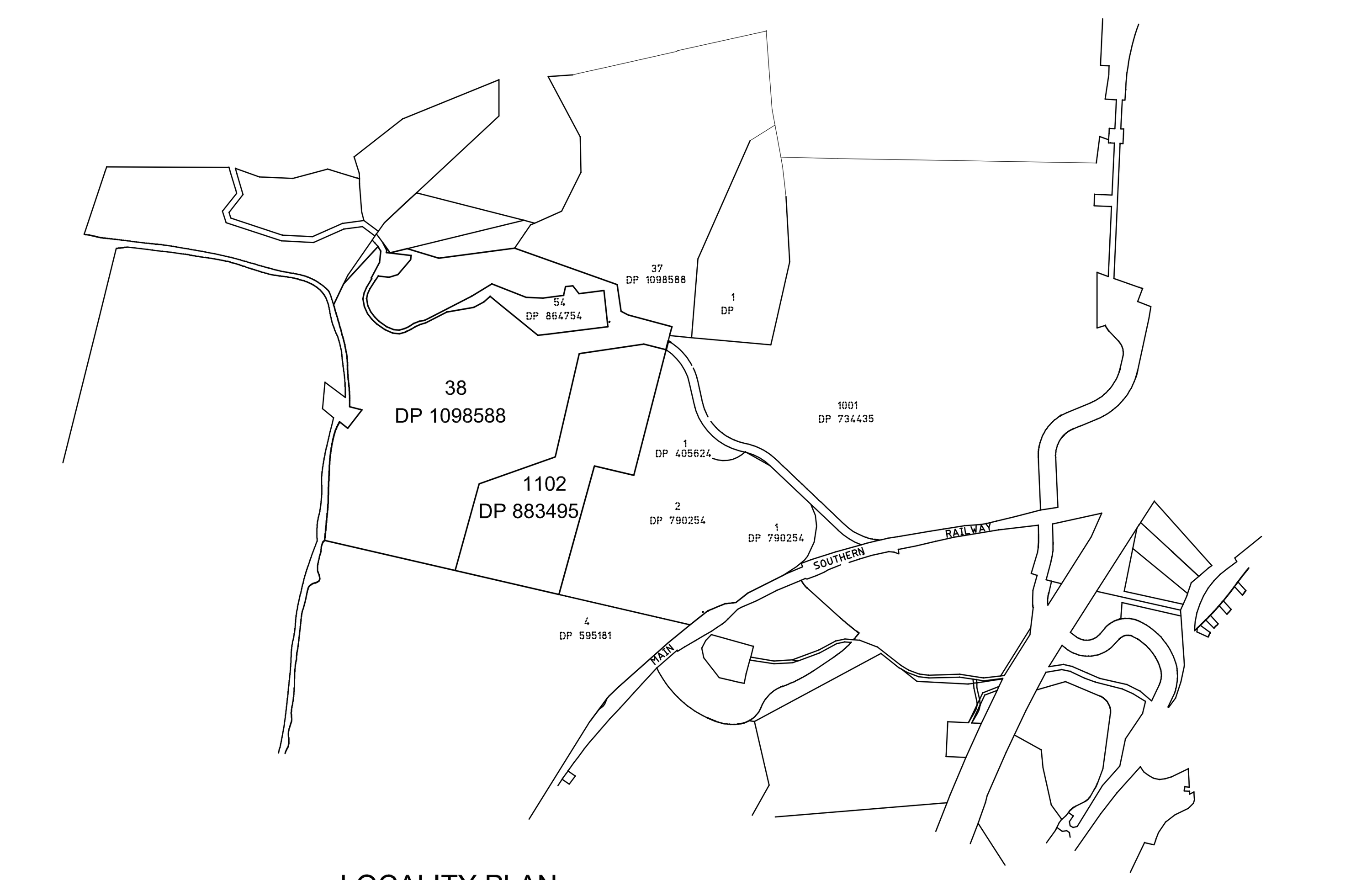
DIAL BEFORE YOU DIG
www.1100.com.au

DIAL 1100 BEFORE YOU DIG. FROM 1ST JULY 2010 IT IS A LEGAL REQUIREMENT TO HAVE DIAL BEFORE YOU DIG PLANS & TO FOLLOW PRESCRIBED WORK PRACTICES WHEN EXCAVATING IN NSW. CRIMINAL PENALTIES CAN APPLY IF DAMAGE IS CAUSED DELIBERATELY OR IRRESPONSIBLY. THE LAW ALSO APPLIES TO EXCAVATION ON PRIVATE PROPERTY.

PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

CAUTION: CONTOURS SHOWN HEREON ARE INDICATIVE ONLY

CONTOUR INTERVAL 0.5m



LOCALITY PLAN
N.T.S

REVISION | DATE | DES/DFT | APP'D

Client
MR KEITH DUNBIER
SADA COAL

Origin of Levels
PM 33441
RL 88.35

Datum
AHD

Property Description
LOT 38 DP 1098588
LOT 1102 DP 883495

LOCALITY
GLENLEE
CAMPBELLTOWN

Surveyed
N.GREEN

Drawn
E. LAZZARINI

Checked
L.WARD

Authorised
L.WARD

Date
MARCH 2014

Scale @ A1
1:2000
0 20 40 80

Formerly
LEAN & HAYWARD PTY LTD

Smec Urban
Level 1, 14 Dumaresq Street, Campbelltown, NSW, 2560
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Geelong	+61 3 5228 3100	Traralgon	+61 3 5173 0100

GLENLEE WASHERY

CAMPBELLTOWN CITY COUNCIL
CONTOURS OVER STOCKPILE
AS AT MAY 2012

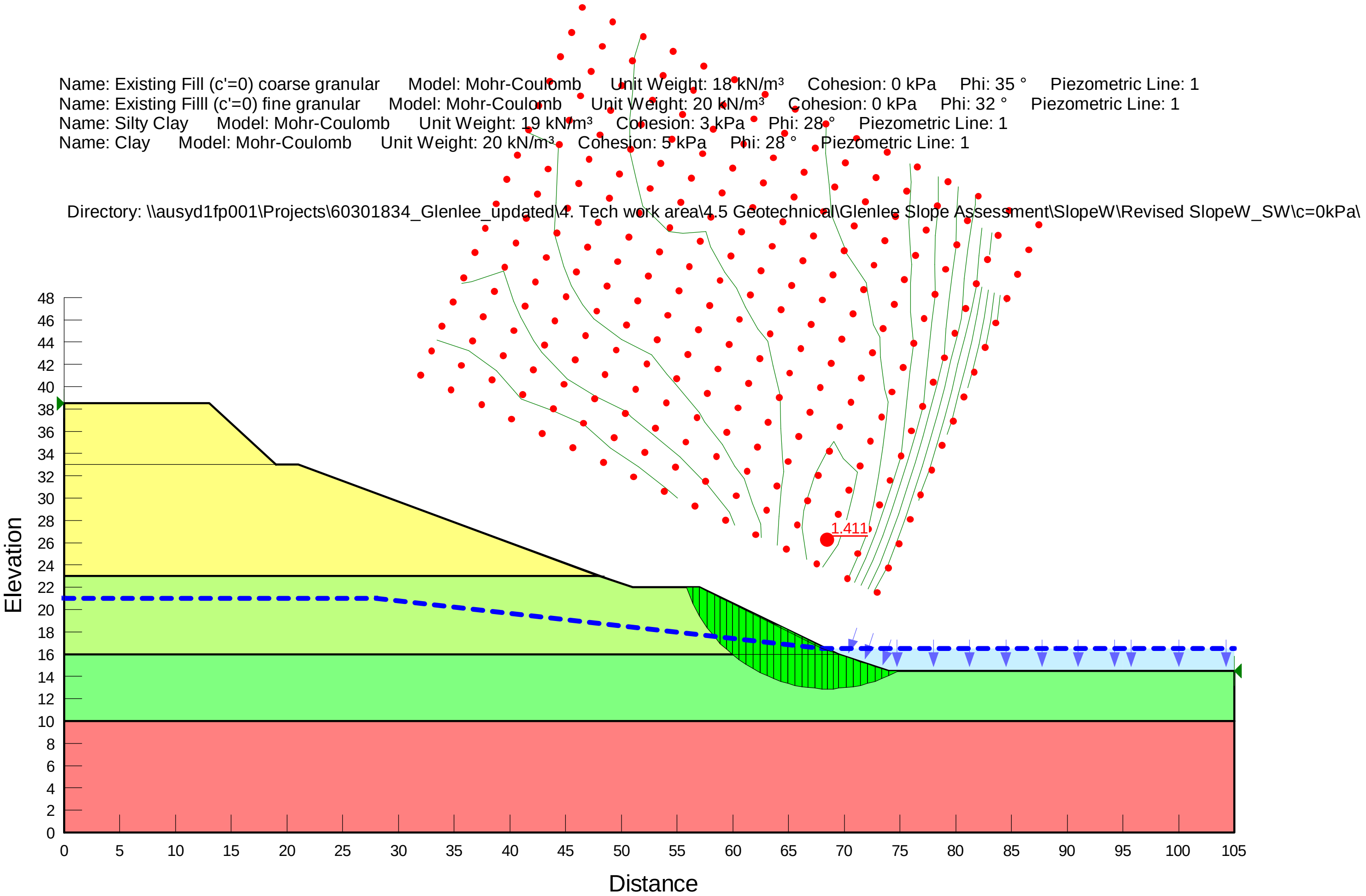
Drawing No. **67844.28.D02** **Rev -**

Sheet No. 1 of 1

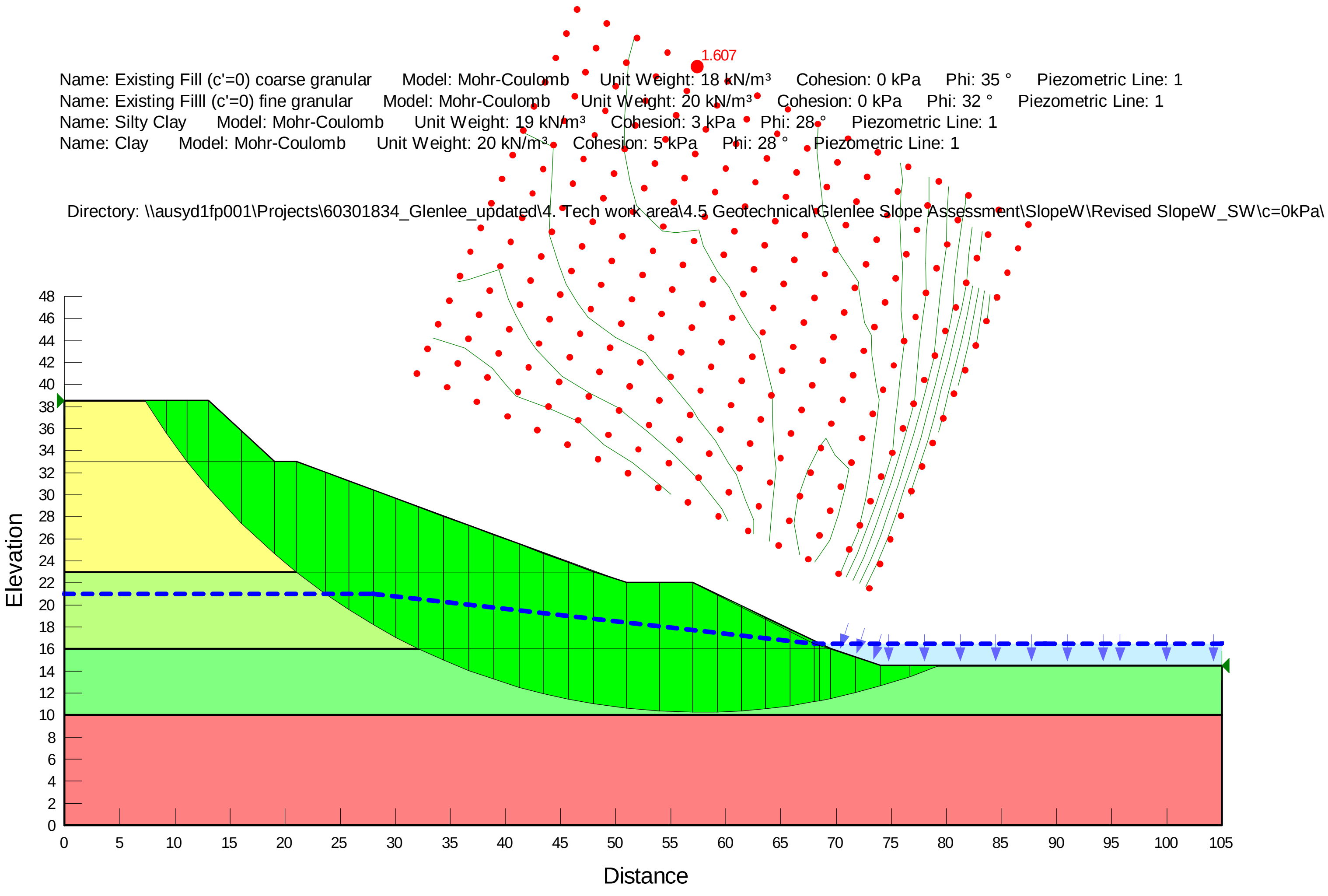
Check Print
For internal discussion only

FILE_LOCATION

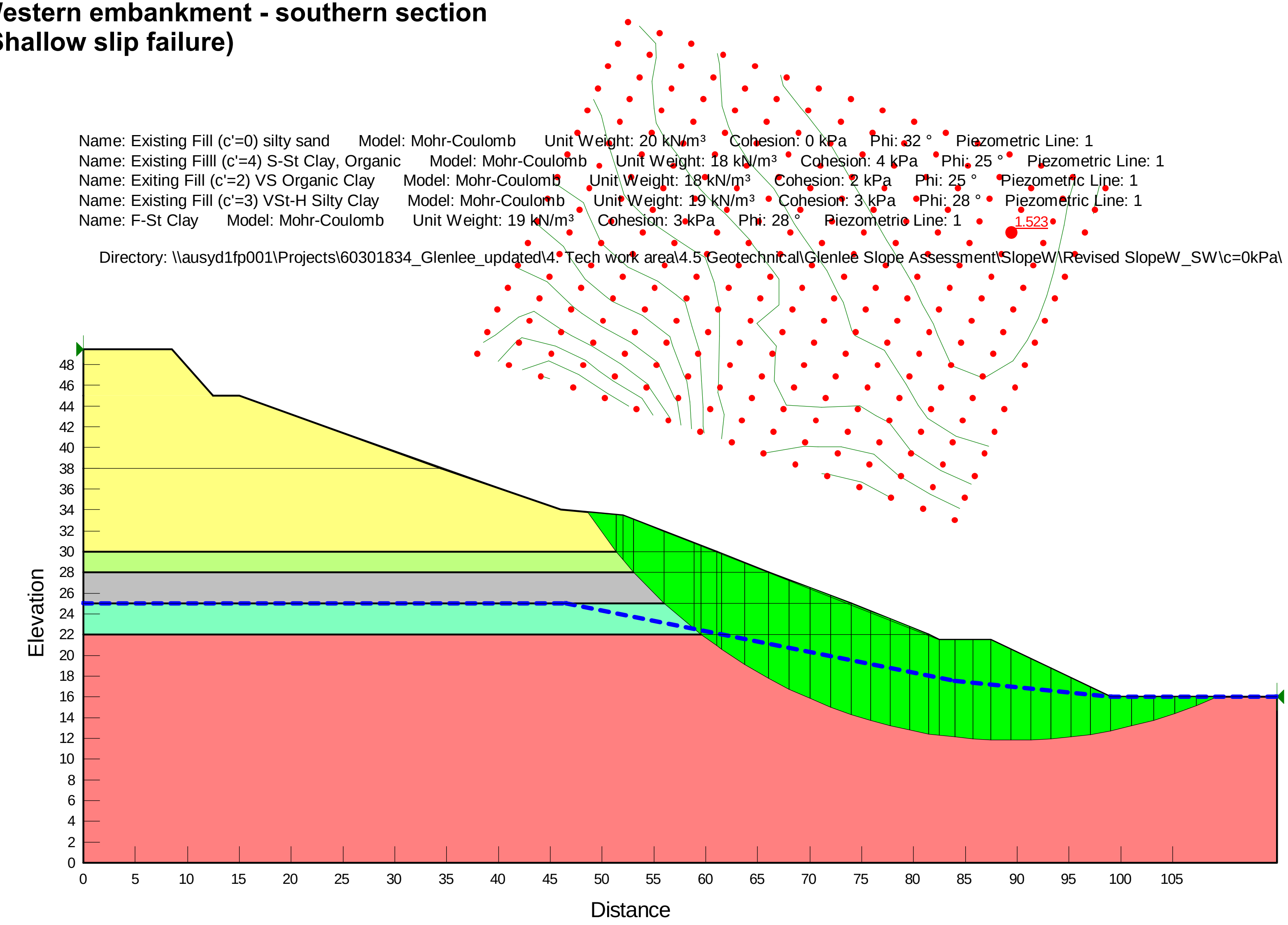
Western embankment - northern section (shallow slip failure)



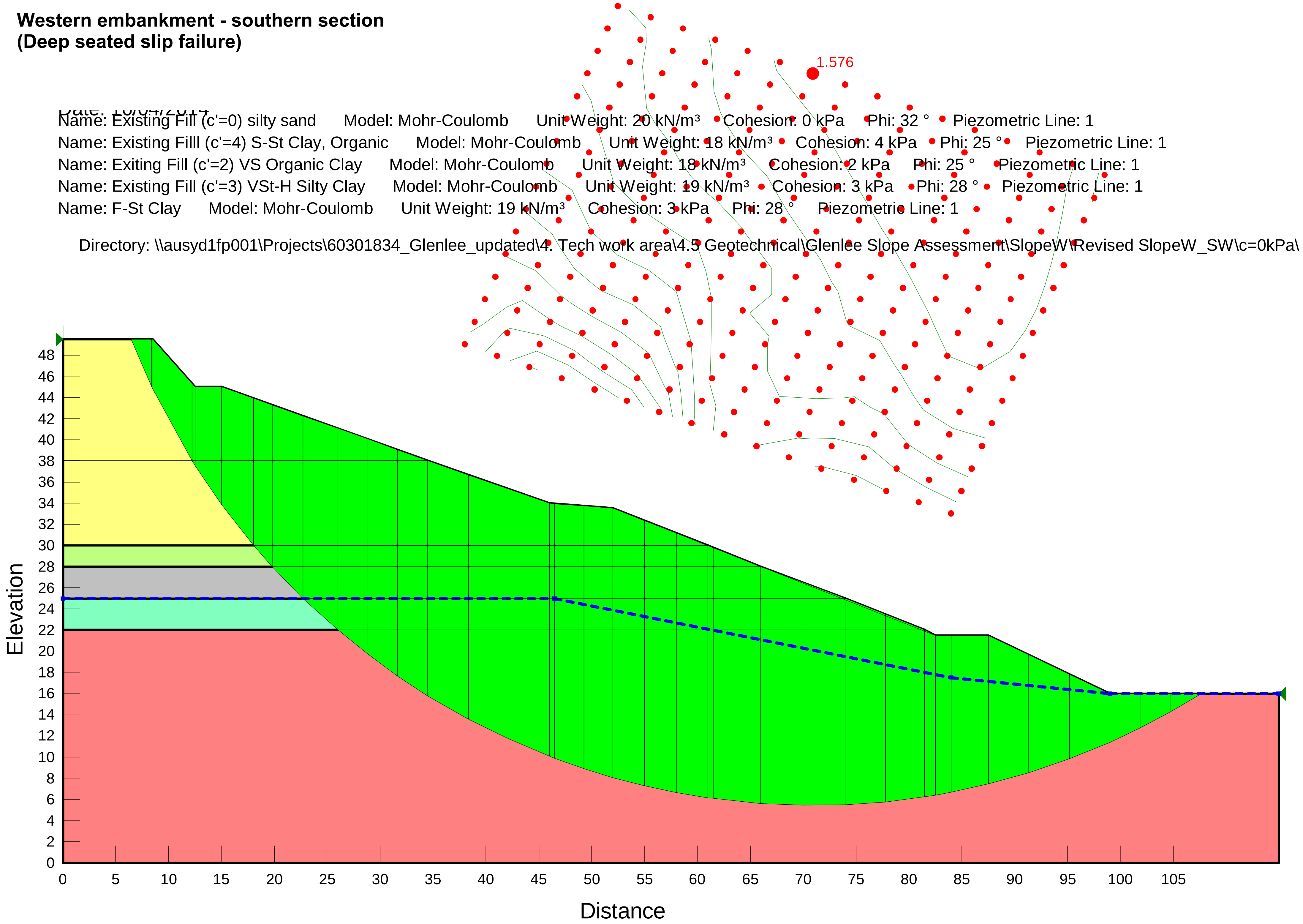
Western embankment - northern section
(Deep seated slip failure)



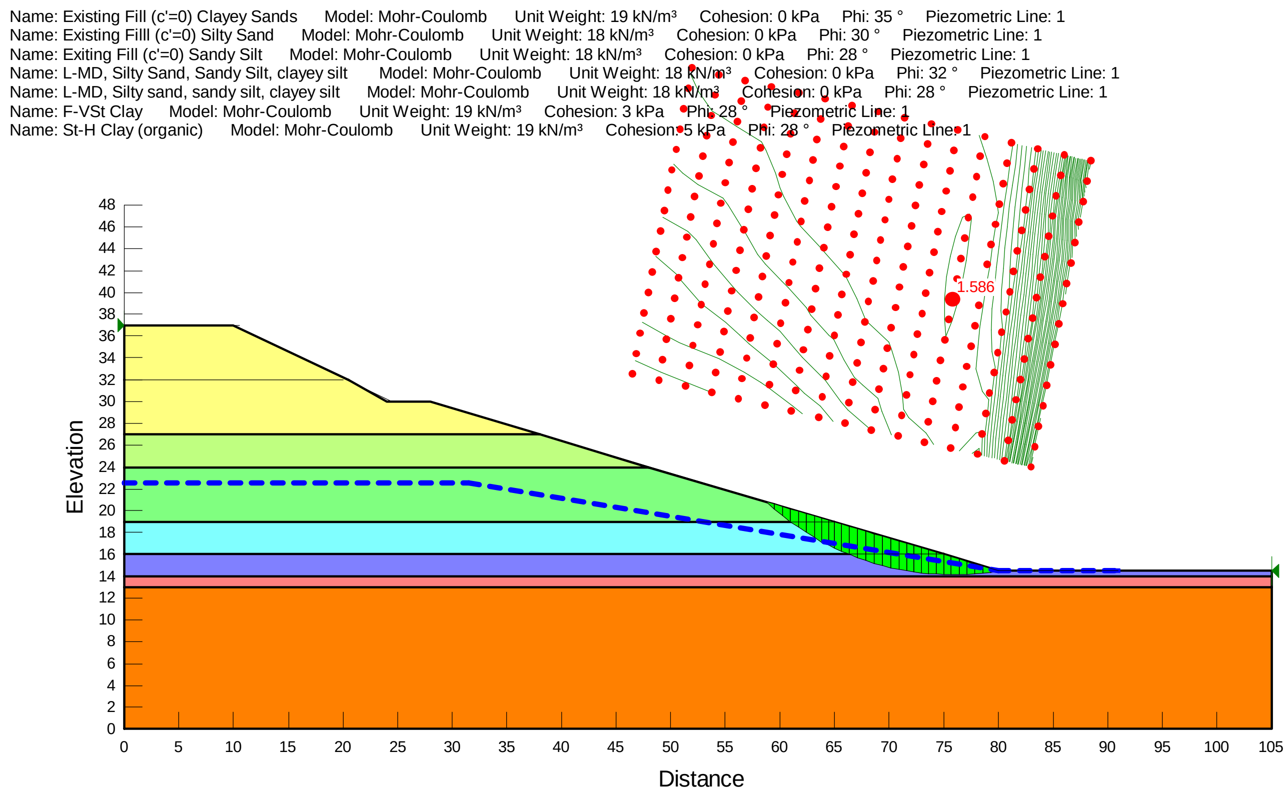
Western embankment - southern section
(Shallow slip failure)



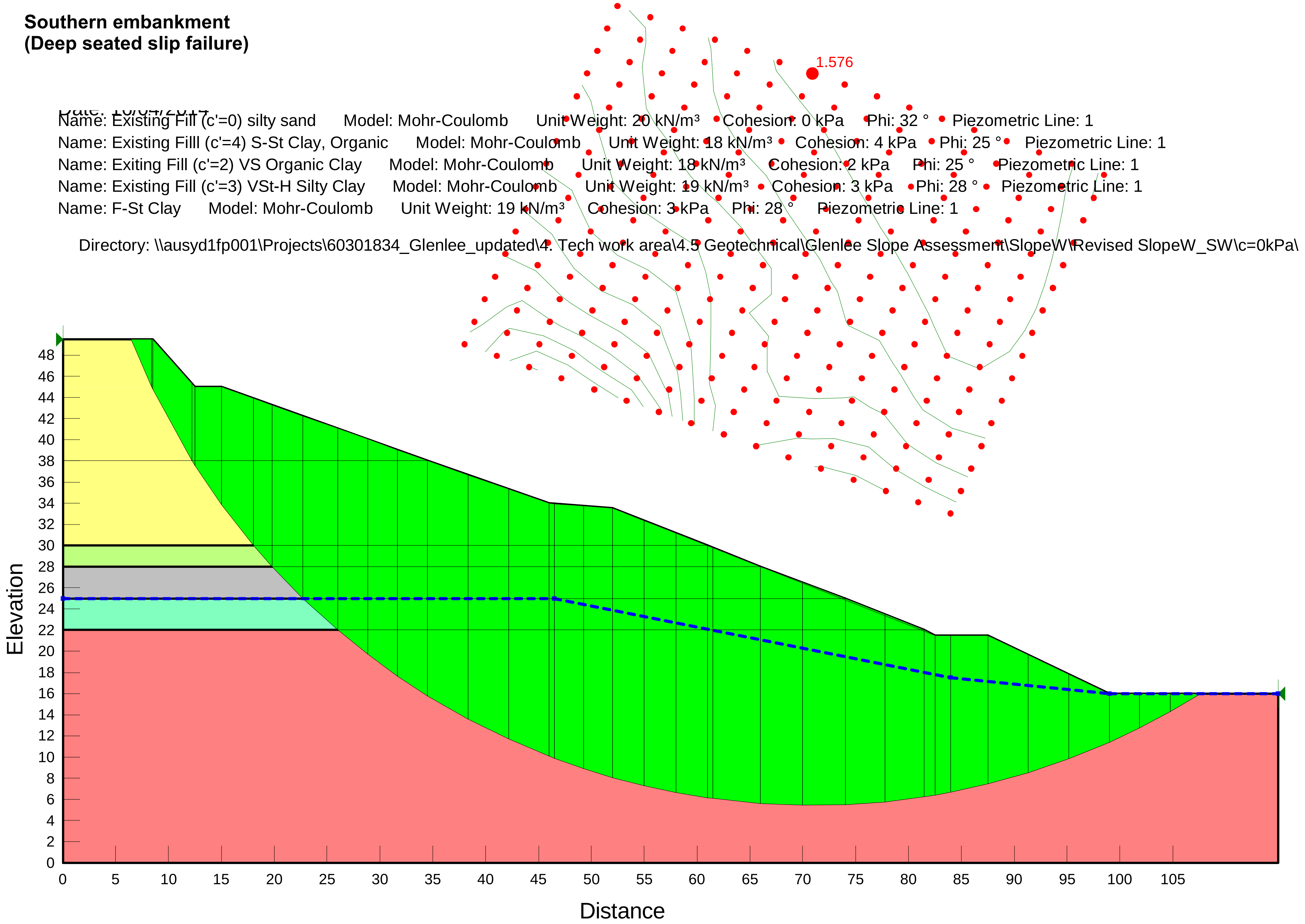
Western embankment - southern section
(Deep seated slip failure)



Southern embankment (shallow slip failure)

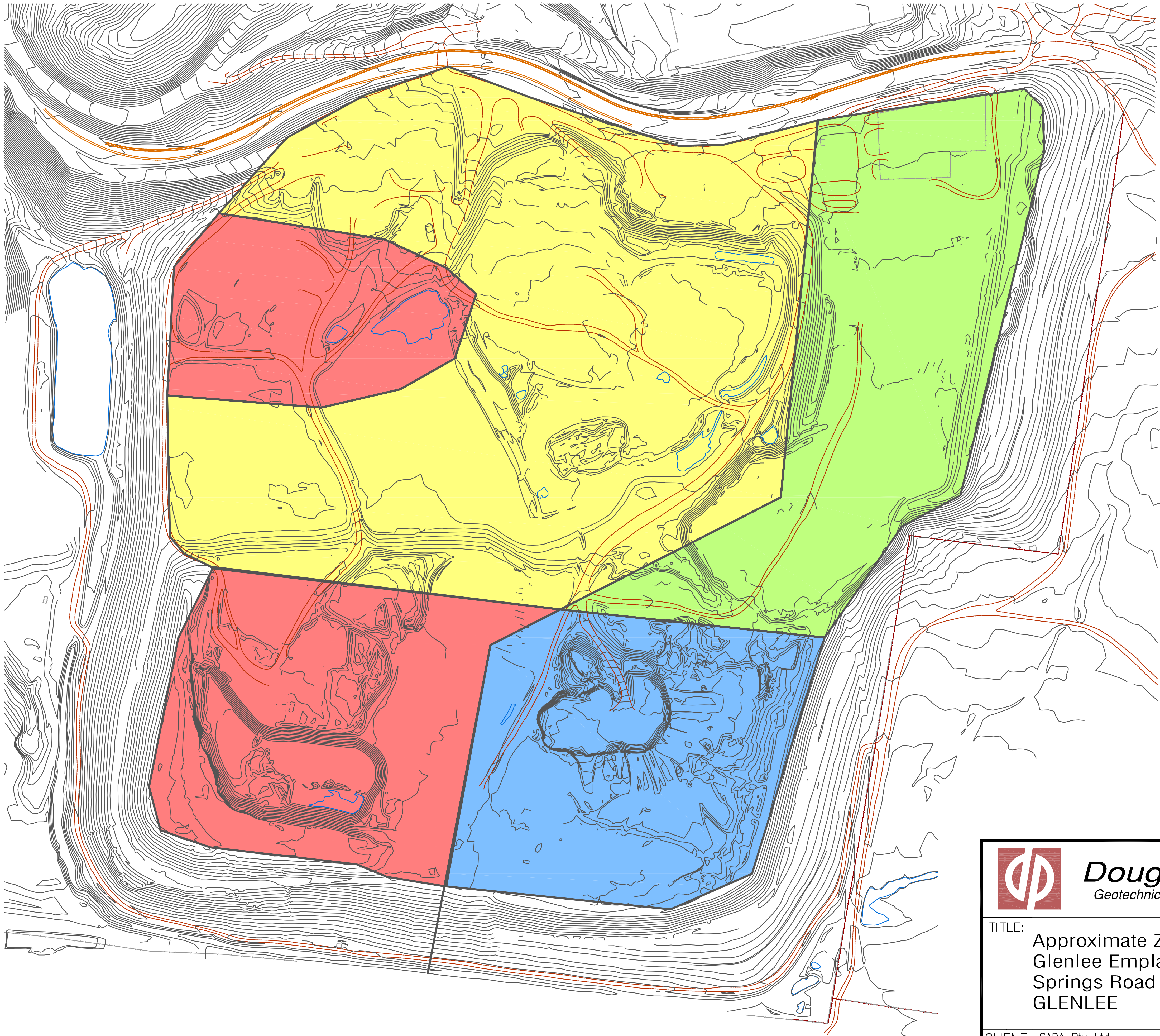


Southern embankment
(Deep seated slip failure)



Appendix C

Douglas Partners Emplacement Area Zone Boundaries for Settlement Calculations



LEGEND

A	SADA WITH TAILINGS
B	SADA WITHOUT TAILINGS
C	CAMDEN WITHOUT TAILINGS
D	CAMDEN TO BE DETERMINED
——	APPROXIMATE PROPERTY BOUNDARY

SCALE
0 100 200m
1:4000

Douglas Partners
Geotechnics, Environment, Groundwater

Sydney, Newcastle, Brisbane, Melbourne, Wyong, Canberra, Campbelltown, Townsville, Perth, Cairns, Wollongong, Darwin, Gold Coast, Sunshine Coast

TITLE:
Approximate Zone Boundaries
Glenlee Emplacement Area
Springs Road
GLENLEE

CLIENT: SADA Pty Ltd			
DRAWN BY: RJH	SCALE: 1:4000	PROJECT No: 40950	OFFICE: WOLLONGONG
APPROVED BY:		DATE: 10.03.2008	DRAWING No: 2

Appendix D

Douglas Partners Summary Report on Geotechnical Assessments

Douglas Partners
Geotechnics / Environment / Groundwater

Integrated Practical Solutions

Summary Report on Geotechnical Assessments

Proposed Redevelopment of the Glenlee Emplacement Area
Springs Road, Mt Annan

Prepared for
SADA Services Pty Ltd

Project 40950.09
April 2016

Douglas Partners
Geotechnics | Environment | Groundwater

Document History

Document details

Project No.	40950.09	Document No.	R.004.Rev1
Document title	Summary Report on Geotechnical Assessments Proposed Redevelopment of the Glenlee Emplacement Area		
Site address	Springs Road, Mt Annan		
Report prepared for	SADA Services Pty Ltd		
File name	40950.09.R.004.Rev1.docx		

Document status and review

Status	Prepared by	Reviewed by	Date issued
Revision 0	K Schultz	G W McIntosh	11 April 2016

Distribution of copies

Status	Electronic	Paper	Issued to
Revision 0	1	0	Mr Mark Brackenbury, SADA Services Pty Ltd

The undersigned, on behalf of Douglas Partners Pty Ltd, confirm that this document and all attached drawings, logs and test results have been checked and reviewed for errors, omissions and inaccuracies.

	Signature	Date
Author		11/4/2016
Reviewer	G W McIntosh	11/4/2016

ISO 9001 Quality Management

Douglas Partners Pty Ltd
ABN 75 053 980 117
www.douglaspartners.com.au
1/1 Luso Drive
Unanderra NSW 2526
PO Box 486
Unanderra NSW 2526
Phone (02) 4271 1836
Fax (02) 4271 1897

Executive Summary

This report summarises the results of geotechnical investigations and assessments undertaken by Douglas Partners Pty Ltd (DP) during the period March 2008 to October 2015 for the proposed redevelopment of the Glenlee Emplacement off Springs Road, Mount Annan.

Included in this report is comment on the nature of the subsurface conditions and methodologies being developed for optimising the redevelopment of the site by rectifying or controlling the various constraints that have resulted from the earlier emplacement construction and management techniques. Ultimately it is intended that the site be used for commercial purposes, probably primarily hardstand with some warehouses, roads and possibly railway lines.

The subsurface conditions underlying the site are variable with coal washery reject filling including loosely to moderately compacted coarse rejects, soft/saturated fine grained coal tailings and clay capping layers to depths of up to about 25 m overlying alluvial and residual soil, typically increasing in strength with depth then weathered rock at depths of up to 40 m. Groundwater levels are at depths greater than 8 m across the site.

Filling and development of the site will result in consolidation and creep of the weak materials over time, which, depending on the final land use, may need to be rectified prior to development. In addition to the previous testing a surcharging trial is underway to provide an indication of the effectiveness of this method and allow the derivation of more precise material properties for future modelling.

Results of testing indicate that the Bulli Seam coal washery rejects emplaced at the site are not prone to spontaneous combustion or the production of acid leachate when in contact with groundwater.

Whilst fine grained silty sand materials that can be prone to liquefaction are present on site, the depth to groundwater (greater than 8 m) and increasing confining pressures of the new filling being placed above the fine material indicate that the emplacement will not be adversely affected by liquefaction in the event of a large earthquake.

The development area has been divided into zones (refer Drawing 5) that will require differing investigation and rectification works to suit the proposed development type.

The results of the previous investigations and assessments indicate that the redevelopment of the emplacement for commercial or industrial land use is considered feasible from a geotechnical perspective. Ongoing detailed geotechnical investigation and analysis will be required to develop an earthworks methodology for the construction. Soft soils, where encountered, will be preloaded to achieve settlement targets, new filling will be placed in layers and compacted in accordance with the methodology developed, external batters will be regraded and stabilised and the whole site will be capped with at least 2 m of engineered filling.

Table of Contents

Summary Report on Geotechnical Assessments
Proposed Redevelopment of the Glenlee Emplacement Area
Springs Road, Mt Annan

1. Introduction

This summary report presents the results of geotechnical investigations and assessments undertaken by Douglas Partners Pty Ltd for the proposed redevelopment of the Glenlee Emplacement off Springs Road, Mount Annan. The work was requested by Sada Services Pty Limited, owner and operator of most of the Glenlee Emplacement.

Geotechnical investigation, assessment and earthworks trials have previously been undertaken on the site which has primarily been used for emplacement of coal washery rejects. The aim of the work was to determine the nature of the subsurface conditions and develop a methodology for optimising the redevelopment of the site by rectifying or controlling the various constraints that have resulted from the earlier emplacement construction and management techniques. Ultimately it is intended that the site be used for commercial purposes, most likely including hardstand areas, warehouses, roads and possibly railway lines.

This summary report gives details of work undertaken by Douglas Partners Pty Ltd on the whole of the Glenlee emplacement site, including areas operated by SADA Services Pty Ltd (60%) and by J & W Tripodi Holdings Pty Ltd (40%). Details of the various reports are given in Section 3.

2. Site Description

The Glenlee Emplacement site is located off Springs Road, Mt Annan, some 4 km south-west of Narellan. It is accessed via a private road from the end of Springs Road and is bounded by Jacks Gully Waste Management Facility to the north and north-west, vacant land associated with a buffer zone for Jacks Gully to the north and vacant land to the south, east and to the west, the Nepean River.

The emplacement is generally contained by a perimeter earthfill embankment constructed on the eastern, southern and western sides (refer Drawing 1 in Appendix A). The maximum height of the embankment is around 18 - 23 m with average side slopes measured to be in the range 4.5:1 (H:V) on the eastern side, 3.2 - 3.7:1 (H:V) on the southern side and 2.8:1 (H:V) on the western side. A central berm up to 4 m in width was constructed as part of the embankment. The crest level of the existing wall is understood to be at RL 90 m relative to the Australian Height Datum (AHD). It is also understood that a series of "internal" embankments have been constructed and either added to or removed as part of the operation of the emplacement, with some areas operating as wet disposal and others being dry placed in conjunction with mechanical compaction.

At the time of reporting, the western portion of the site was operated by Sada Services Pty Ltd as a coal washery reject emplacement, with the south eastern portion of the site operated by J & W Tripodi Holdings Pty Ltd as a receiver of landfill (virgin excavated natural material, VENM and excavated natural material, ENM, only) and production of screened sand for the construction industry. The north eastern corner of the site (ie part of the Tripodi site) is operated as a green waste composting facility by Sita.

3. Background

Douglas Partners Pty Ltd has prepared various reports for aspects of the redevelopment of the whole or part of the site and for planning the closure of the emplacement, details of which are given below:

- Project 40950 dated 14 March 2008 was prepared for the whole emplacement site and titled "Report on Preliminary Geotechnical Investigation, Proposed Site Redevelopment Glenlee Emplacement Area, Springs Road Glenlee). The investigation included CPTs and test pits.
- Project 40950.01 Monitoring of water levels within the emplacement (April 2008 to April 2009). The water monitoring included installation and monitoring of standpipes and monitoring of standpipes previously installed by others. Water level monitoring was carried out at regular intervals.
- Project 40950.02, dated May 2008 preliminary plan for filling of the J & W Tripodi Pty Ltd portion of the site.
- Project 40950.03, dated November 2010 dam surveillance reports and application to DSC for de-prescribing of the dam.
- Project 40950.04 dated 10 February 2011 prepared for the whole of the emplacement and titled "Report on Glenlee Emplacement Area Closure Plan, Glenlee Washery Industrial Complex, Springs Road, Glenlee".
- Project 40950.05-1 dated 20 April 2011 prepared for the Sada Services Pty Ltd portion of the emplacement and titled "Report on Additional Geotechnical Investigation, Proposed Area 1 Glenlee Emplacement, Springs Road, Glenlee" The additional investigation included CPT's.
- Project 40950.05-2 dated 20 October 2011 prepared for the Sada Services Pty Ltd portion of the emplacement and titled "Report on Geotechnical Assessment, Compaction Trial and Additional Testing Glenlee Emplacement, Springs Road, Glenlee" The additional investigation included CPT's and monitoring the results of the compaction trial.
- Project 40950.05-3 dated 17 February 2012 prepared for the Sada Services Pty Ltd portion of the emplacement and titled "Proposed Surcharge Trial - Glenlee Emplacement, Springs Road, Glenlee" The additional investigation included CPT's as part of choosing a suitable trial area. The full trial is in progress.
- Project 78371-1 dated 8 May 2012 prepared for the J & W Tripodi Pty Ltd operated portion of the emplacement and titled "Proposed Redevelopment of a Coalwash Emplacement, Part Lot 1102 Springs Road, Spring Farm".
- Project 78371-2 Ongoing geotechnical investigation, assessment and advice for the filling of the J & W Tripodi operated portion of the emplacement. The work was undertaken in conjunction with the Phase 1 contamination assessment and includes CPT's and boreholes. Final assessment and reporting was not completed as a result of change in usage as soil hardstand.
- Project 78371.01 dated 14 August 2012 prepared for the J & W Tripodi Pty Ltd portion of the site and titled "Report on Phase 1 Contamination Assessment with Limited Sampling, Part Lot 1192 Deposited Plan 883495 Glenlee Road, Menangle Park. The assessment included test pits and boreholes.

4. Investigation Methods

Investigation of the site has previously included cone penetration tests and peizocone penetration tests with measurement of pore water pressure. In the CPT, a 35 mm diameter cone and a 130 mm long friction sleeve are attached to rods of the same diameter, and pushed continuously into the soil at about 2 cm/sec by hydraulic thrust from a purpose-built truck mounted test rig. Cone tip resistance, sleeve friction and inclination from vertical were recorded by a computer data acquisition system for subsequent plotting and analysis. In the CPTU, a filter element is located behind the tip on the cone shoulder (u2 position) allowing dynamic pore pressure to be recorded as the rods are pushed into the soil.

Pore pressure dissipation tests were undertaken during the CPTUs by stopping the cone penetration at a nominated depth and monitoring the reduction in excess pore pressure while the cone was stationary. The dissipation tests were mainly conducted in the upper fine grained filling materials, however some tests were also undertaken in deeper natural clay layers. In general, dissipation was monitored until at least 50% reduction in the excess pore pressure was achieved, relative to the peak pore pressure observed. Following completion of each CPT and CPTU test, the remnant cone hole was dipped to measure the depth to the water table at the time of testing.

The cones and monitors used by DP are purpose built by A.P. Van Den Berg (APV) and specified in accordance with EN ISO 22476-1. The typical parameters recorded and reported on the CPT traces are: tip resistance (q_c), local (sleeve) friction (f_s), pore water pressure (u_2) and inclination (I x/y). The data transmission for q_c, f_s and u_2 is 24 bit A/D and 16 bit A/D for I x/y. The accuracy of recording for these parameters is set out in Table 2.

Table 2: Accuracy of A.P. Van Den Berg

1000 m² Cone	Nominal MPa	Maximum MPa	Accuracy Class 2	Accuracy Class 1
Tip resistance (q_c)	75	150	100 kPa or 5%	35 kPa or 5%
Local (sleeve) friction (f_s)	1	1.5	15 kPa or 15%	5 kPa or 10%
Pore water pressure (U)	2 or 10	3 or 15	25 or 3%	10 or 2%
Inclination (I)	20°	25°	2°	2°
Depth			0.1 m or 1%	0.1 m or 1%

The cones are calibrated by APV with calibration checks within a load frame carried out on the DP CPT rig. These are carried out typically on the following basis:

- After every 500 m pushed.
- Noticeable offsets being present after completing a test, typically around 3-4%.
- Prior to use if the cone has been unused for 6 months.
- Following a cone recalibration.

The calibration ranges for cones can vary but are typically: q_c = 50 MPa, f_s = 765 kPa and U = 2050 kPa.

All CPT traces are reviewed by a DP geotechnical engineer as the CPT is in progress, then again by the reporting engineer when the soil behaviour type is determined using Robertson's normalised charts.

Based on this information, the data recovered using the CPT equipment is considered suitable for an assessment of all the variable materials encountered on the coal washery rejects site. It should also be noted that the material parameters derived from the testing will be verified and modified by the results of surcharging of the site prior to use for industrial development.

5. Subsurface Conditions

5.1 Soil

Based on the results of the intrusive investigations undertaken across the whole of the emplacement site, the subsurface conditions encountered were variable and included uncontrolled filling, namely coal washery reject, comprising loosely to moderately compacted coarse rejects, soft/saturated fine grained coal tailings and clay capping layers, with the overall fill profile determined to depths of up to about 25 m. Alluvial and residual soils, were then encountered, typically increasing in strength with depth then weathered rock at depths of up to 40 m.

Detailed logs from all of the investigations undertaken to date are contained in Appendix B.

The implication of the deep uncontrolled filling and unknown extent of soft fine grained soils is that variable settlements will affect any infrastructure placed on the site including roads, rail, underground services and any permanent building constructed on the emplacement platform. The results of the investigations have been used to determine the likely extent of soft, deep filling. Trial potential rectification options such as surcharging of soft areas and impact rolling for loose granular areas have also been assessed.

The results of the previous investigations indicate that emplacement materials and underlying natural clays are variable in depth and properties. Given this high variability, separate geotechnical models were developed for each test location. The subsurface material type and strength was inferred from the cone tip resistance (q_c), sleeve friction (f_s) and the derived friction ratio (R_f). The material type and q_c were also used to derive parameters for the settlement analysis including the coefficient of compressibility (m_v) and creep coefficient (c_a). An estimate the vertical coefficient of consolidation (c_v) and creep was made based on the material type, strength and empirical values previously determined for similar materials. Typical values used in the settlement analyses are presented in Table 1.

Table 1: Typical Geotechnical Parameters

Parameter	Range of Values
Youngs Modulus, E (MPa)	1.5 - 15.0
Coefficient of volume compressibility, m_v (m^2/MN)	0.05 - 0.60
Vertical coefficient of consolidation, c_v m^2/y	1 - 100
Creep coefficient, c_α	0.0050

Ref: DP Project 40950 dated March 2008

Once appropriate rectification methods have been trialled and determined suitable for the site, the construction methodology will be updated and reformulated to provide optimum results for the extent of the areas proposed for redevelopment.

Additional information on typical chemical and mechanical properties of CWR are presented in detail in Appendix C.

5.2 Groundwater

Groundwater monitoring has been carried out since 2002 using standpipe piezometers installed in boreholes drilled with the coal washery reject. Recent monitoring indicates that groundwater levels are generally static at 8 m to 15 m below the existing ground surface. Detailed results of the monitoring are presented in Appendix B.

6. Construction and Rectification Options

Based on the work carried out to date, the aim of the construction and rectification works will include a capping layer of controlled granular filling at least 2 m thick over the site to assist in mitigating the effects of the variable filling that has been placed over many years and also help to address the issue of excessive long term settlement of deep, soft filling and alluvial soils, where encountered.

The capping layer and rectification works should also provide sufficient support for pavements and lightly loaded flexible structures such as light industrial buildings. Heavily loaded, settlement sensitive structures will need to be piled to the underlying natural soil or rock strata.

6.1 Final Landform and Site Filling

Drawing 1 Appendix A shows all relevant test locations. Drawings 2 - 4 give geotechnical sections that summarise the subsurface conditions encountered. Drawing 5 shows an updated layout of the proposed staging together with test locations. The derivation of the boundaries is primarily based on the proximity to existing services and the expected ease of completing site preparation and rectification works. Whilst not fixed, the boundaries approximately correlate with known previous site usage boundaries or areas identified by subsequent CPT testing. Area E (refer Drawing 5) is currently being used for a surcharging trial to refine the known issues associated with interpretation of CPT results to derive material parameters.

Whilst no survey data of the original landform is available, survey of the undeveloped land to the east of the site has an undulating, sloping surface that is incised by erosion gullies. The general fall is to the south east towards the Nepean River. On the western side of the existing developments the Nepean River is approximately 500 m from the toe of the main emplacement with the land surface around the toe at approximately RL 70 m AHD. The water level in the Nepean River (flowing north and west) is approximately RL 60 AHD.

It is noted that the reference to published geological information indicates that the footprint of the emplacement is not underlain by sand deposits and there is no record of sand mining very being carried out within the emplacement boundaries.

Based on this information, it is extremely unlikely that original landform was flat and level, and it is considered that the original landform probably comprised gentle undulating hills with incised gullies generally sloping towards the Nepean River in the west.

As noted in previous reports, the CWR on the site is from the Bulli Seam originally from Burragorang Valley Mine and more recently processed at the Metropolitan Colliery at Helensburgh. It is extremely variable and ranges from cobbles sized material, through gravel and sand to silt and clay sized particles, all variably compacted. In addition, over the years the material on site has been reprocessed with fine spoil deposited in tailings dams, resulting in some areas of the site being underlain by relatively deep layers of very low strength material that will in some areas consolidate and creep over time. Material parameters derived from the CPT have been used to provide indicative, rather than definitive settlement estimates due to the known limitations associated with testing very soft soils with high load CPT equipment required to penetrate the upper granular layers. Notwithstanding this, the CPT does provide a near continuous record at the test locations and accurate delineation of various layers.

Additional testing will be carried out in each of the development zones, including test pits and CPTs. The additional information will be used to refine the subsurface profiles, and the "truthing" of the CPT data using the surcharge trial enable a rectification methodology to be developed appropriate for each zone.

Where the site surface level is below design level, conventional earthworks are being carried out to raise the site to design levels. Where coarse reject or similar materials have been used for filling on the Sada site, the following methodology has been implemented:

- inspection and test rolling all areas to be filled and nomination of areas that may need remedial works. At least 2 m of engineered fill must be placed over the existing emplacement;
- placement of a minimum 500 mm thick coarse reject bridging layer where weak subgrade conditions are present,
- placement of coarse reject in layers not more than 300 mm loose thickness compacted to a dry density ratio of 98% relative to standard compaction (AS 1289 5.1.1) with moisture contents maintained within 2% of OMC (where OMC = optimum moisture content for standard compaction).

Placement of thicker layers has been carried out where feasible, with the actual thickness dependent upon the size of equipment to be used, the overall grading of the fill materials and the results of field trials.

DP has been monitoring the filling operations on the Sada site and testing of new filling has been carried out under Level 2 geotechnical control to the requirements of AS 3798 "Guidelines on Earthworks for Commercial and Residential Developments".

A similar construction methodology is being used to place fill on the Tripodi site. The site levels are generally much lower in the Tripodi area however, and the filling material generally comprises sandstone and shale (rocky fill) quarried from nearby landfill sites. Where encountered near the surface, the soft, fine coalwash has been excavated and blended with the rocky imported filling to minimise the settlement of the weaker material once the embankment has been constructed to target levels.

DP has been monitoring the filling operations on the Tripodi site and undertaking earthworks quality control testing as the platform is raised.

Typical material parameters and settlement calculations are presented in Appendix D.

6.2 Spontaneous Combustion of Bulli Seam Coal Washery Rejects (CWR)

A composite sample of CWR taken from six test pits excavated across the site to depths of up to 5 m was dispatched to CB3 Mine Pty Limited in Queensland for a spontaneous combustion assessment. The results of the testing are presented in a report dated October 2015 in Appendix E. The results indicate that the Bulli Seam CWR sample tested by SponComSIM™ (incubation) testing shows that under ideal conditions of critical thickness, ample continuous supply of oxygen and minimal heat dissipation, the coal washery rejects show no signs of self-heating and in fact there is a gradual temperature decrease from the initial start temperature due to evaporative cooling effects.

The report also indicates that previous testing on the Bulli Seam coal also shows no propensity for spontaneous combustion, even in ideal conditions.

Based on these results, spontaneous combustion of the CWR should not be considered a factor limiting development of the site.

6.3 Acid Producing Potential of Bulli Seam CWR

A composite sample of CWR taken from six test pits excavated across the site to depths of up to 5 m was dispatched to Envirolab Group in Sydney for an assessment of the Net Acid Production Potential. The detailed results attached, indicate that the CWR sample had a negative Acid Production Potential (ie actually has an Acid Neutralising Capability) of 26 kg of H_2S0_4/tonne.

Similar results were obtained from testing of the CWR by NSW Department of Mineral Resources on 2002. The current and previous results are contained in Appendix F.

Based on these results, the acid production potential of the CWR should not be considered a factor limiting development of the site and is unlikely to adversely affect the quality of the groundwater leaving the site.

6.4 Liquefaction of CWR Fines under Earthquake Loads

Where the subsurface soils include zones of loose sands or silty sands, these soils can be susceptible to liquefaction during a significant seismic event. Previous investigation by DP has indicated that such soils are present on the site at various depths in various CPT's (such as CPT 1, 3, 5 104, 105, 108 and 220).

Preliminary analysis of the CPT profiles was carried out using the method of Juang et al (Appendix G). A Hazard Factor, Z, of 0.11 which corresponds to the peak horizontal bedrock acceleration for the Mt Annan area. This value has a 1 in 500 year annual probability of exceedance (or a 10% chance of exceedance in 50 years - a typical design life) and a Magnitude 6 earthquake (approximately a 1 in 500 year event and similar to the 1989 Newcastle earthquake).

With the groundwater levels based on the results of the nearest borehole data, the results of the analysis indicate the potential for liquefaction is virtually zero for all of the CPT's analysed. Groundwater levels would need to rise dramatically to near surface levels for any significant potential for liquefaction to affect the development with the current profile. As further CWR filling is placed, the overburden pressures will increase and the potential for liquefaction will reduce further.

Plots showing the results of measured groundwater levels are presented in Appendix B. Also in Appendix B are plots for CPT 108 indicating the effect of the groundwater levels on liquefaction potential.

Based on the results of groundwater monitoring it is considered extremely unlikely that liquefaction of fine CWR will affect the development. Notwithstanding this, monitoring of groundwater levels during and after development would be prudent to confirm the assumptions.

6.5 Impact Rolling

High energy impact rolling has been considered as an option to improve the uniformity and density of the upper 1 m to 3 m of the existing emplacement. It should be noted that the impact rolling will not significantly reduce the magnitude and duration of the long term settlements which are primarily governed by the deep layers of soft soil, located well below the zone of influence of the impact roller.

Notwithstanding this and given the likely nature of the proposed development, impact rolling has the potential to improve the geotechnical characteristics of the upper layers of existing emplacement and provide a suitable base for placement of engineered filling. Impact rolling could also be targeted to sensitive areas beneath structures and where no engineered filling has been placed.

Monitoring and testing by DP on construction sites in NSW indicate that impact rollers can have a zone of influence on ground improvement up to 3 m in depth, providing soil conditions and the groundwater regime are favourable. The impact roller operates most effectively on granular, non-cohesive soils such as coal washery coarse rejects with a groundwater level at least 1.5 m below the depth of roller influence and with a firm underlying stratum.

Monitoring of an impact rolling trial on the Sada site (Project 40950.05-2 dated 20 October 2011) indicated significant increase in the modulus (ie strength) of the near surface coalwash, however the results of CPT testing indicated that the zone of influence was relatively shallow (less than 1 m) in areas that had previously been compacted in layers using conventional equipment.

As the groundwater levels across the site are likely to be well below the zone in which they can influence to impact rolling, extensive dewatering and/or drying of the filling will probably not be required for impact rolling to be effective over a significant depth of previously uncompacted filling. Typically, investigation and testing are undertaken before and after impact rolling to gauge the effectiveness of the work. Monitoring of settlement during construction would be carried out using settlement plates installed at different levels in the filling soils, with rolling deemed to be complete when predetermined settlement criteria (typically in the order of 5 - 10 mm settlement per 20 roller passes) have been achieved.

6.6 Surcharge

The CPT results indicate that there are extensive areas of soft, fined grained cohesive filling material underlying the site. Settlement estimates indicate that at some locations this material could consolidate and result in total settlement at the surface of the emplacement in the order of 1 m under the new filling embankment loads and final (development) working loads. To minimise the effects on structures, consolidation of the fine grained cohesive emplacement materials within and beneath the granular filling could be induced and accelerated by placing surcharge loads on the filling platform after it has been compacted using the methodology set out Section 6.1 above. Typically, the surcharge load applied should be at least 1.5 times the maximum distributed design bearing pressure proposed for the area in its final configuration. Surcharge would be in place for sufficient time to achieve up to 90% primary consolidation settlement and a significant proportion of secondary "creep" settlement.

Testing has indicated that the cohesive material is variable in strength, location and depth, and that the height of preload required to achieve the target 90% consolidation in 2 years would be greater than 5 - 6 m in some areas.

To provide suitable settlement data, a number of settlement plates will need to be installed during filling and regularly monitored until the surcharge is removed. Installation of survey monuments should also be carried out to monitor the settlement performance of the embankment for at least 5 years after the removal of surcharge to ensure that the surcharging has achieved the desired result. Rates of secondary "creep" would also be estimated from the continued settlement monitoring readings after removal of surcharge.

An area within the Sada site has been selected for a trial and filled to design level (Project 40950.05-3 dated 17 February 2012). Settlement plates have been installed, surcharge placed and monitoring underway. The results to date are variable, with up to 100 mm of settlement measured. The results have not been analysed in detail yet.

6.7 Perimeter Wall Batter Slopes

Inspection of the site and review of the survey information indicates that the perimeter wall was originally constructed as a dam wall and is, in parts of the Tripodi site, irregular in its alignment. To provide a safe, long term perimeter to the proposed development some re-profiling and reworking of the perimeter wall may be required. The results of the recent investigation on the Tripodi site will provide information to develop a geotechnical model for a stability assessment of the batters and suggest modified profiles.

7. Summary

The results of the previous investigations and assessments indicate that the redevelopment of the emplacement for commercial or industrial land use is considered feasible from a geotechnical perspective. Ongoing detailed geotechnical investigation and analysis will be required to develop an earthworks methodology for the construction. Soft soils, where encountered, will be preloaded to achieve settlement targets, new filling will be placed in layers and compacted in accordance with the methodology developed, external batters will be regraded and stabilised and the whole site will be capped with at least 2 m of engineered filling.

8. Limitations

Douglas Partners Pty Ltd (DP) has prepared this report for this project at Glenlee Emplacement off Springs Road at Spring Farm. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Sada Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

Douglas Partners Pty Ltd

Appendix A

About This Report
Drawings 1 - 5

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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This report is the property of Douglas Partners Pty Ltd. The report may only be used for the purpose for which it was commissioned and in accordance with the Conditions of Engagement for the commission supplied at the time of proposal. Unauthorised use of this report in any form whatsoever is prohibited.

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard AS 1726, Geotechnical Site Investigations Code. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	20 - 63
Medium gravel	6 - 20
Fine gravel	2.36 - 6
Coarse sand	0.6 - 2.36
Medium sand	0.2 - 0.6
Fine sand	0.075 - 0.2

The proportions of secondary constituents of soils are described as:

Term	Proportion	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	20 - 35%	Sandy Clay
Slightly	12 - 20%	Slightly Sandy Clay
With some	5 - 12%	Clay with some sand
With a trace of	0 - 5%	Clay with a trace of sand

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	vs	<12
Soft	s	12 - 25
Firm	f	25 - 50
Stiff	st	50 - 100
Very stiff	vst	100 - 200
Hard	h	>200

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	SPT N value	CPT qc value (MPa)
Very loose	vl	<4	<2
Loose	l	4 - 10	2 -5
Medium dense	md	10 - 30	5 - 15
Dense	d	30 - 50	15 - 25
Very dense	vd	>50	>25

Soil Descriptions

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Transported soils - formed somewhere else and transported by nature to the site; or
- Filling - moved by man.

Transported soils may be further subdivided into:

- Alluvium - river deposits
- Lacustrine - lake deposits
- Aeolian - wind deposits
- Littoral - beach deposits
- Estuarine - tidal river deposits
- Talus - scree or coarse colluvium
- Slopewash or Colluvium - transported downslope by gravity assisted by water. Often includes angular rock fragments and boulders.

Rock Descriptions

Douglas Partners

Rock Strength

Rock strength is defined by the Point Load Strength Index ($Is_{(50)}$) and refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects. The test procedure is described by Australian Standard 4133.4.1 - 1993. The terms used to describe rock strength are as follows:

Term	Abbreviation	Point Load Index $Is_{(50)}$ MPa	Approx Unconfined Compressive Strength MPa*
Extremely low	EL	<0.03	<0.6
Very low	VL	0.03 - 0.1	0.6 - 2
Low	L	0.1 - 0.3	2 - 6
Medium	M	0.3 - 1.0	6 - 20
High	H	1 - 3	20 - 60
Very high	VH	3 - 10	60 - 200
Extremely high	EH	>10	>200

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Extremely weathered	EW	Rock substance has soil properties, i.e. it can be remoulded and classified as a soil but the texture of the original rock is still evident.
Highly weathered	HW	Limonite staining or bleaching affects whole of rock substance and other signs of decomposition are evident. Porosity and strength may be altered as a result of iron leaching or deposition. Colour and strength of original fresh rock is not recognisable
Moderately weathered	MW	Staining and discolouration of rock substance has taken place
Slightly weathered	SW	Rock substance is slightly discoloured but shows little or no change of strength from fresh rock
Fresh stained	Fs	Rock substance unaffected by weathering but staining visible along defects
Fresh	Fr	No signs of decomposition or staining

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with some fragments
Fractured	Core lengths of 40-200 mm with some shorter and longer sections
Slightly Fractured	Core lengths of 200-1000 mm with some shorter and loner sections
Unbroken	Core lengths mostly > 1000 mm

Rock Descriptions

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections} \geq 100 \text{ mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or better. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

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Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core Drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

Symbols & Abbreviations

Graphic Symbols for Soil and Rock

General

 Asphalt

 Road base

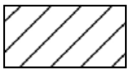
 Concrete

 Filling

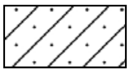
Soils

 Topsoil

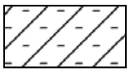
 Peat

 Clay

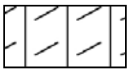
 Silty clay

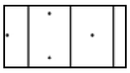
 Sandy clay

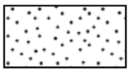
 Gravelly clay

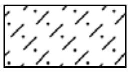
 Shaly clay

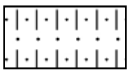
 Silt

 Clayey silt

 Sandy silt

 Sand

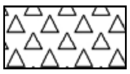
 Clayey sand

 Silty sand

 Gravel

 Sandy gravel

 Cobbles, boulders

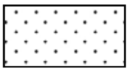
 Talus

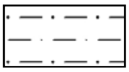
Sedimentary Rocks

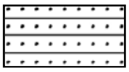
 Boulder conglomerate

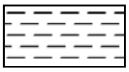
 Conglomerate

 Conglomeratic sandstone

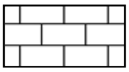
 Sandstone

 Siltstone

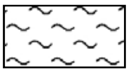
 Laminite

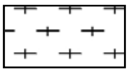
 Mudstone, claystone, shale

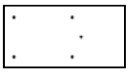
 Coal

 Limestone

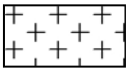
Metamorphic Rocks

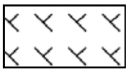
 Slate, phyllite, schist

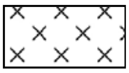
 Gneiss

 Quartzite

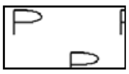
Igneous Rocks

 Granite

 Dolerite, basalt, andesite

 Dacite, epidote

 Tuff, breccia

 Porphyry

Cone Penetration Tests

Douglas Partners

Introduction

The Cone Penetration Test (CPT) is a sophisticated soil profiling test carried out in-situ. A special cone shaped probe is used which is connected to a digital data acquisition system. The cone and adjoining sleeve section contain a series of strain gauges and other transducers which continuously monitor and record various soil parameters as the cone penetrates the soils.

The soil parameters measured depend on the type of cone being used, however they always include the following basic measurements

- Cone tip resistance q_c
- Sleeve friction f_s
- Inclination (from vertical) i
- Depth below ground z

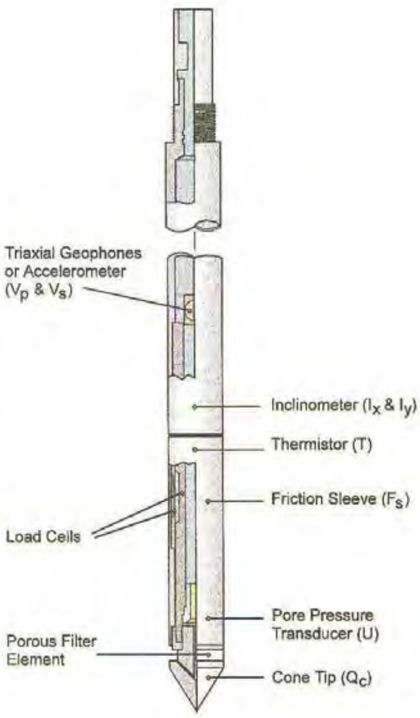


Figure 1: Cone Diagram

The inclinometer in the cone enables the verticality of the test to be confirmed and, if required, the vertical depth can be corrected.

The cone is thrust into the ground at a steady rate of about 20 mm/sec, usually using the hydraulic rams of a purpose built CPT rig, or a drilling rig. The testing is carried out in accordance with the Australian Standard AS1289 Test 6.5.1.

Figure 2: Purpose built CPT rig

The CPT can penetrate most soil types and is particularly suited to alluvial soils, being able to detect fine layering and strength variations. With sufficient thrust the cone can often penetrate a short distance into weathered rock. The cone will usually reach refusal in coarse filling, medium to coarse gravel and on very low strength or better rock. Tests have been successfully completed to more than 60 m.

Types of CPTs

Douglas Partners (and its subsidiary GroundTest) owns and operates the following types of CPT cones:

Type	Measures
Standard	Basic parameters (q_c, f_s, i & z)
Piezocone	Dynamic pore pressure (u) plus basic parameters. Dissipation tests estimate consolidation parameters
Conductivity	Bulk soil electrical conductivity (σ) plus basic parameters
Seismic	Shear wave velocity (V_s), compression wave velocity (V_p), plus basic parameters

Strata Interpretation

The CPT parameters can be used to infer the Soil Behaviour Type (SBT), based on normalised values of cone resistance (Qt) and friction ratio (Fr). These are used in conjunction with soil classification charts, such as the one below (after Robertson 1990)

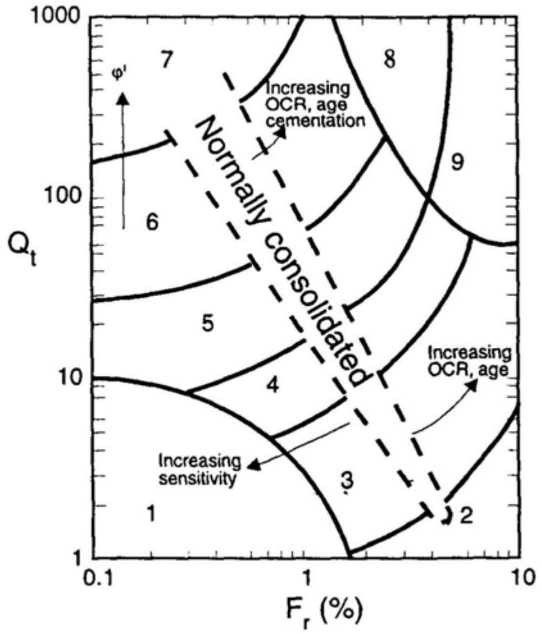


Figure 3: Soil Classification Chart

DP's in-house CPT software provides computer aided interpretation of soil strata, generating soil descriptions and strengths for each layer. The software can also produce plots of estimated soil parameters, including modulus, friction angle, relative density, shear strength and over consolidation ratio.

DP's CPT software helps our engineers quickly evaluate the critical soil layers and then focus on developing practical solutions for the client's project.

Engineering Applications

There are many uses for CPT data. The main applications are briefly introduced below:

Settlement

CPT provides a continuous profile of soil type and strength, providing an excellent basis for settlement analysis. Soil compressibility can be estimated from cone derived moduli, or known consolidation parameters for the critical layers (eg. from laboratory testing). Further, if pore pressure dissipation tests are undertaken using a piezocone, in-situ consolidation coefficients can be estimated to aid analysis.

Pile Capacity

The cone is, in effect, a small scale pile and, therefore, ideal for direct estimation of pile capacity. DP's in-house program ConePile can analyse most pile types and produces pile capacity versus depth plots. The analysis methods are based on proven static theory and empirical studies, taking account of scale effects, pile materials and method of installation. The results are expressed in limit state format, consistent with the Piling Code AS2159.

Dynamic or Earthquake Analysis

CPT and, in particular, Seismic CPT are suitable for dynamic foundation studies and earthquake response analyses, by profiling the low strain shear modulus G_0. Techniques have also been developed relating CPT results to the risk of soil liquefaction.

Other Applications

Other applications of CPT include ground improvement monitoring (testing before and after works), salinity and contaminant plume mapping (conductivity cone), preloading studies and verification of strength gain.

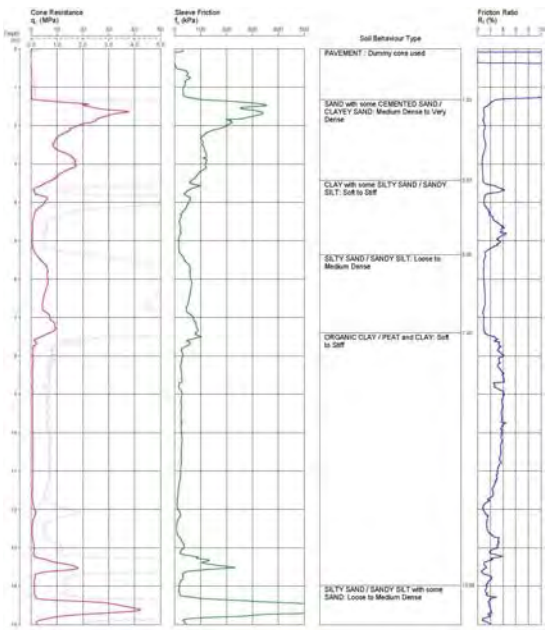


Figure 4: Sample Cone Plot

0 20 40 60 80 100 150 200 300 400m

1:4000 @ A3

Locality Plan

NOTE: Aerial image taken from nearmap.com

LEGEND

- Test Pit Location (DP Project 40950.09 dated November 2015)
- Test Pit Location (DP Project 40950.09 dated September 2015)
- Cone Penetration Test Location (78371)
- Test Pit Location (DP Project 78371.01 dated August 2012)
- Borehole Location (DP Project 78371.01 dated 2012)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.05)
- CPT Location (DP Project 40950.05)
- Borehole Location (DP Project 40950.01)
- CPT Location (DP Project 40950.00)
- CPT and Test Pit Location (DP Project 40950.00)
- Test Pit Location (DP Project 40950.00)

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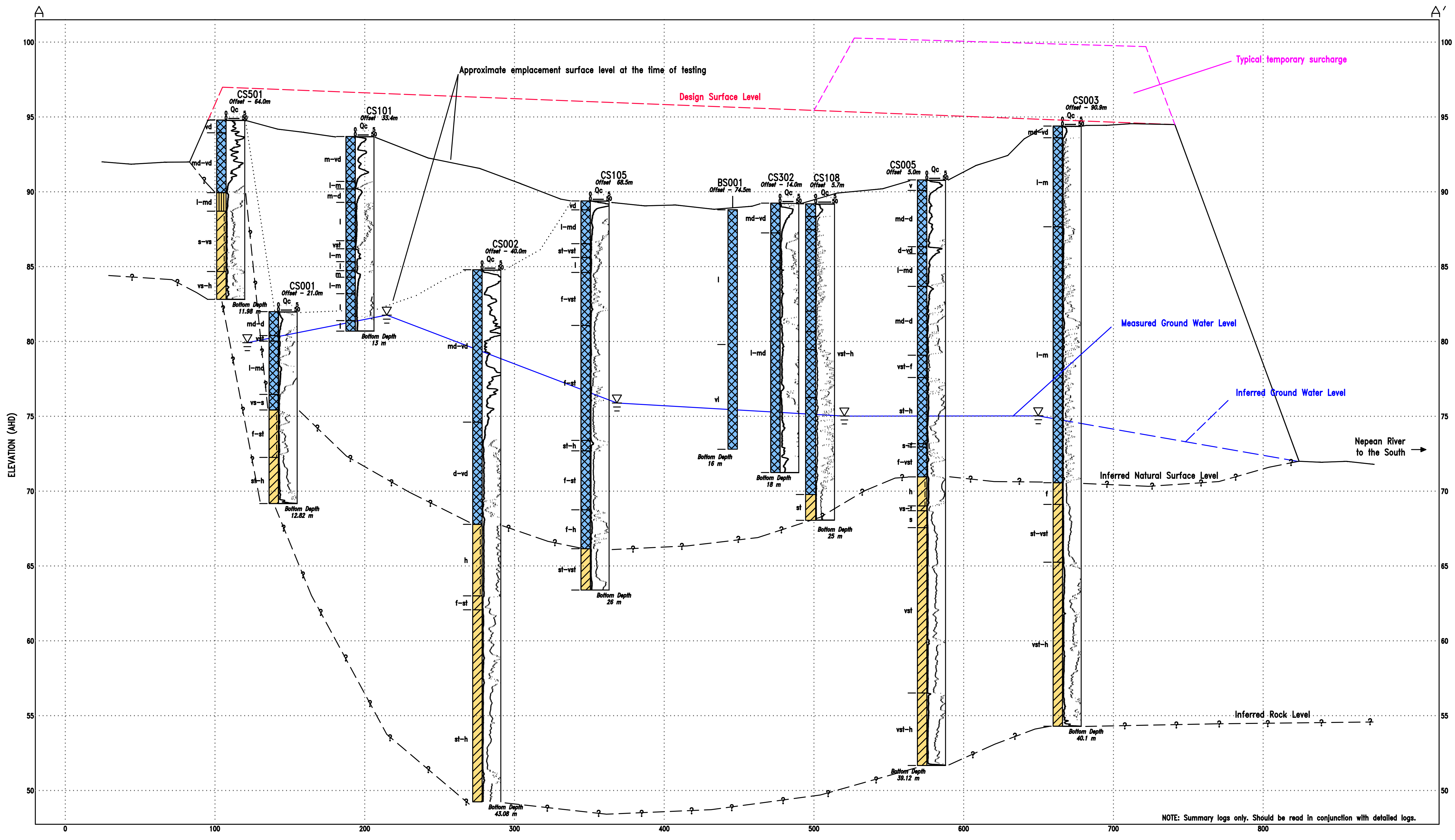
CLIENT: SADA Services Pty Ltd		TITLE: **Test Locations**	PROJECT No: 40950.09
OFFICE: Wollongong	DRAWN BY: CMcD	**Glenlee Emplacement Area**	DRAWING No: 1
SCALE: 1: 4000 @ A3	DATE: 30.11.2015	**Glenlee Road, Menangle Park**	REVISION: A

MGA



LEGEND

- Clay
- Filling
- Silty Clay
- Silt
- Natural Soil

ROCK STRENGTH		SOIL CONSISTENCY				TESTS / OTHER	
EL	– Extremely Low	vs	– very soft	vl	– very loose	N	– Standard penetration test value
VL	– Very Low	s	– soft	l	– loose	∇	– Water level
L	– Low	f	– firm	md	– medium dense		
M	– Medium	st	– stiff	d	– dense		
H	– High	vst	– very stiff	vd	– very dense		
VH	– Very High	h	– hard				

CLIENT: SADA Services Pty Ltd		TITLE: Cross–section A–A' Glenlee Precinct Rezoning Springs Road, Glenlee, NSW	PROJECT No: 40950.09
OFFICE: Wollongong	DRAWN BY: CMcD		DRAWING No: 2
SCALE: 1:2500 (H) 1:250 (V) @ A3	DATE: 30.11.2015		REVISION: A

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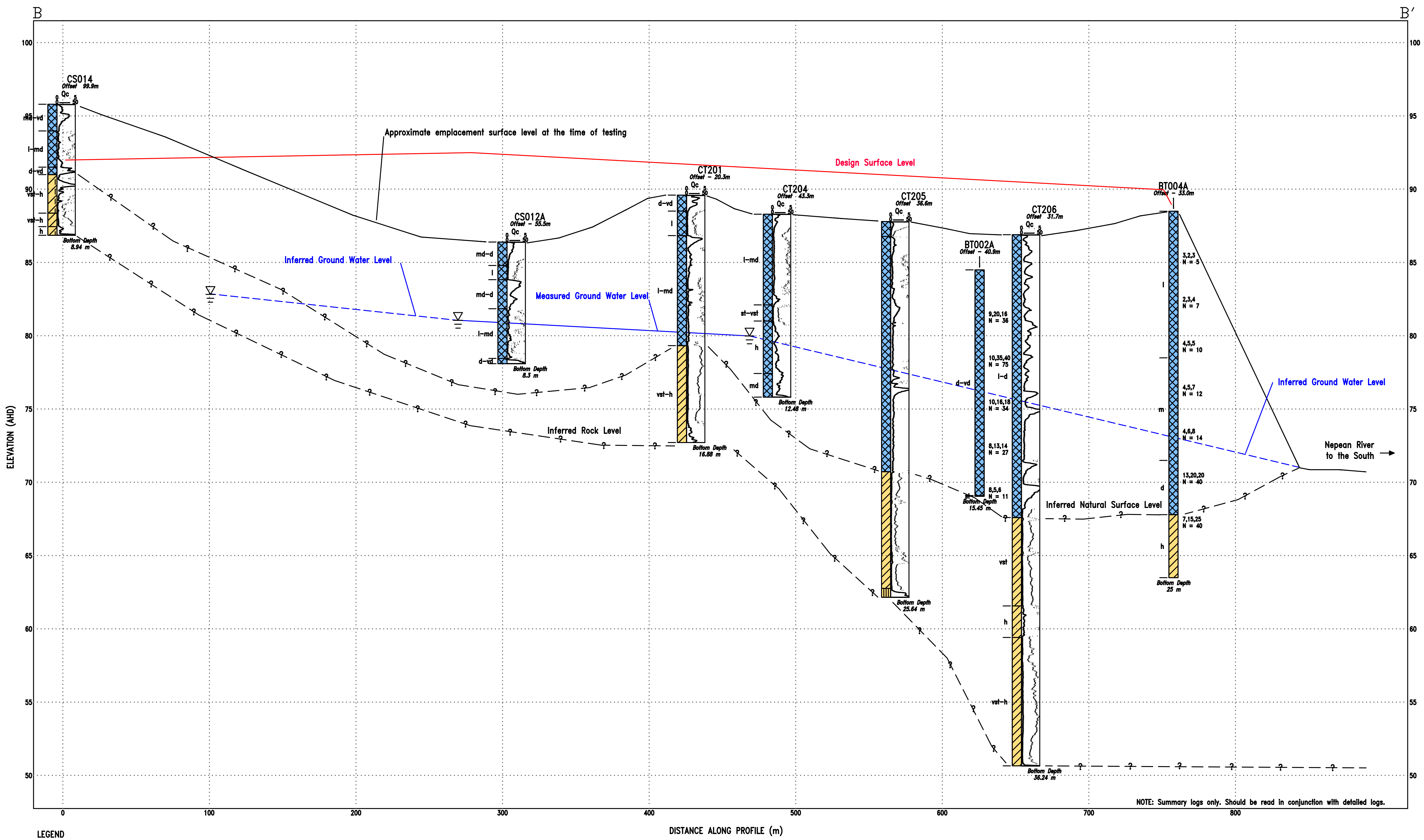
CPT LONG SECTION 40950.05 ALL FIELD DATA.GPJ DPTEMPLATE2012_V1_SYDMET.GDT 10/4/15



LEGEND

- Clay
- Filling
- Silty Clay
- Silt
- Natural Soil

ROCK STRENGTH
- EL – Extremely Low
- VL – Very Low
- L – Low
- M – Medium
- H – High
- VH – Very High

SOIL CONSISTENCY
- vs – very soft
- s – soft
- f – firm
- st – stiff
- vst – very stiff
- h – hard
- vl – very loose
- l – loose
- md – medium dense
- d – dense
- vd – very dense

TESTS / OTHER
- N – Standard penetration test value
- ▽ – Water level

0 50
Horizontal Scale (metres)
Vertical Exaggeration = 10.0

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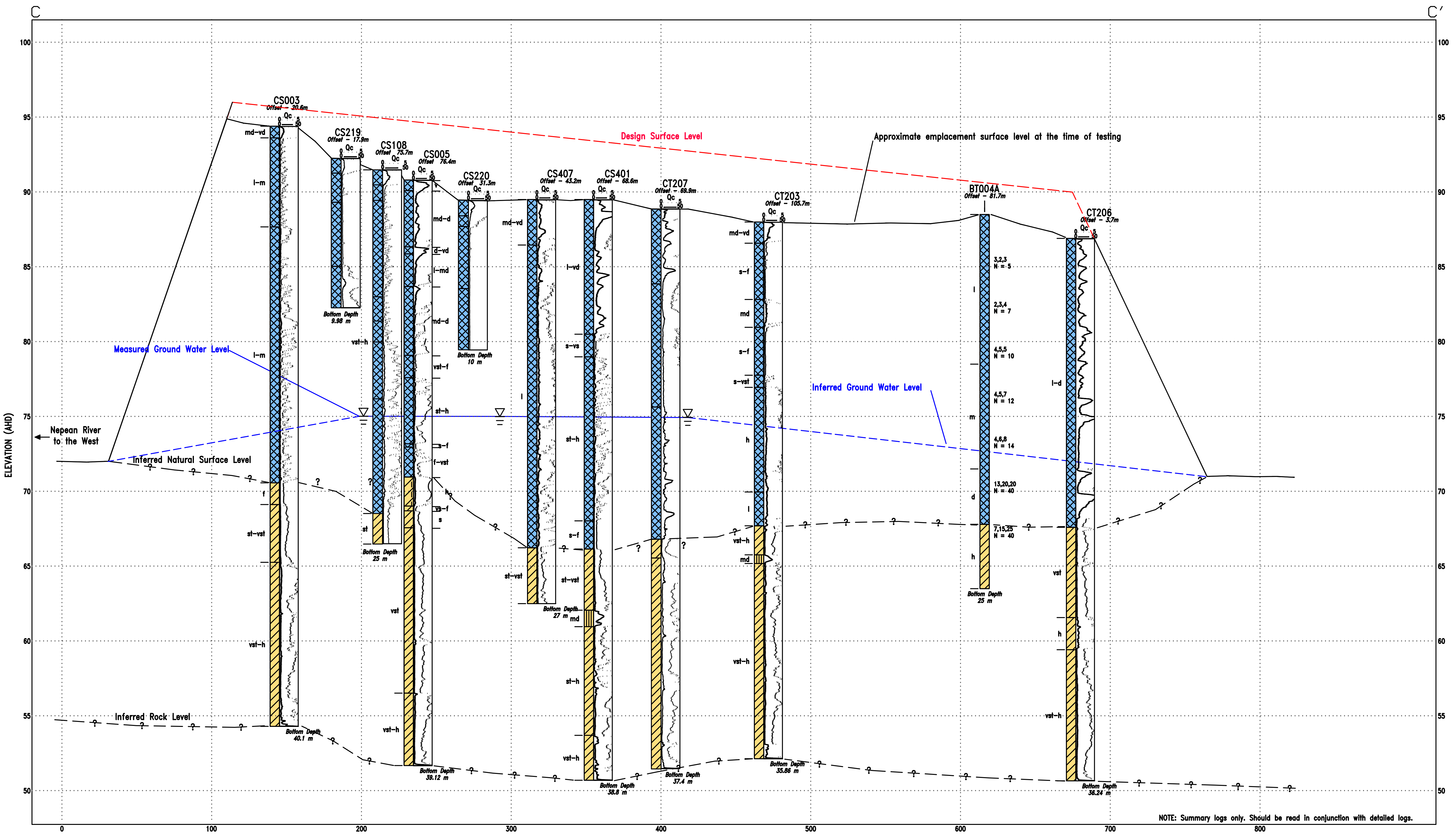
Geotechnics / Environment / Groundwater

CLIENT:	SADA Services Pty Ltd		
OFFICE:	Wollongong	DRAWN BY:	CMcD
SCALE:	1:2500 (H) 1:250 (V) @ A3	DATE:	30.11.2015

TITLE: Cross-section B-B'
Glenlee Precinct Rezoning
Springs Road, Glenlee, NSW

PROJECT No:	40950.09
DRAWING No:	3
REVISION:	

CPT LONG SECTION 40950.05 ALL FIELD DATA.GPJ DPTEMPLATE2012_V1_SYDMET.GDT 10/4/15



LEGEND

- Filling
- Natural Soil
- Clay
- Silty Clay
- Silt

ROCK STRENGTH	SOIL CONSISTENCY		TESTS / OTHER
EL – Extremely Low	vs – very soft	vl – very loose	N – Standard penetration test value
VL – Very Low	s – soft	l – loose	Water level
L – Low	f – firm	md – medium dense	
M – Medium	st – stiff	d – dense	
H – High	vst – very stiff	vd – very dense	
VH – Very High	h – hard		

0 50

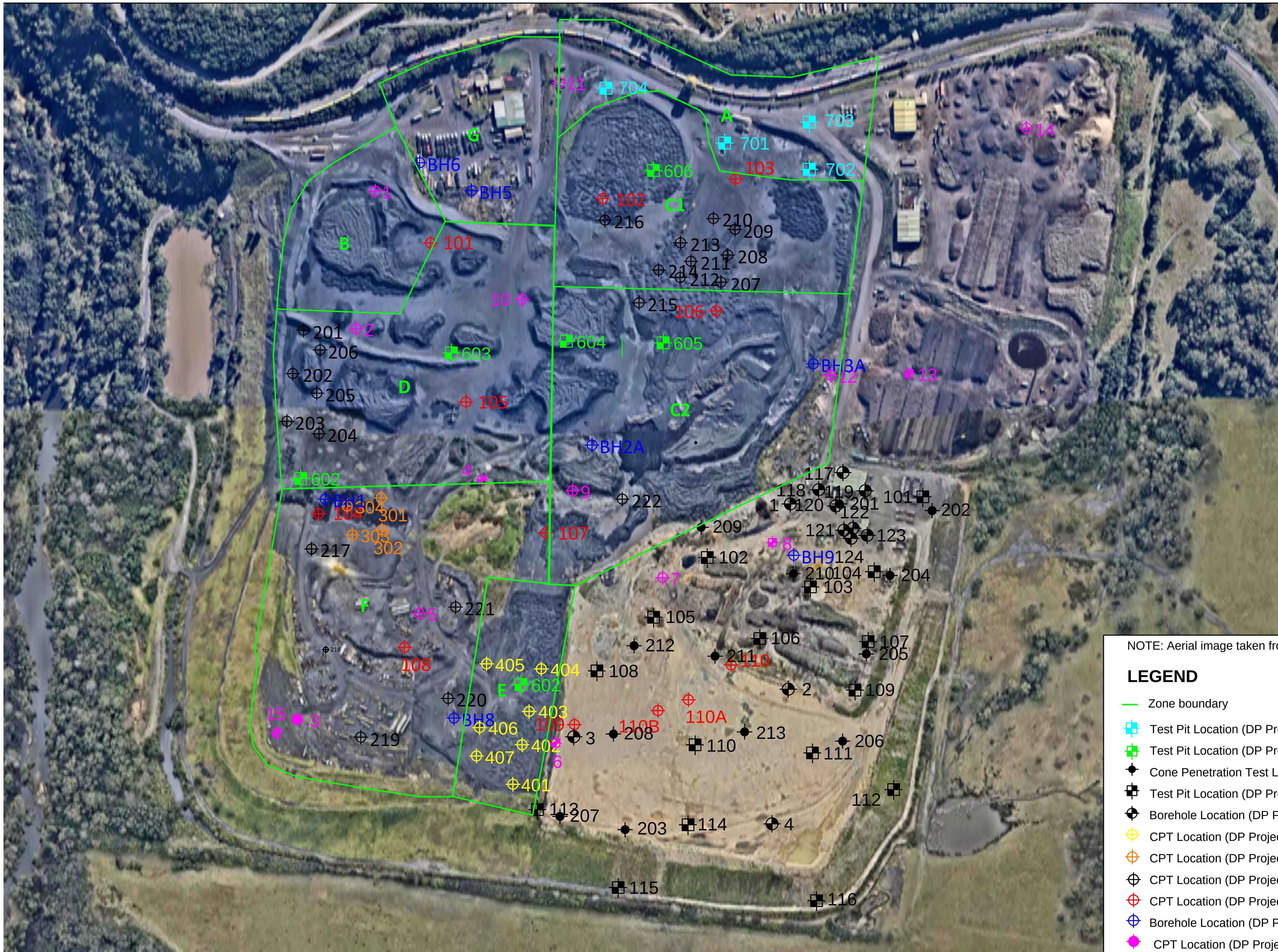
Horizontal Scale (metres)

Vertical Exaggeration = 10.0

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: SADA Services Pty Ltd		TITLE: Cross-section C – C′ Glenlee Precinct Rezoning Springs Road, Glenlee, NSW	PROJECT No: 40950.09
OFFICE: Wollongong	DRAWN BY: CMcD		DRAWING No: 4
SCALE: 1:2500 (H) 1:250 (V) @ A3	DATE: 30.11.2015		REVISION:

CPT LONG SECTION 40950.05 ALL FIELD DATA.GPJ DPTEMPLATE2012_V1_SYDMET.GDT 10/4/15



Locality Plan

0 20 40 60 80 100 150 200 300 400m

1:4000 @ A3

NOTE: Aerial image taken from nearmap.com

LEGEND

- Zone boundary
- Test Pit Location (DP Project 40950.09 dated November 2015)
- Test Pit Location (DP Project 40950.09 dated September 2015)
- Cone Penetration Test Location (78371)
- Test Pit Location (DP Project 78371.01 dated August 2012)
- Borehole Location (DP Project 78371.01 dated 2012)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.06)
- CPT Location (DP Project 40950.05)
- CPT Location (DP Project 40950.05)
- Borehole Location (DP Project 40950.01)
- CPT Location (DP Project 40950.00)
- CPT and Test Pit Location (DP Project 40950.00)
- Test Pit Location (DP Project 40950.00)

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CLIENT: SADA Services Pty Ltd		TITLE: **Test Locations**	PROJECT No: 40950.09
OFFICE: Wollongong	DRAWN BY: CMcD	**Glenlee Emplacement Area**	DRAWING No: 5
SCALE: 1: 4000 @ A3	DATE: 30.11.2015	**Glenlee Road, Menangle Park**	REVISION: A

N
MGA

Appendix B

Results of Field Work
Results of Groundwater Monitoring

TEST PIT LOG

CLIENT: Sada Services Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 82.0 AHD
EASTING: 291929
NORTHING: 6226642
DIP/AZIMUTH: 90°/--

PIT No: 1
PROJECT No: 40950
DATE: 27 Nov 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
82		FILLING - very loose to loose, slightly sandy fine to coarse gravel (shale) filling, moist (REJECT)							
				D	0.5				
81	1								
				D	1.5				
	1.8	FILLING - stiff, red brown clay filling, damp (CLAY CAP)						▷	
80	2			D	2.0				
	2.1	FILLING - soft, black silt to silty clay filling, humid (TAILINGS)							
				D	2.5				
	2.9	Pit discontinued at 2.9m (limit of investigation)							
79	3								

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: Minor to moderate seepage at 1.8m
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Sada Services Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 84.8 AHD
EASTING: 291910
NORTHING: 6226506
DIP/AZIMUTH: 90°/--

PIT No: 2
PROJECT No: 40950
DATE: 27 Nov 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - poorly to moderately compacted, slightly silty, slightly clayey medium to coarse gravel (carbonaceous shale, shale) filling, damp		D	0.2				
	0.3	FILLING - poorly to moderately compacted, slightly sandy medium to coarse gravel (shale) filling, humid (REJECT)							
		- tuff and sandstone gravel between 0.6 - 1.3m		D	0.6				
84									
	1								
		- poorly compacted below 1.3m							
				D	1.6				
83									
	2								
				D	2.5				
82		- gravel (sandstone) at 2.8m							
	3								
				D	3.1				
	3.2	Pit discontinued at 3.2m (limit of investigation)							
81									

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Sada Services Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 94.4 AHD
EASTING: 291973
NORTHING: 6226225
DIP/AZIMUTH: 90°/--

PIT No: 3
PROJECT No: 40950
DATE: 27 Nov 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - well compacted, black slightly sandy gravel (shale, sandstone) with trace cobbles and trace silt, dry (REJECT)							
		- becoming moderately compacted below 0.3m							
94									
		- humid below 0.5m		D	0.5				
	1								
93		- moist and poorly compacted below 1.4m		B	1.4–1.6				
	2								
92				D	2.5				
	3								
91				D	3.4				
	3.5	Pit discontinued at 3.5m (limit of investigation)							

RIG: Cat 428B Backhoe (600mm bucket)

LOGGED: R Haselden

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Sada Services Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 83.9 AHD
EASTING: 292035
NORTHING: 6226357
DIP/AZIMUTH: 90°/--

PIT No: 4
PROJECT No: 40950
DATE: 27 Nov 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - moderately compacted, black silty filling with some sand, humid							
	0.15	FILLING - well compacted, black slightly sandy fine to coarse gravel (shale, sandstone) filling with trace cobbles, dry to humid (REJECT)							
		- moderately compacted below 0.4m		D	0.5				
		- humid below 0.6m							
83	1								1
		- poorly compacted, moist below 1.5m		D	1.7				
82	2								2
				D	2.5				
81	3								3
	3.5	- trace waste material (wood) at 3.5m Pit discontinued at 3.5m (limit of investigation)		D	3.5				
80									

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 89.6
EASTING: 292108
NORTHING: 6226097
DIP/AZIMUTH: 90°/--

PIT No: 6
PROJECT No: 40950
DATE: 10 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.05	FILLING - moderately compacted, white and brown fine to coarse gravel and cobbles (sandstone) filling with some waste material (wood chips), dry							
		FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale and siltstone) filling with some sand, dry [REJECT] - humid below 0.6m		B	0.5–0.9				
89									
	1								
				D	1.5				
88									
	2								
	2.3	FILLING - poorly compacted, brown silt filling with some gravel sized pockets of clay, some root remains and trace waste material (plastic), humid [TAILINGS]		D	2.5				
87									
	2.9	FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale, siltstone) filling with some cobbles and sand, moist [REJECT]							
	3								
				D	3.5				
86									
	3.8	Pit discontinued at 3.8m							
	4								
85									

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 87.5
EASTING: 292213
NORTHING: 6226260
DIP/AZIMUTH: 90°/--

PIT No: 7
PROJECT No: 40950
DATE: 10 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - poorly compacted, dark grey to black stratified fine to medium sand filling with some silt and trace medium to coarse gravel (shale, siltstone), moist. Trace roots between 0.0 - 0.7m [TAILINGS]							
87				D	0.5				
	1								1
86				D	1.5				
	2								2
85				D	2.5				
	3								3
84				D	3.5				
	3.7	Pit discontinued at 3.7m (limit of reach)							
	4								4
83									

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 89.5
EASTING: 292322
NORTHING: 6226295
DIP/AZIMUTH: 90°/--

PIT No: 8
PROJECT No: 40950
DATE: 10 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - poorly compacted, grey to black gravel (shale, siltstone, brick) filling with some sand, waste material (plastic) and roots, humid [REJECT]							
89	0.25	FILLING - poorly compacted, brown and black stratified fine to coarse sand filling with some silt, humid to moist. Trace roots between 0.0 - 0.9m [TAILINGS]		D	0.5				
	1								1
88				B	1.5 - 1.7				
	2								2
87				D	2.5				
	3	- with some coarse gravel and trace cobbles (siltstone) below 3.0m							3
86				D	3.8				
	4 4.0	Pit discontinued at 4.0m (limit of reach)							4
85									

RIG: Cat 428B Backhoe (600mm bucket)

LOGGED: R Haselden

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 87.3
EASTING: 292124
NORTHING: 6226346
DIP/AZIMUTH: 90°/--

PIT No: 9
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale, siltstone and trace coal and sandstone) filling with some cobbles, trace sand and silt, dry to humid [REJECT] - humid below 0.2m - moist below 0.6m - trace waste material (wood) below 2.5m		D D D	0.5 1.5 2.5				
	2.8	FILLING - poorly compacted, grey and brown silty clay filling with root remains, damp [CLAY CAP]		D	2.8		pp = 60-70kPa		
	2.95	FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale, siltstone) with some sand, trace silt, cobbles and waste material (wood), humid to moist [REJECT]		D	3.5				
	3.5	Pit discontinued at 3.5m							

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Cave 0.7m out, from 0.2 - 2.4m

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 87.0
EASTING: 292074
NORTHING: 6226535
DIP/AZIMUTH: 90°/--

PIT No: 10
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
87		FILLING - poorly compacted, dark grey slightly cobbly fine to coarse gravel (shale, siltstone), trace sand and silt, dry to humid [REJECT] - humid below 0.2m							
				D	0.5				
86	1	- moist below 0.9m							1
				B	1.4 – 1.6				
85	2								2
				D	2.5				
84	3								3
				D	3.5				
	3.6	Pit discontinued at 3.6m							
83	4								4

RIG: Cat 428B Backhoe (600mm bucket)

LOGGED: R Haselden

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 96.3
EASTING: 292111
NORTHING: 6226749
DIP/AZIMUTH: 90°/--

PIT No: 11
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
96		FILLING - well compacted, mid to dark grey fine to coase gravel (shale, siltstone, coal and trace bricks) with some sand and cobbles and trace silt, dry [REJECT]							
				D	0.5				
		- moderately compacted and humid below 0.6m							
	1								
95		- sandy below 1.2m							
				B	1.4–1.6				
		- poorly compacted below 1.6m							
	2								
94									
				D	2.5				
	3								
93									
	3.5	Pit discontinued at 3.5m		D	3.5				
	4								
92									

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 86.4
EASTING: 292379
NORTHING: 6226460
DIP/AZIMUTH: 90°/--

PIT No: 12
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale, siltstone, trace sandstone) filling with trace cobbles, sand and silt, humid [REJECT]							
86		- moist below 0.5m		D	0.5				
85	1			D	1.5				
84	2			D	2.5				
83	3			D	3.5				
	4								
82	4.1	Pit discontinued at 4.1m							

RIG: Cat EL30 Excavator (1200mm bucket)

LOGGED: R Haselden

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 93.5
EASTING: 292457
NORTHING: 6226462
DIP/AZIMUTH: 90°/--

PIT No: 13
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - moderately compacted, brown and grey fine to coarse gravel (shale, siltstone) filling with some sand and silt, dry							
93	0.3	FILLING - poorly compacted, mid to dark grey fine to coarse gravel (shale, siltstone, trace sandstone and coal) filling with trace sand, silt and some cobbles, dry to humid [REJECT]		D	0.5				
	1								
92		- humid to moist below 1.3m		D	1.5				
91	2			D	2.5				
	2.8	SANDSTONE - medium strength, moderately weathered, yellow grey sandstone							
	2.85	Pit discontinued at 2.85m							
90	3								
89	4								

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: SADA Coal Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 95.8
EASTING: 292573
NORTHING: 6226704
DIP/AZIMUTH: 90°/--

PIT No: 14
PROJECT No: 40950
DATE: 11 Dec 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.03	FILLING - poorly compacted, light yellow grey fine to medium sand filling, dry							
		FILLING - moderately compacted, dark grey fine to coarse gravel (shale, siltstone and trace coal) filling with some cobbles, trace sand and silt, humid [REJECT] - poorly compacted below 0.3m - moist below 0.7m		D	0.5				
				B	1.4 – 1.7				
				D	2.6				
				D	3.4				
	3.5	Pit discontinued at 3.5m							

RIG: Cat 428B Backhoe (600mm bucket)
LOGGED: R Haselden
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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TEST PIT LOG

CLIENT: Sada Services Pty Ltd
PROJECT: Emplacement Area
LOCATION: Springs Road, Glenlee

SURFACE LEVEL: 95.6 AHD
EASTING: 291832
NORTHING: 6226107
DIP/AZIMUTH: 90°/--

PIT No: 15
PROJECT No: 40950
DATE: 27 Nov 07
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - poorly compacted, black fine to coase gravel (shale) filling with some cobbles and some sand and moss with waste materials (metal) between 0.0 - 0.2m (REJECT)							
95				D	0.6				
	1								1
				D	1.5				
94									
	1.7	Pit discontinued at 1.7m (pit terminated due to continued collapses)							
	2								2
93									
	3								3
92									

RIG: Cat 428B Backhoe (600mm bucket)

LOGGED: R Haselden

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Below 1.4m many collapses back to surface 450mm and up to > 2m in places

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U_x	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	▷	Water seep ▼ Water level

CHECKED
Initials:
Date:

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

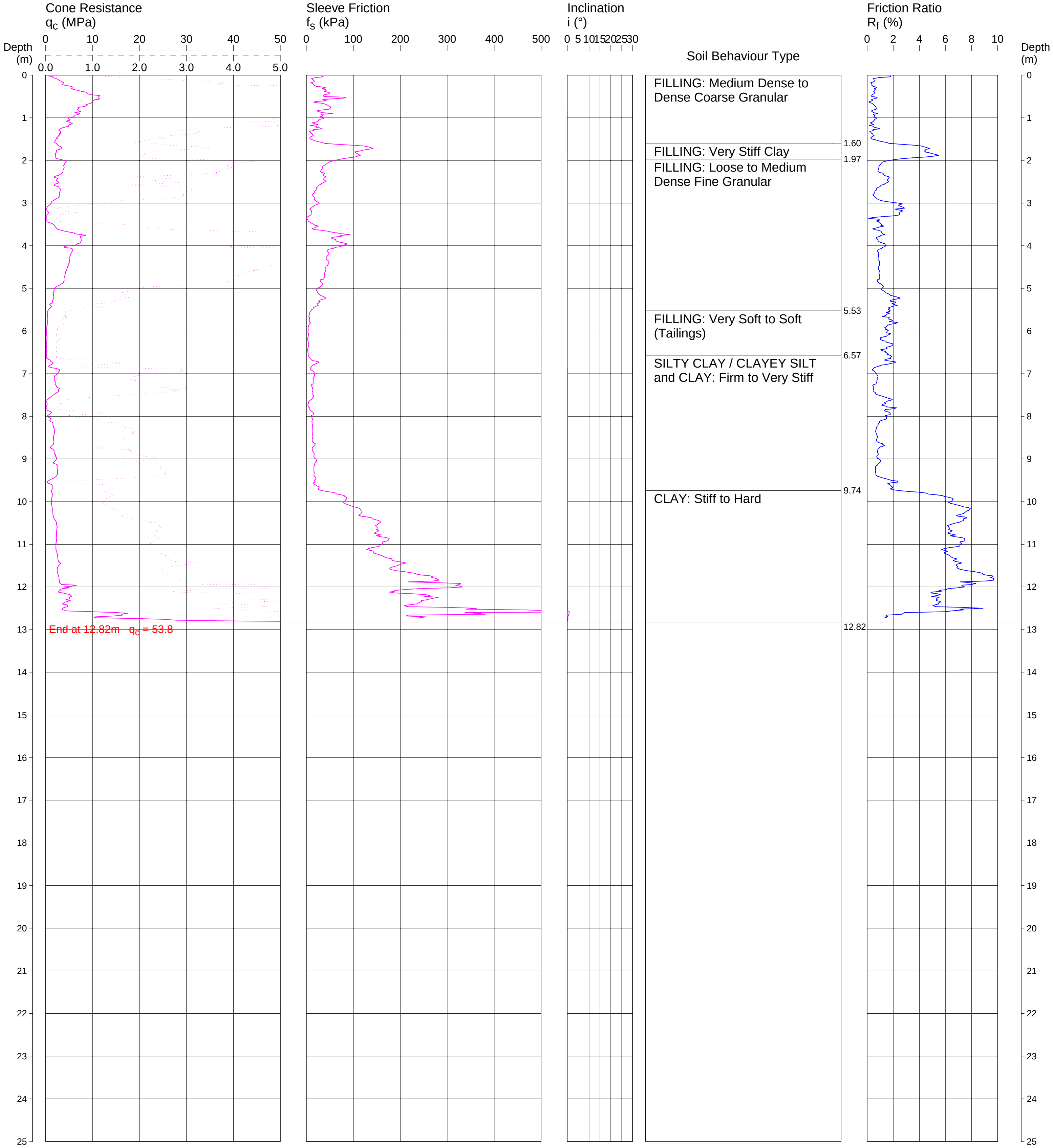
PROJECT No: 40950.00

01

Page 1 of 1

DATE 11/12/2007

SURFACE RL: 82.0



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-01.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

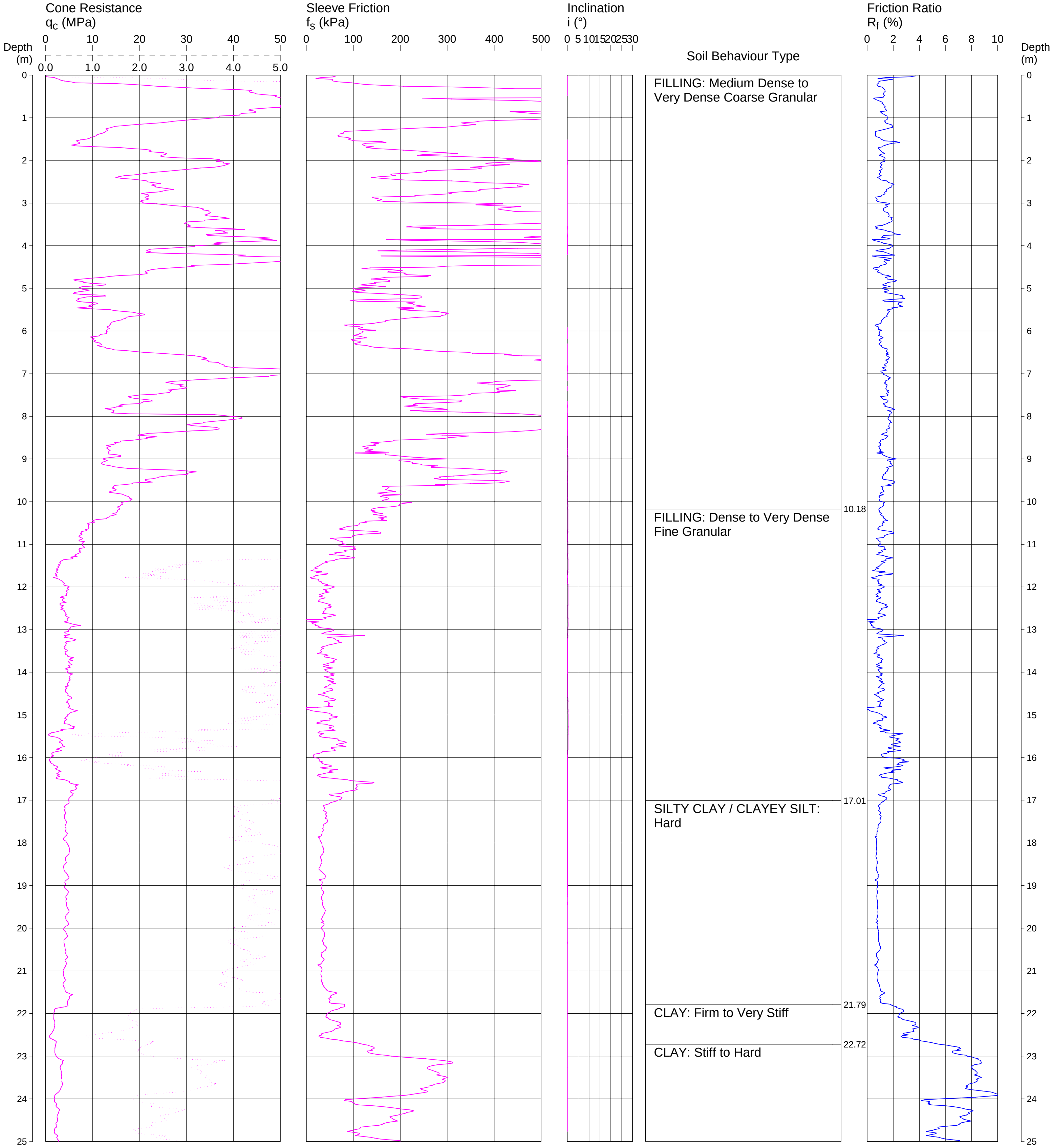
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

02

DATE 11/12/2007

SURFACE RL: 84.8



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-02.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

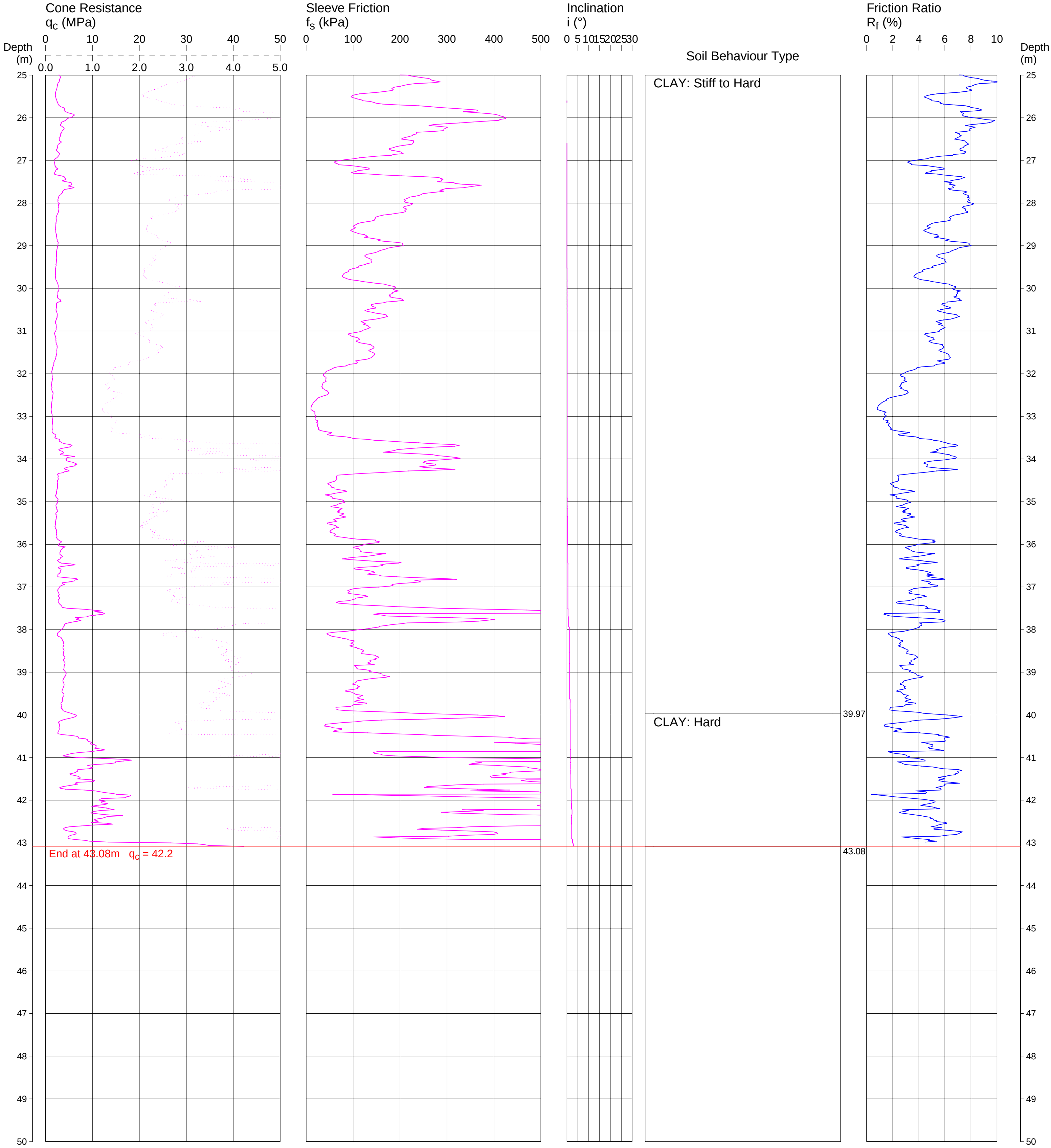
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

02

DATE 11/12/2007

SURFACE RL: 84.8



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-02.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

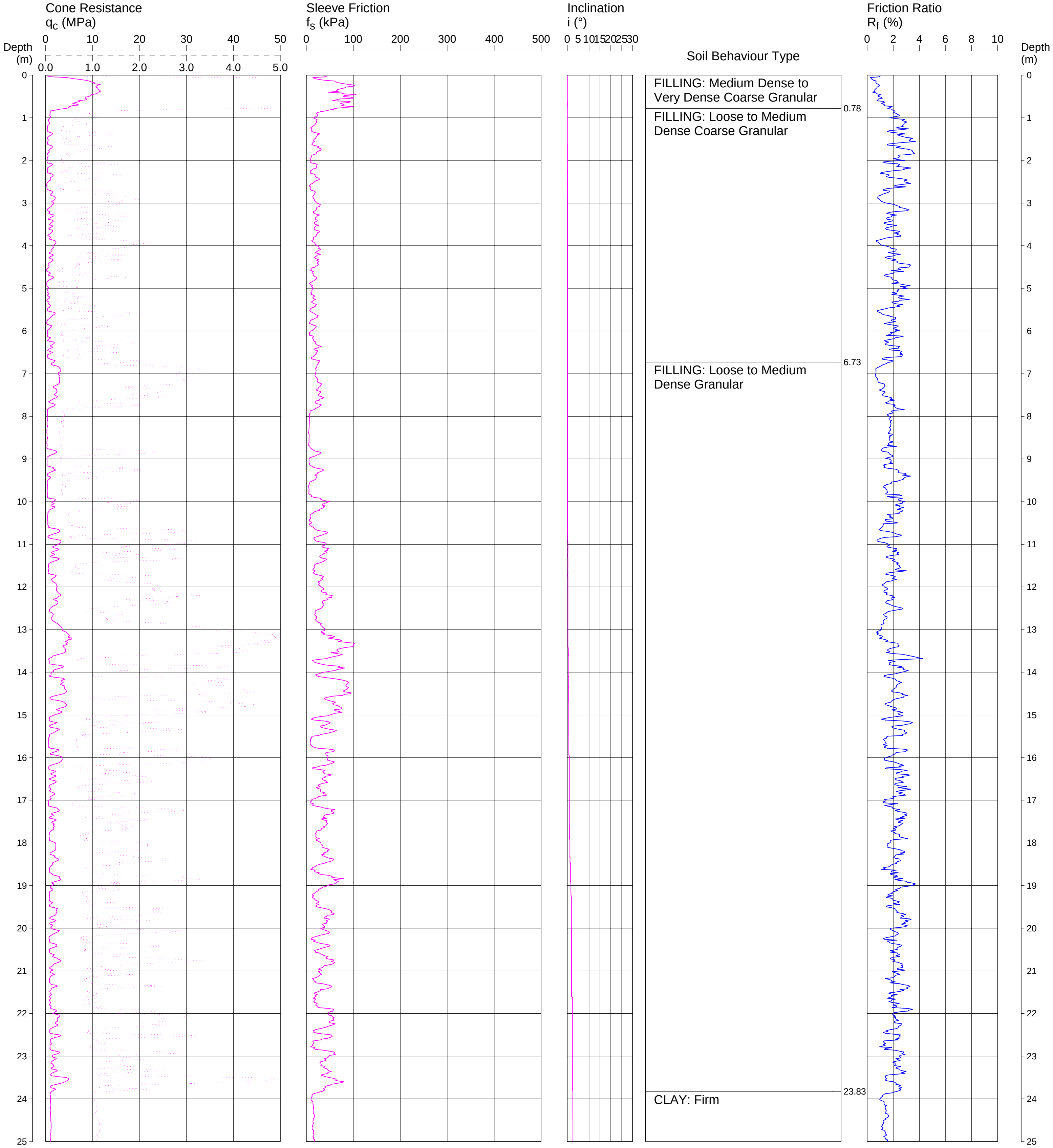
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

03

DATE 10/12/2007

SURFACE RL: 94.4



REMARKS:

Date	
Plotted	
Checked	

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-03.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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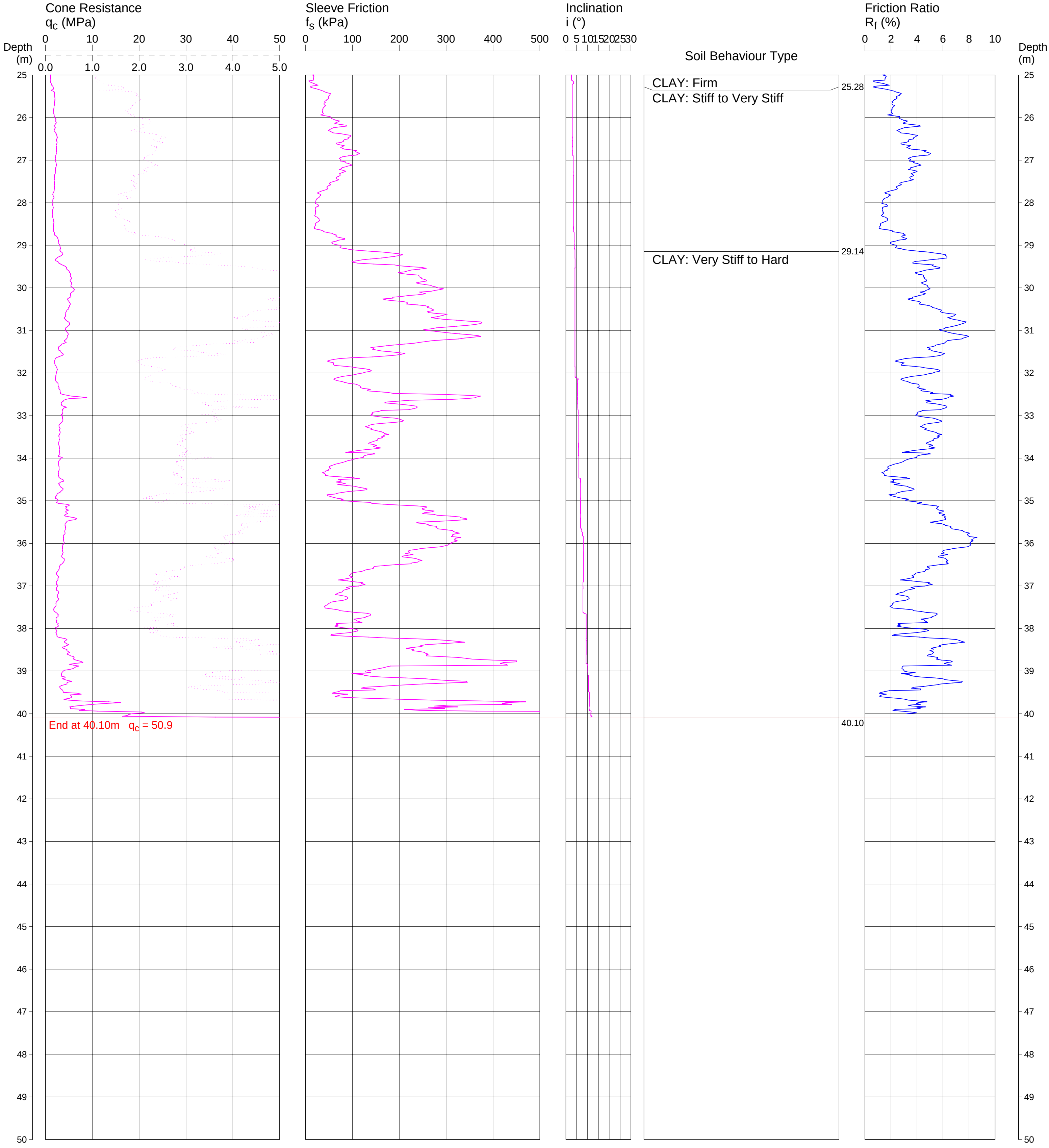
CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA
LOCATION: SPRINGS ROAD, GLENLEE
PROJECT No: 40950.00

03

DATE 10/12/2007
SURFACE RL: 94.4



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-03.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

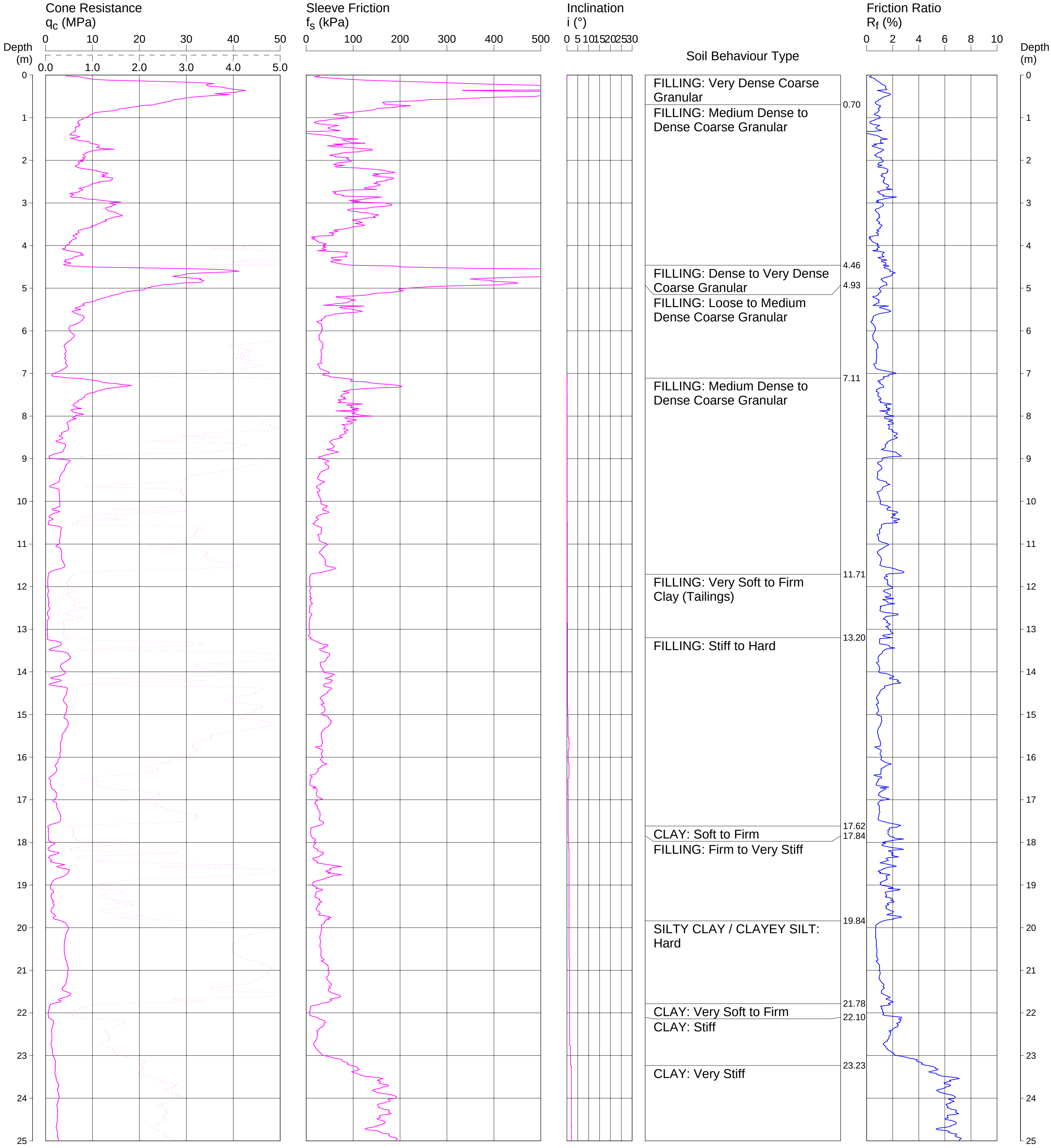
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

05

DATE 10/12/2007

SURFACE RL: 90.8



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-05.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

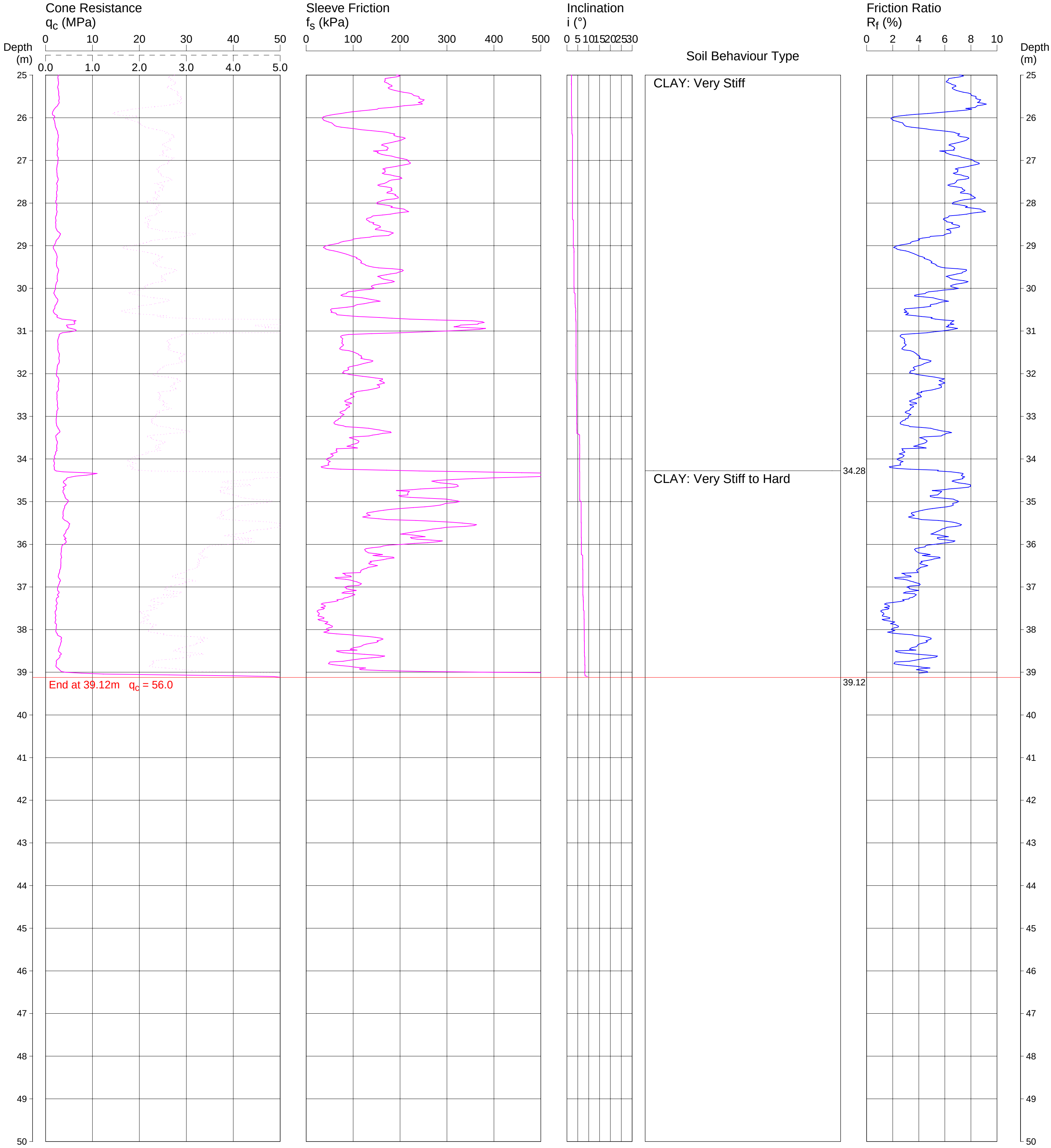
PROJECT No: 40950.00

05

Page 2 of 2

DATE 10/12/2007

SURFACE RL: 90.8



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-05.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

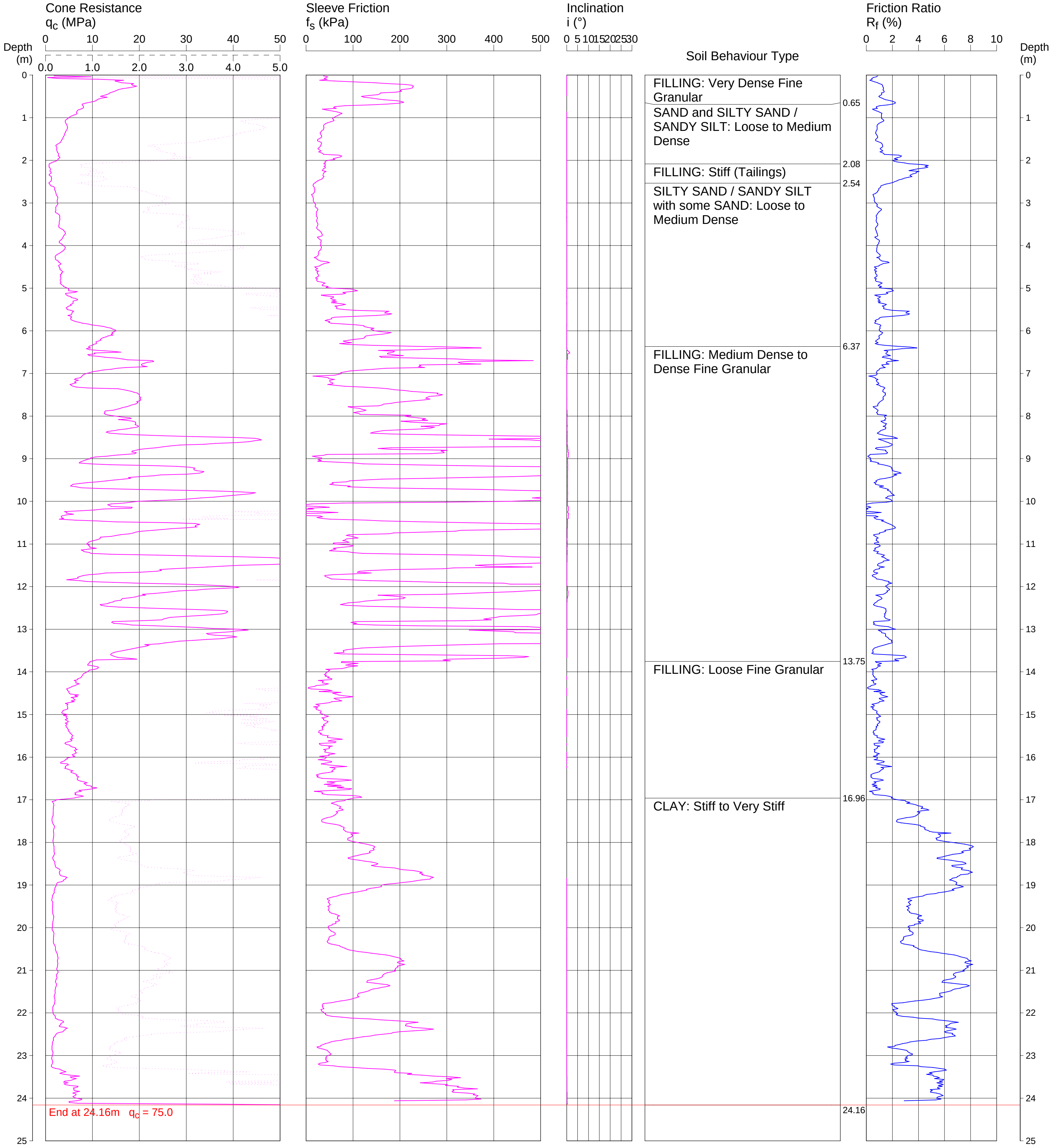
PROJECT No: 40950.00

07

Page 1 of 1

DATE 10/12/2007

SURFACE RL: 87.5



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-07.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

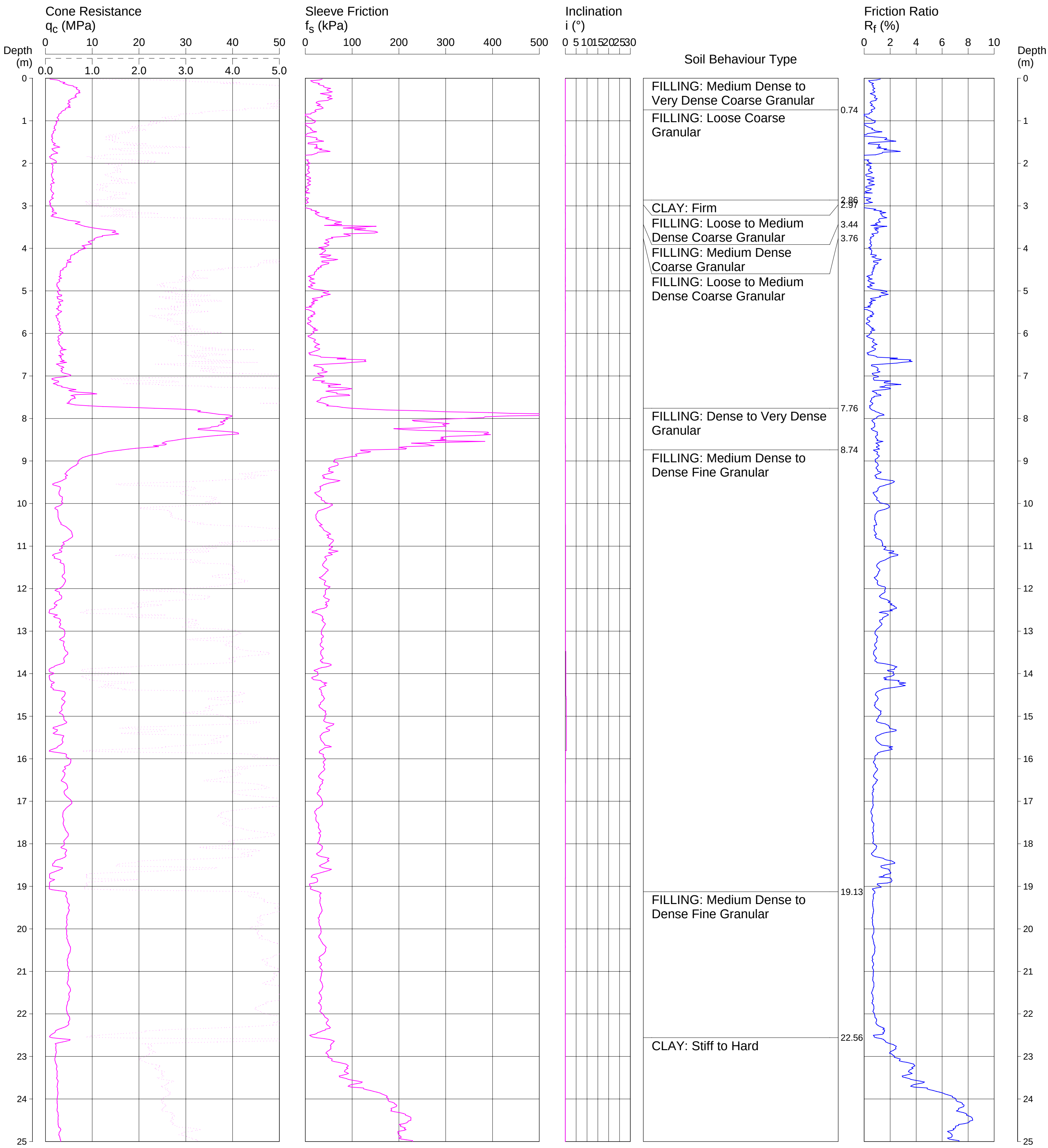
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

09

DATE 11/12/2007

SURFACE RL: 87.3



REMARKS:

Date	
Plotted	
Checked	

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-09.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

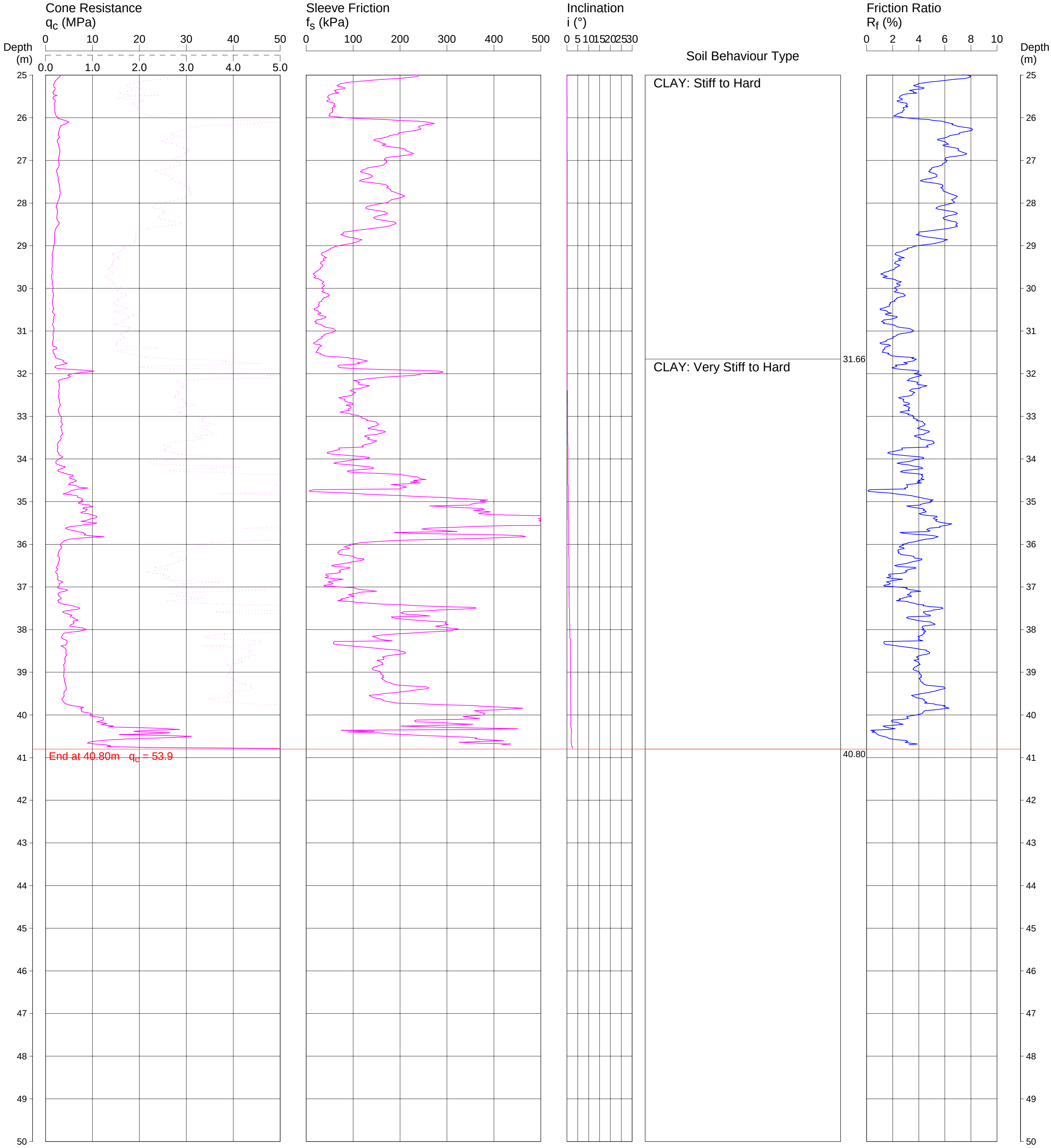
PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

DATE 11/12/2007

SURFACE RL: 87.3



REMARKS:

Date	
Plotted	
Checked	

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-09.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

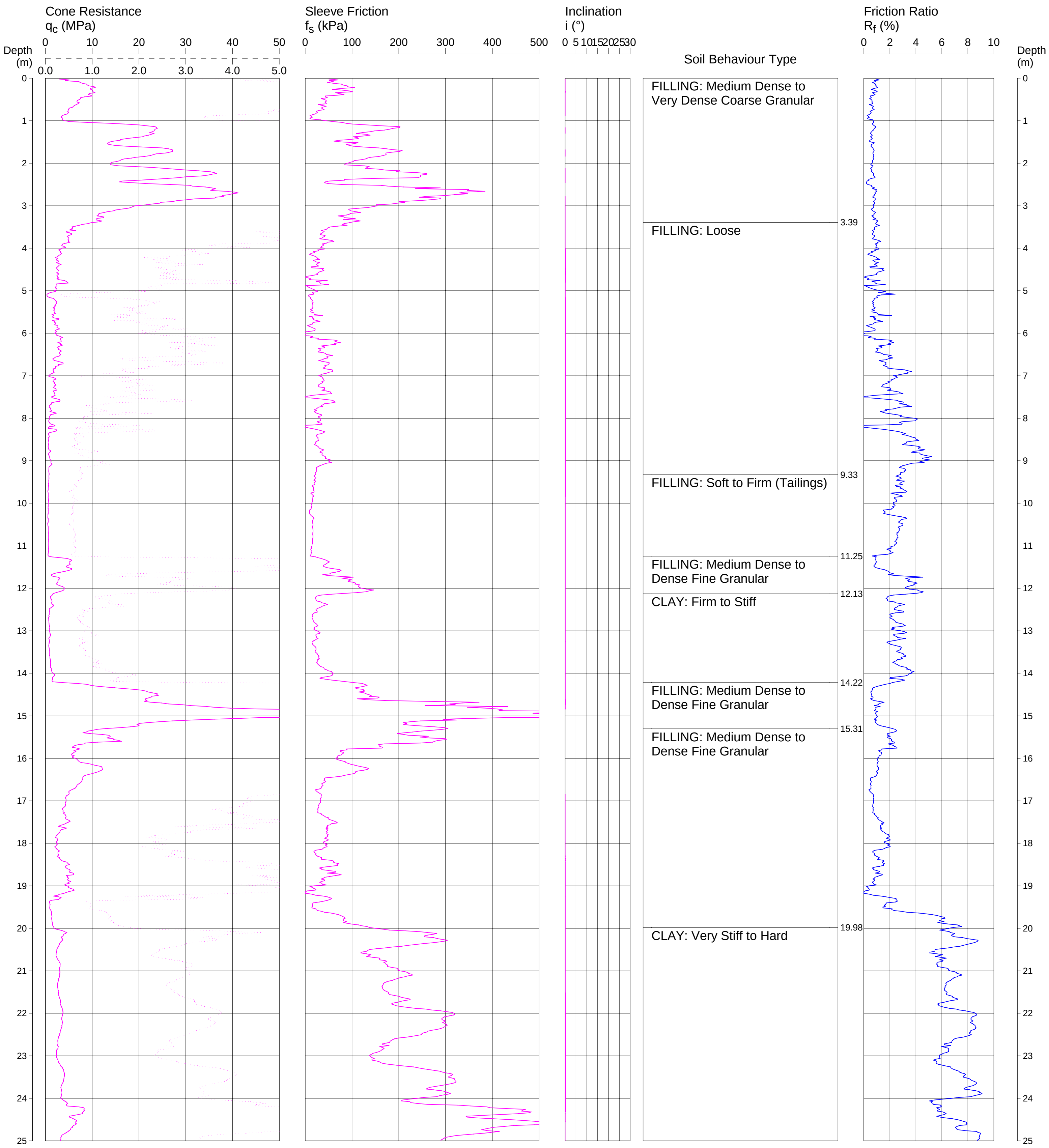
PROJECT No: 40950.00

10

Page 1 of 2

DATE 11/12/2007

SURFACE RL: 87.0



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-10.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

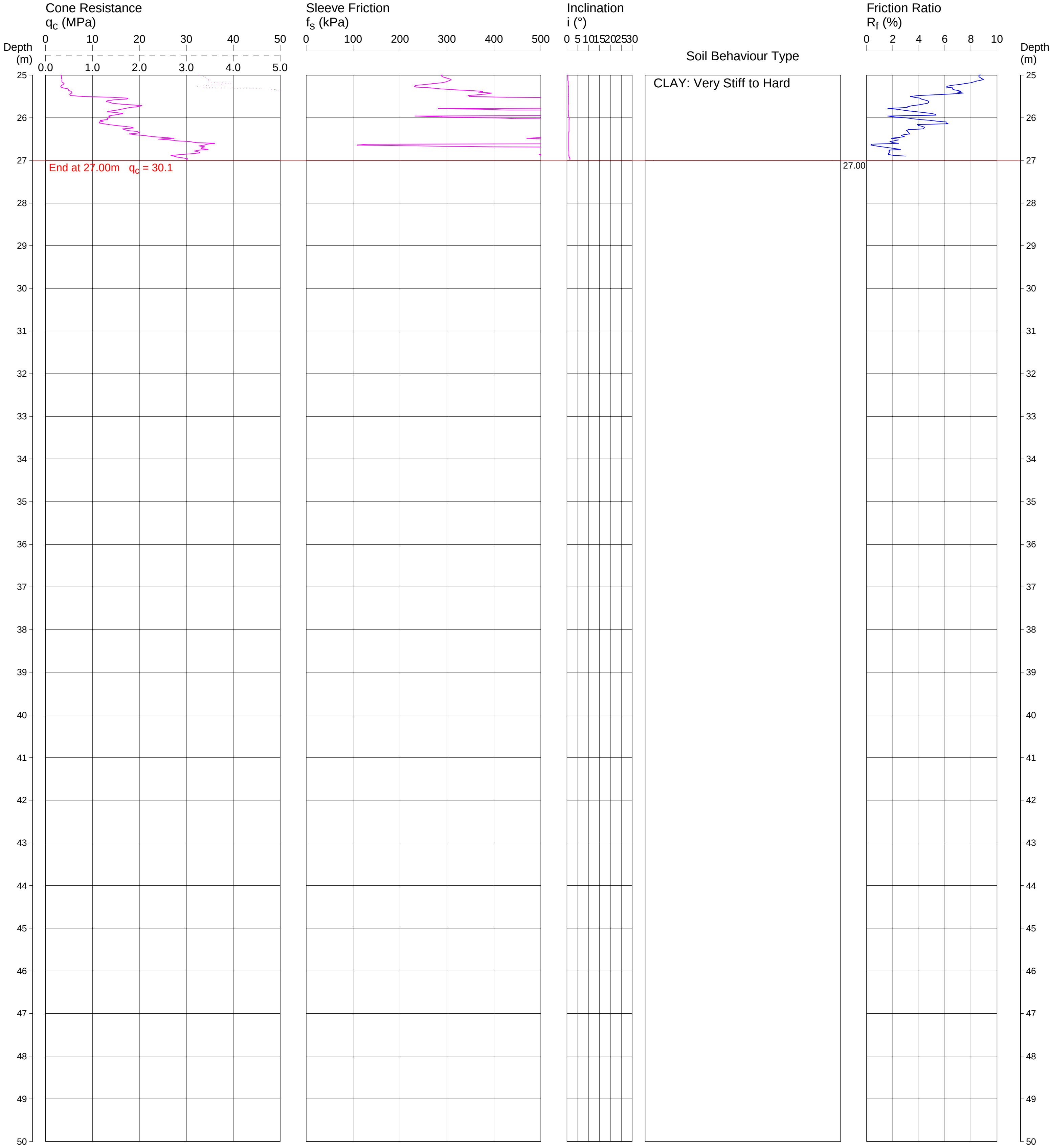
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

10

DATE 11/12/2007

SURFACE RL: 87.0



REMARKS:

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-10.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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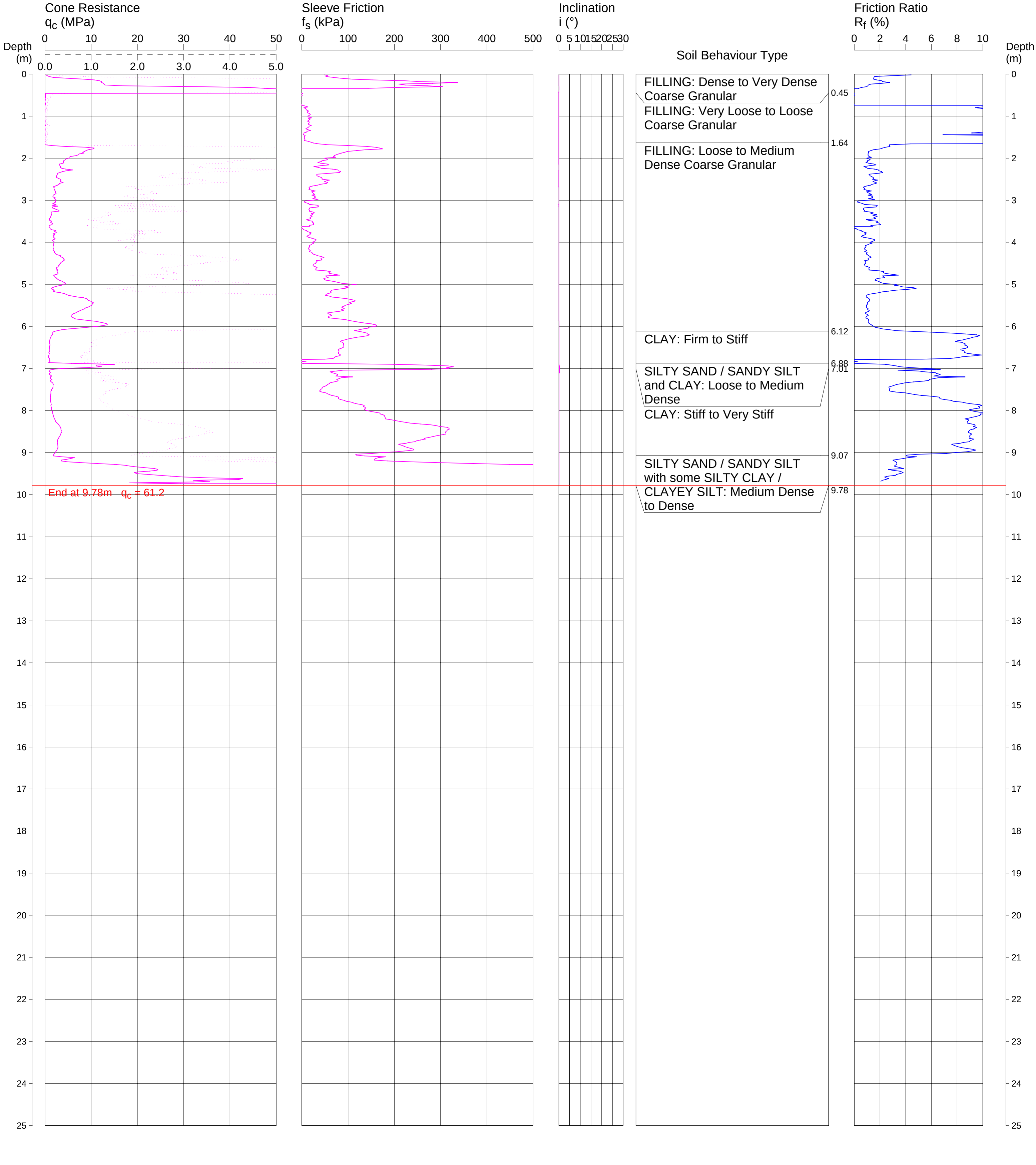
CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA
LOCATION: SPRINGS ROAD, GLENLEE
PROJECT No: 40950.00

11
Page 1 of 1
DATE 10/12/2007
SURFACE RL: 96.3



REMARKS:

Date	
Plotted	
Checked	

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-11.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

LOCATION: SPRINGS ROAD, GLENLEE

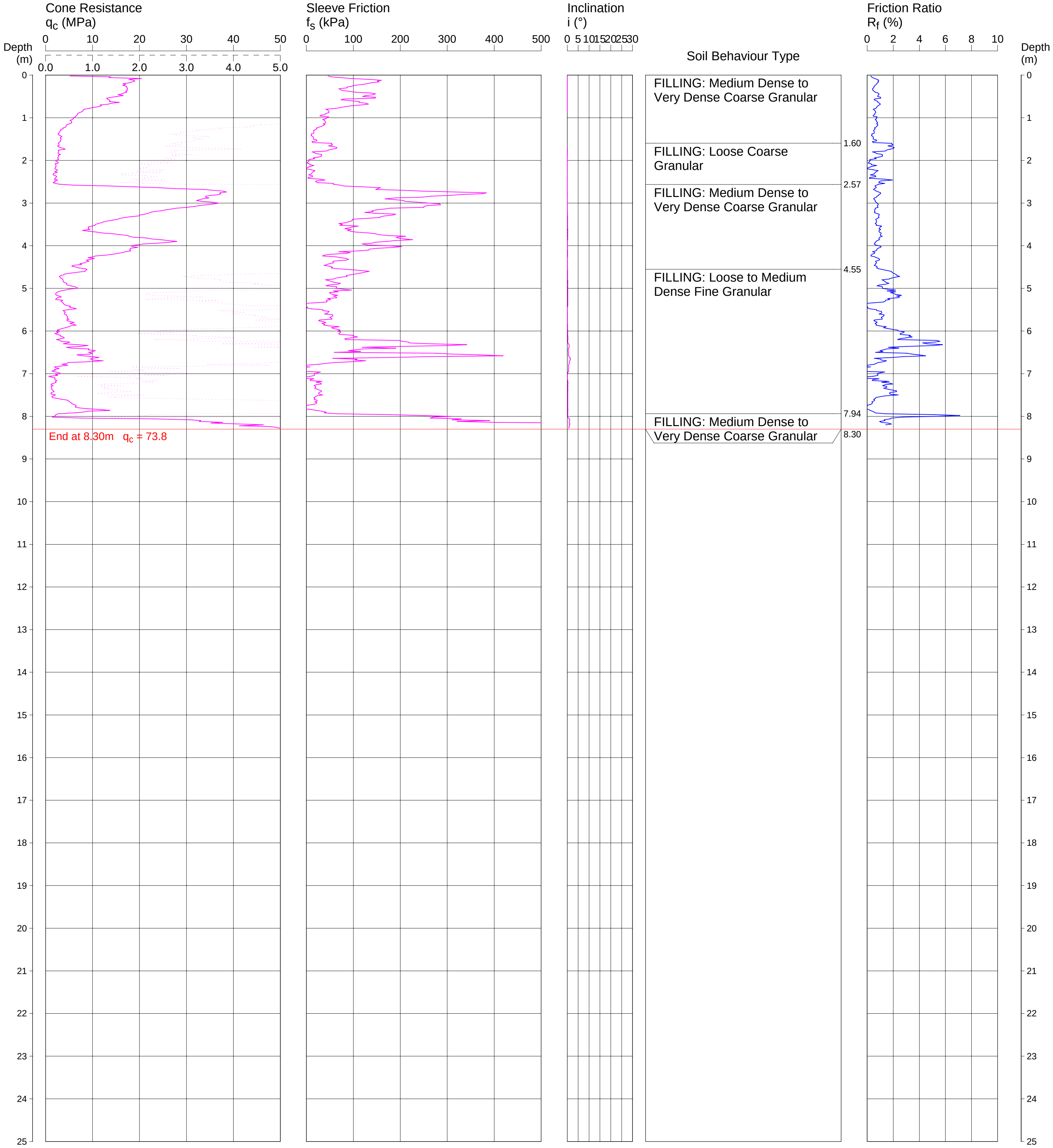
PROJECT No: 40950.00

12A

Page 1 of 1

DATE 11/12/2007

SURFACE RL: 86.4



REMARKS: DEPTH TO WATER AT COMPLETION OF TEST : m

Date
Plotted
Checked

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\4095012A.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA PTY LTD

PROJECT: GLENLEE EMPLACEMENT AREA

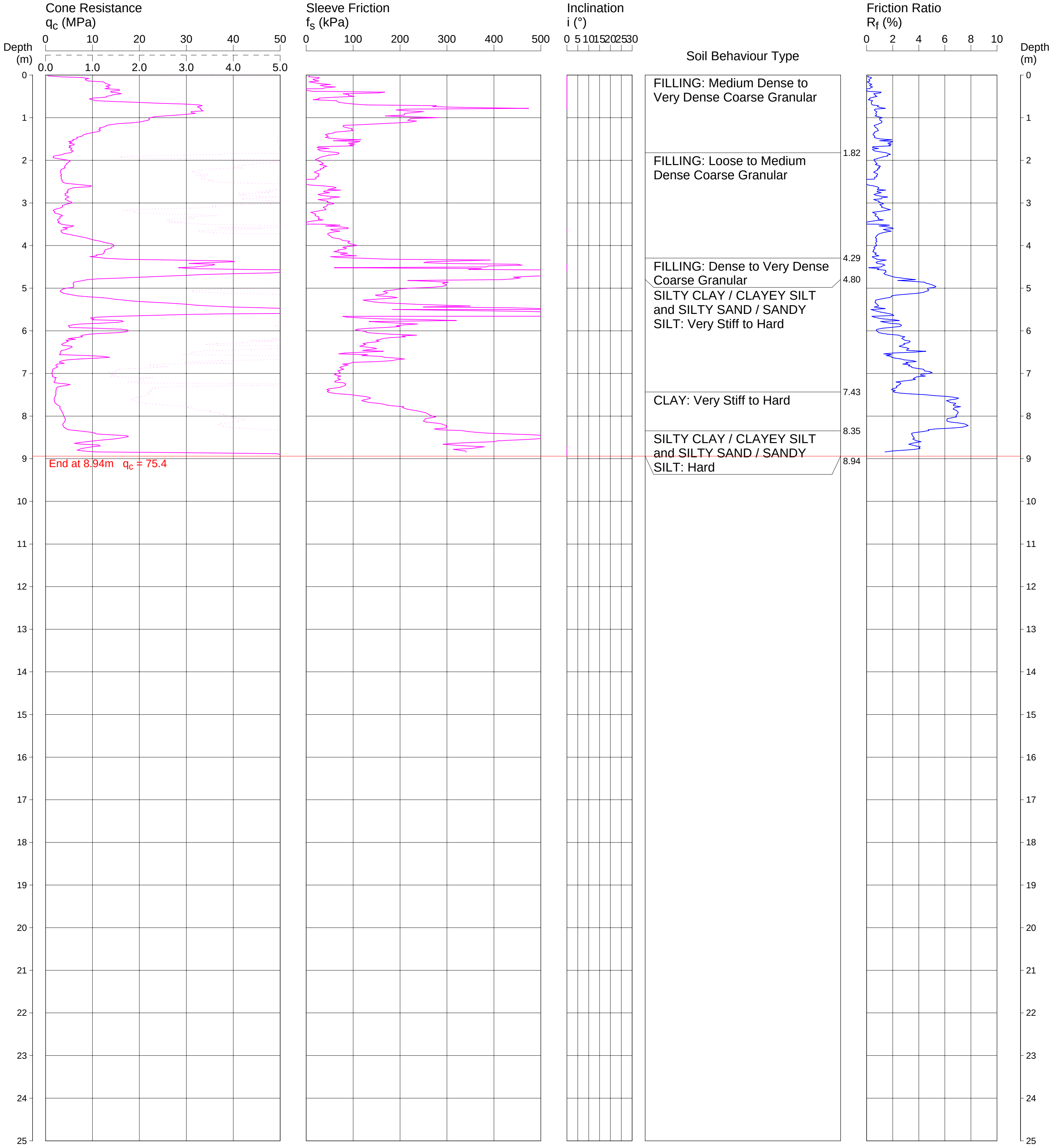
LOCATION: SPRINGS ROAD, GLENLEE

PROJECT No: 40950.00

14
Page 1 of 1

DATE 11/12/2007

SURFACE RL: 95.8



REMARKS: DEPTH TO WATER AT COMPLETION OF TEST : m

Date	
Plotted	
Checked	

File: N:\GEOTECHNICAL PROJECTS\409\40950\CPT\40950-14.CP5
Cone ID: CONE-411 **Type:** 2 Standard

ConePlot Version 5.8.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

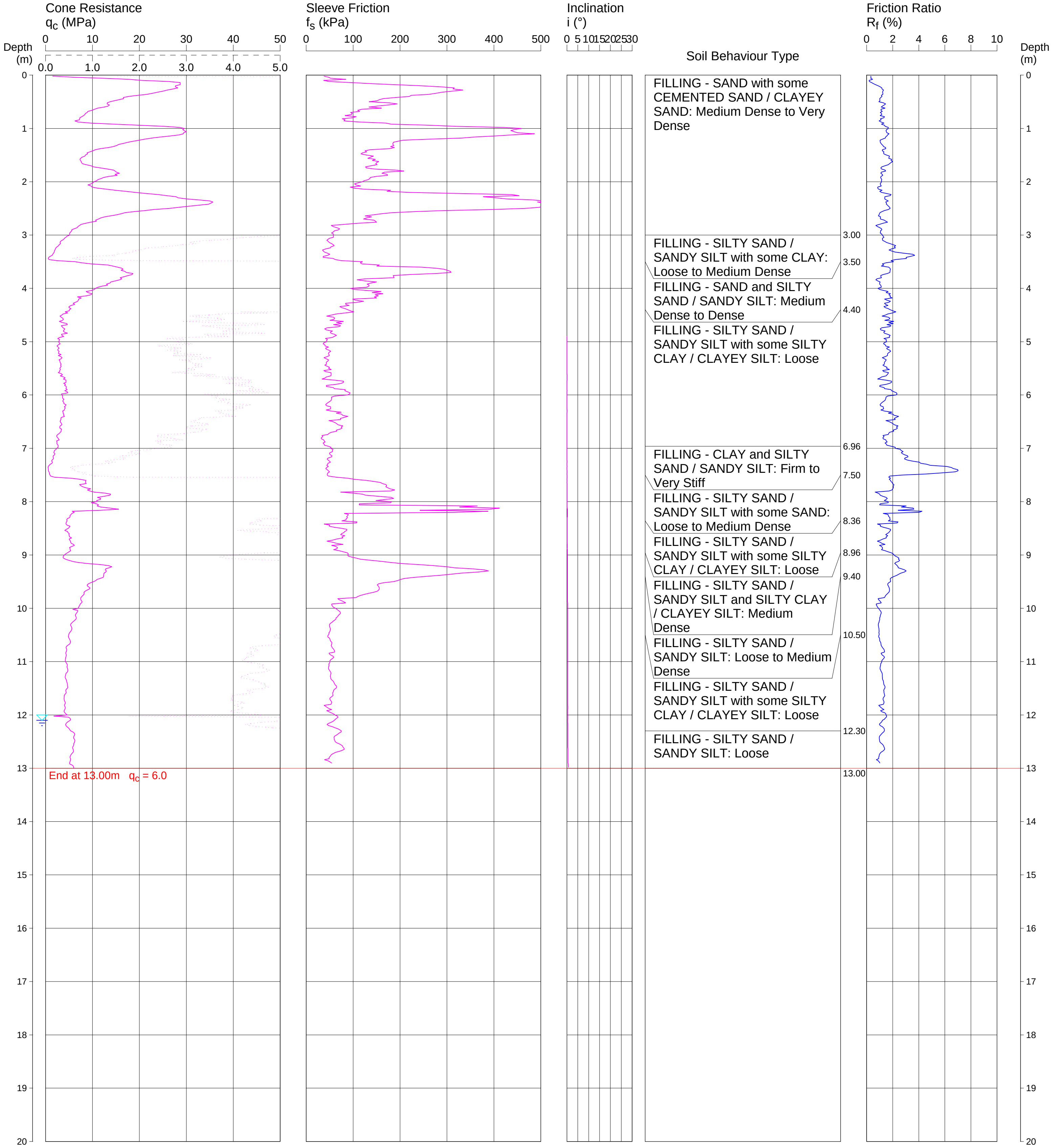
REDUCED LEVEL: 93.7

COORDINATES:

101

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caved 6.5m

File: P:\40950.05 Glenlee\Field\40950-101.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: ARA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

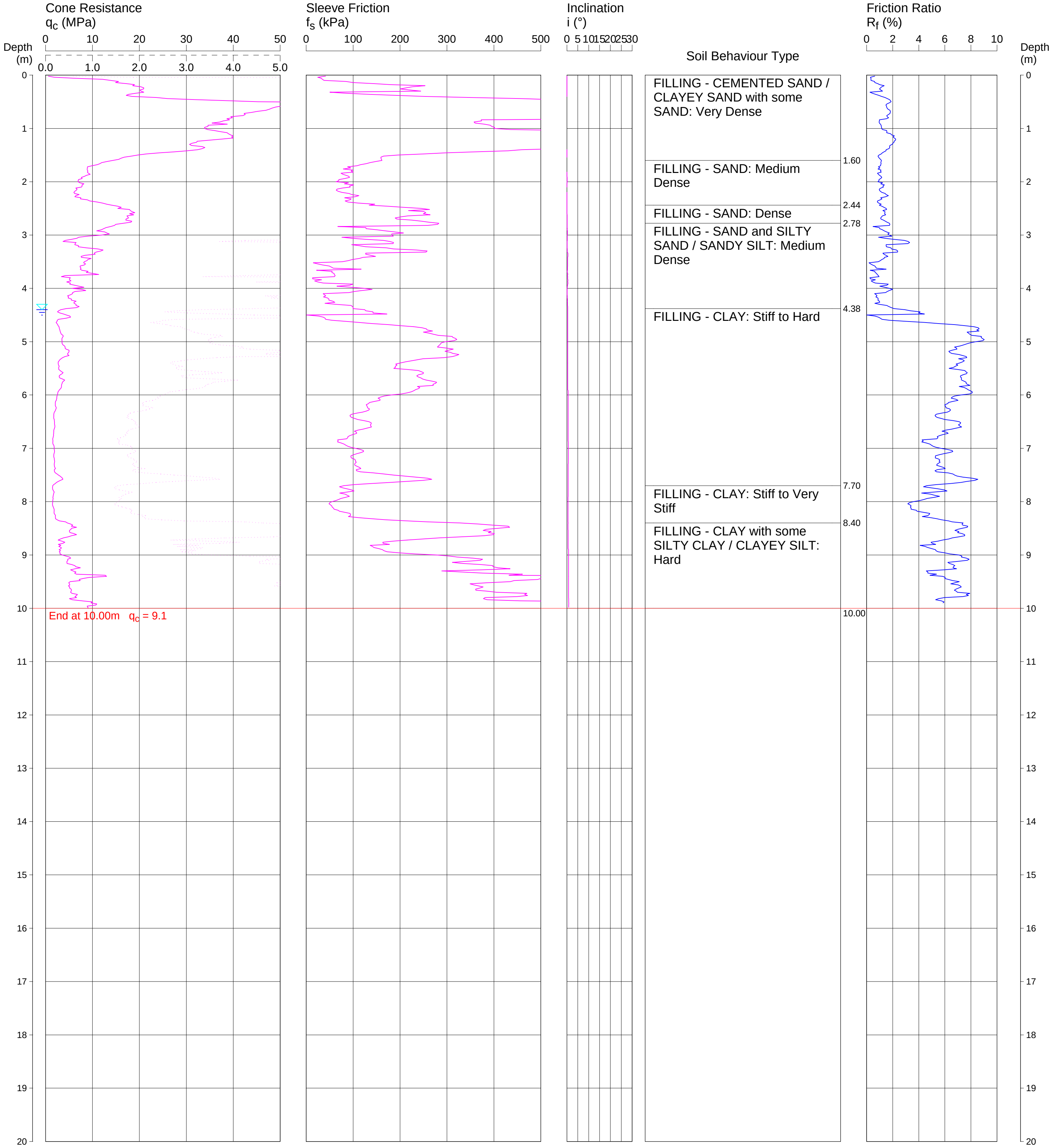
REDUCED LEVEL: 86

COORDINATES:

102

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving at 3.2m

File: P:\40950.05 Glenlee\Field\40950-102.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

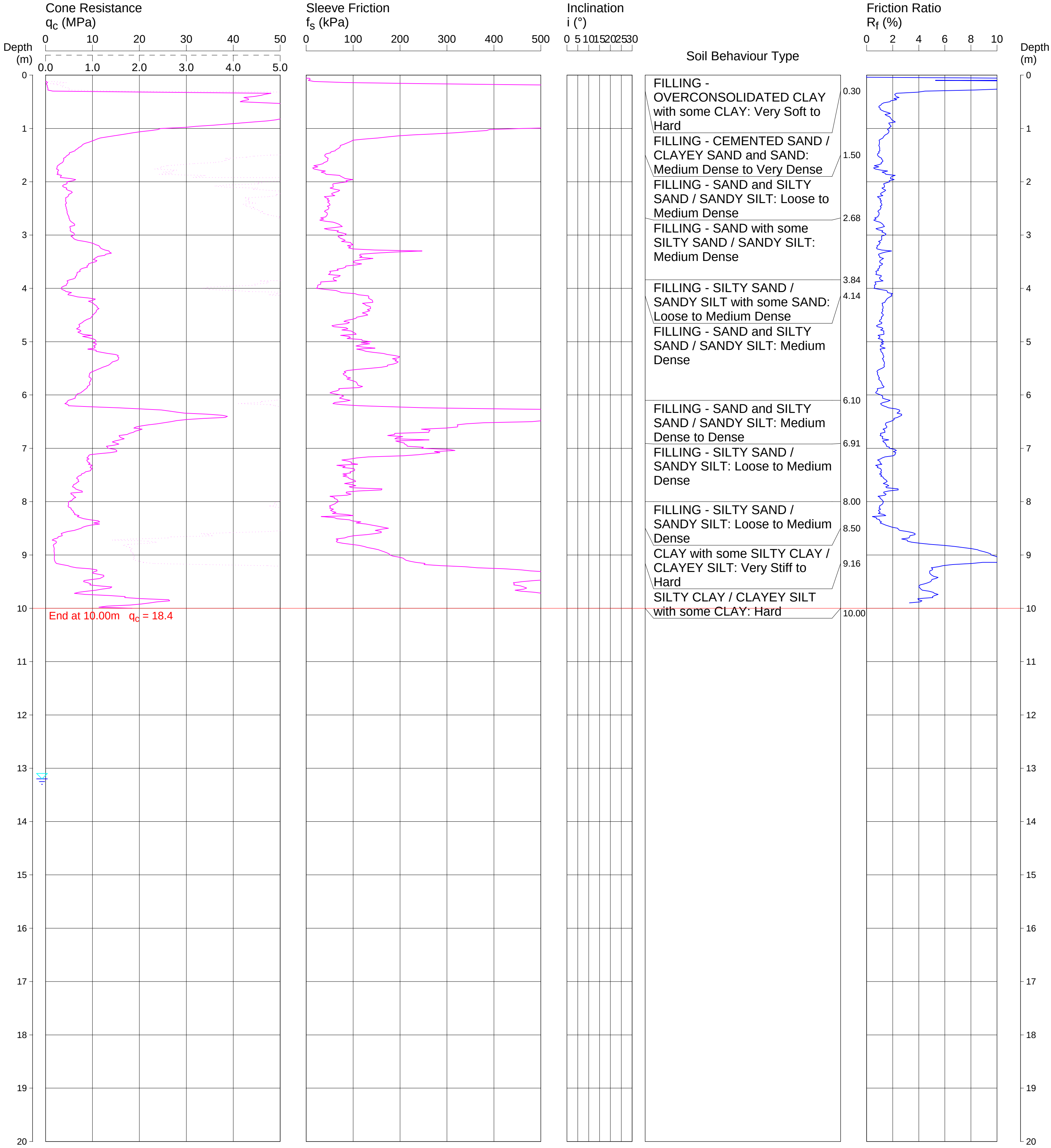
REDUCED LEVEL: 96.1

COORDINATES:

103

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 7.1m

File: P:\40950.05 Glenlee\Field\40950-103.CP5
Cone ID: CONE-HH4 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

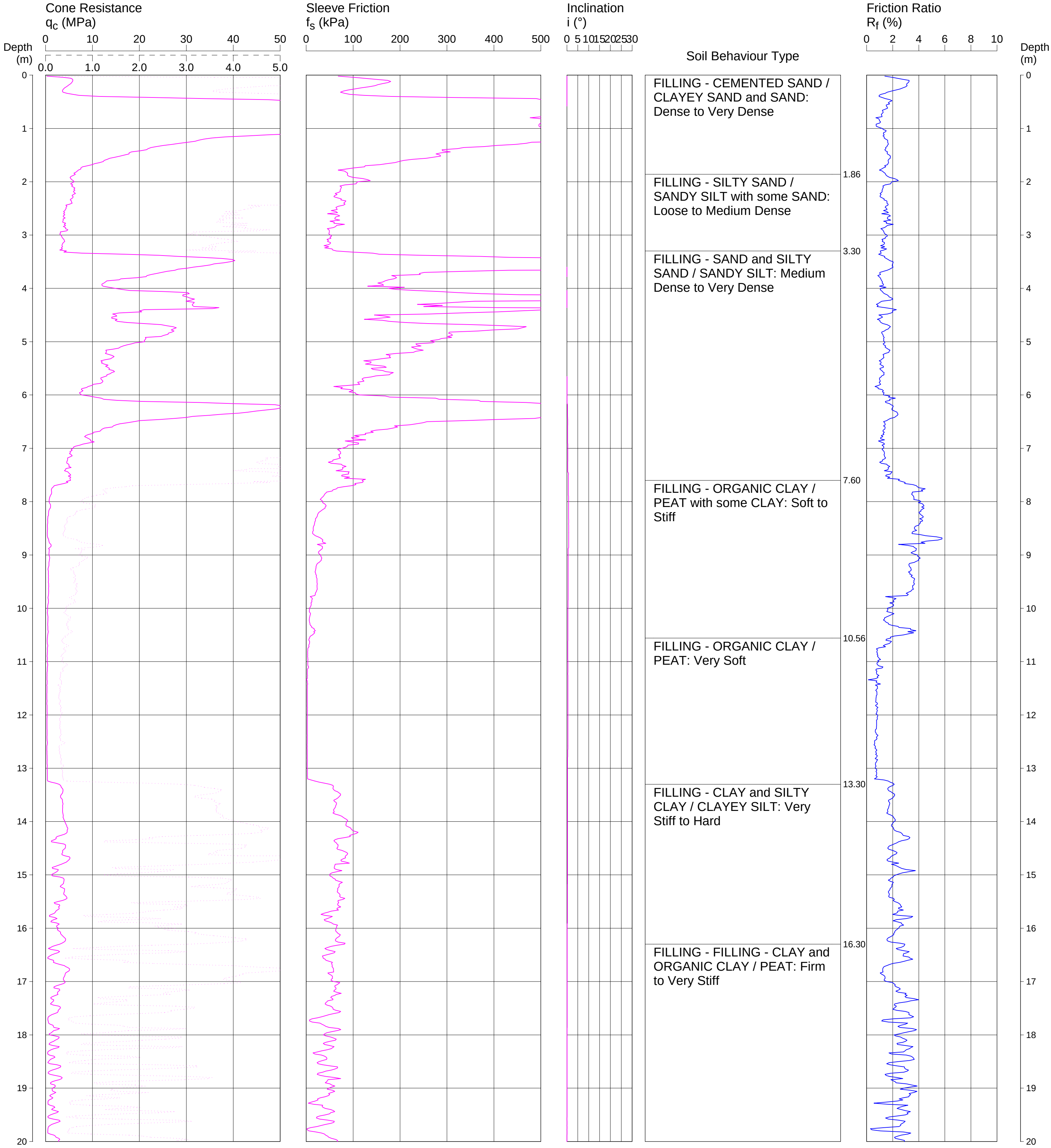
REDUCED LEVEL:

COORDINATES:

104

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 7.6m

File: P:\40950.05 Glenlee\Field\40950-104.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

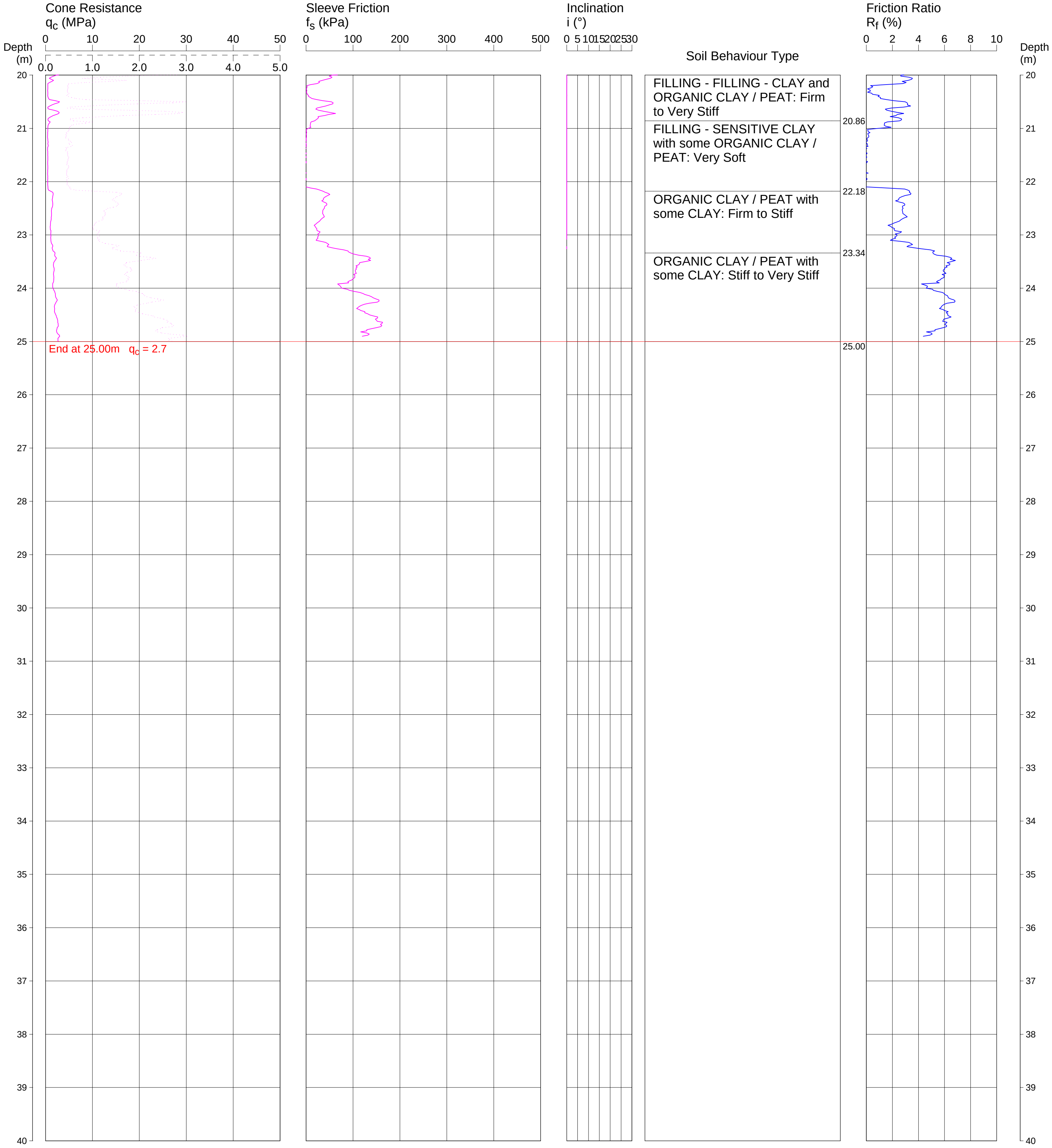
REDUCED LEVEL:

COORDINATES:

104

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 7.6m

File: P:\40950.05 Glenlee\Field\40950-104.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

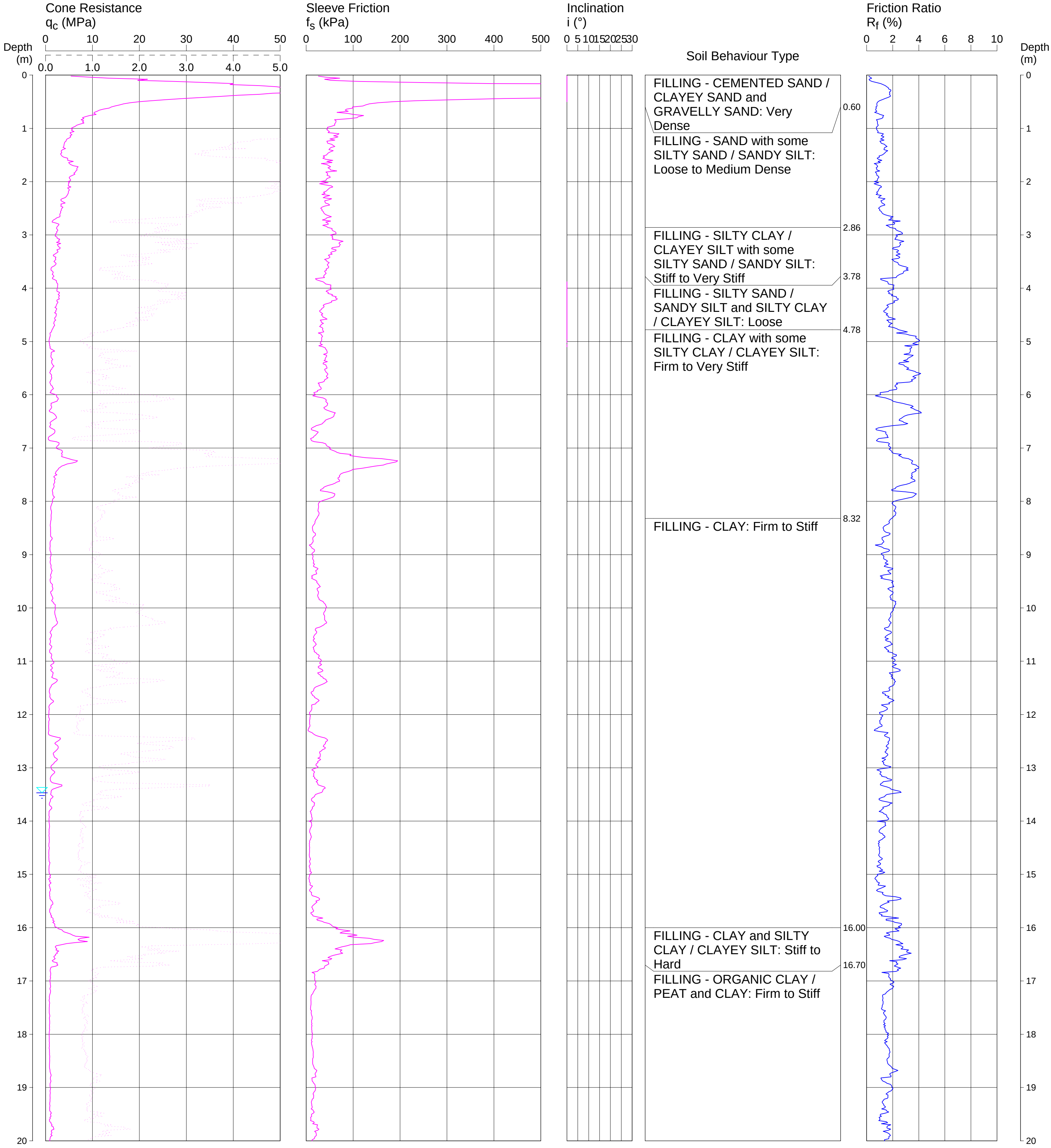
REDUCED LEVEL: 89.4

COORDINATES:

105

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 5.5m

File: P:\40950.05 Glenlee\Field\40950-105.CP5
Cone ID: CONE-HH4 **Type:** 2 Standard

ConePlot Version 5.9.1

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Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

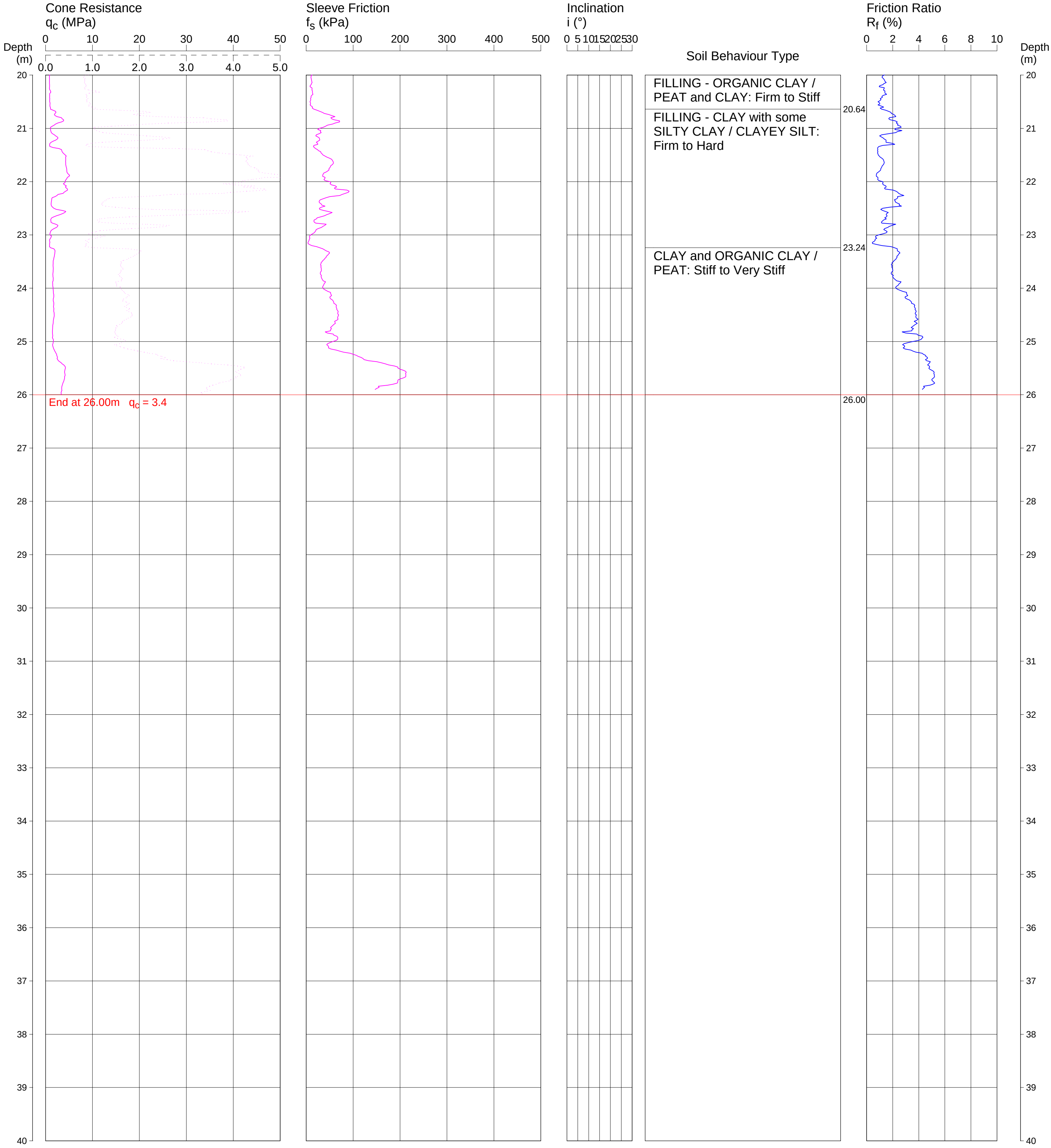
REDUCED LEVEL: 89.4

COORDINATES:

105

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 5.5m

File: P:\40950.05 Glenlee\Field\40950-105.CP5
Cone ID: CONE-HH4 **Type:** 2 Standard

ConePlot Version 5.9.1

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 91.2

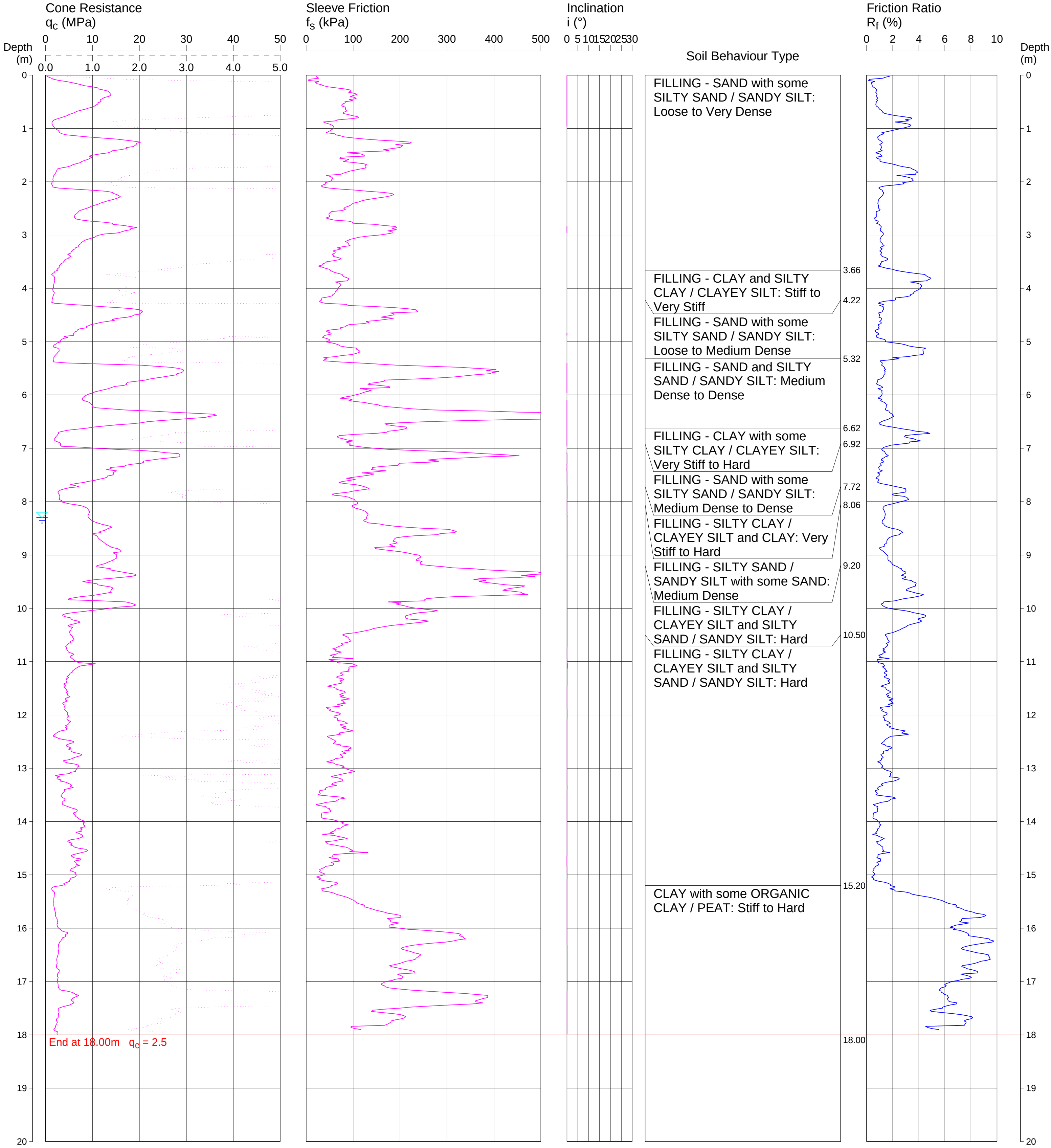
COORDINATES:

106

Page 1 of 1

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 0.8m

File: P:\40950.05 Glenlee\Field\40950-106.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

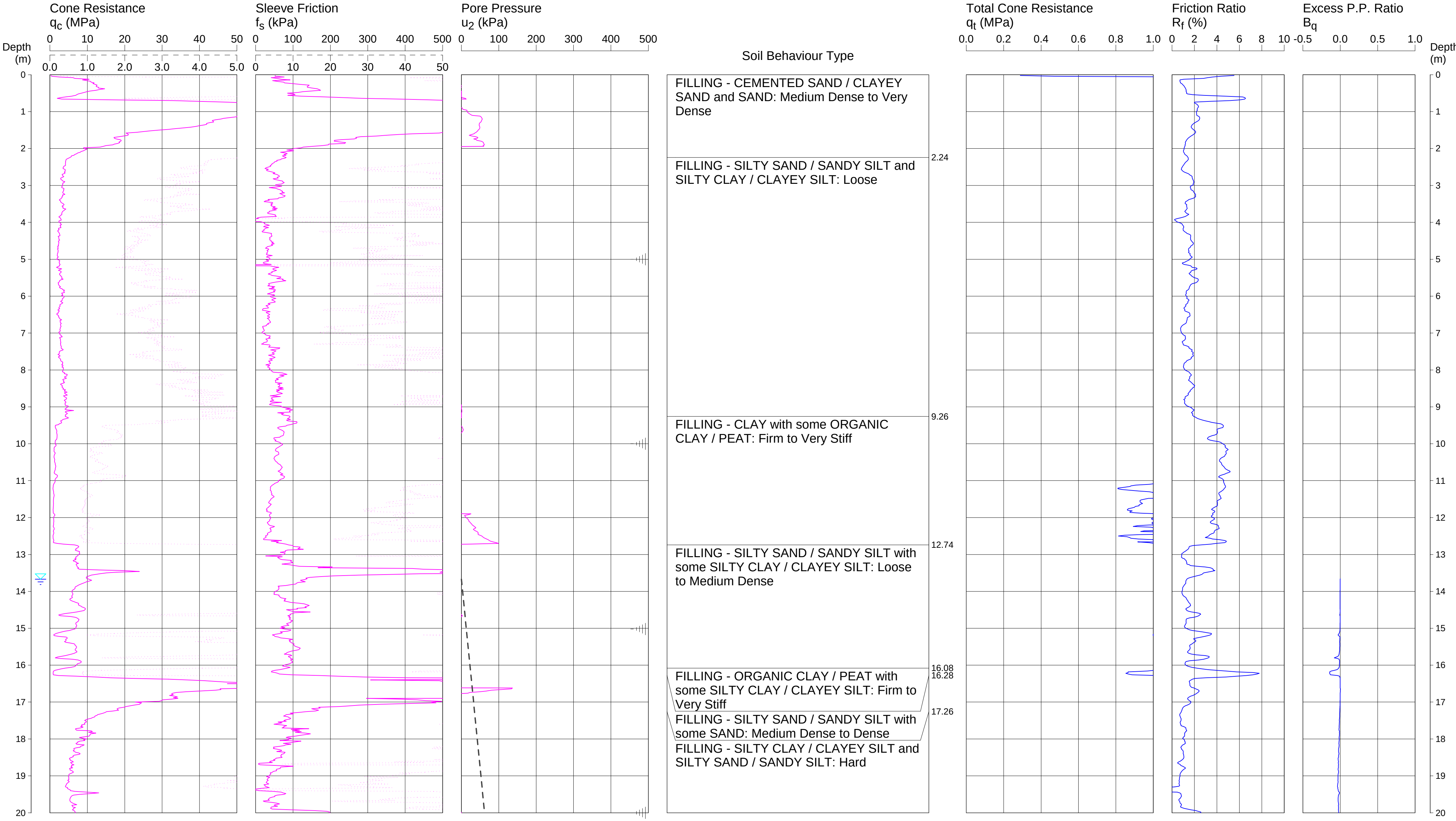
REDUCED LEVEL: 89.6

COORDINATES:

107

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caved at surface

Water depth after test: 13.67m depth (assumed)

File: P:\40950.05 Glenlee\Field\40950-107.CP5

Cone ID: 1734 **Type:** 5 Piezocone

ConePlot Version 5.9.1

Dissipation Test

Douglas Partners
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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

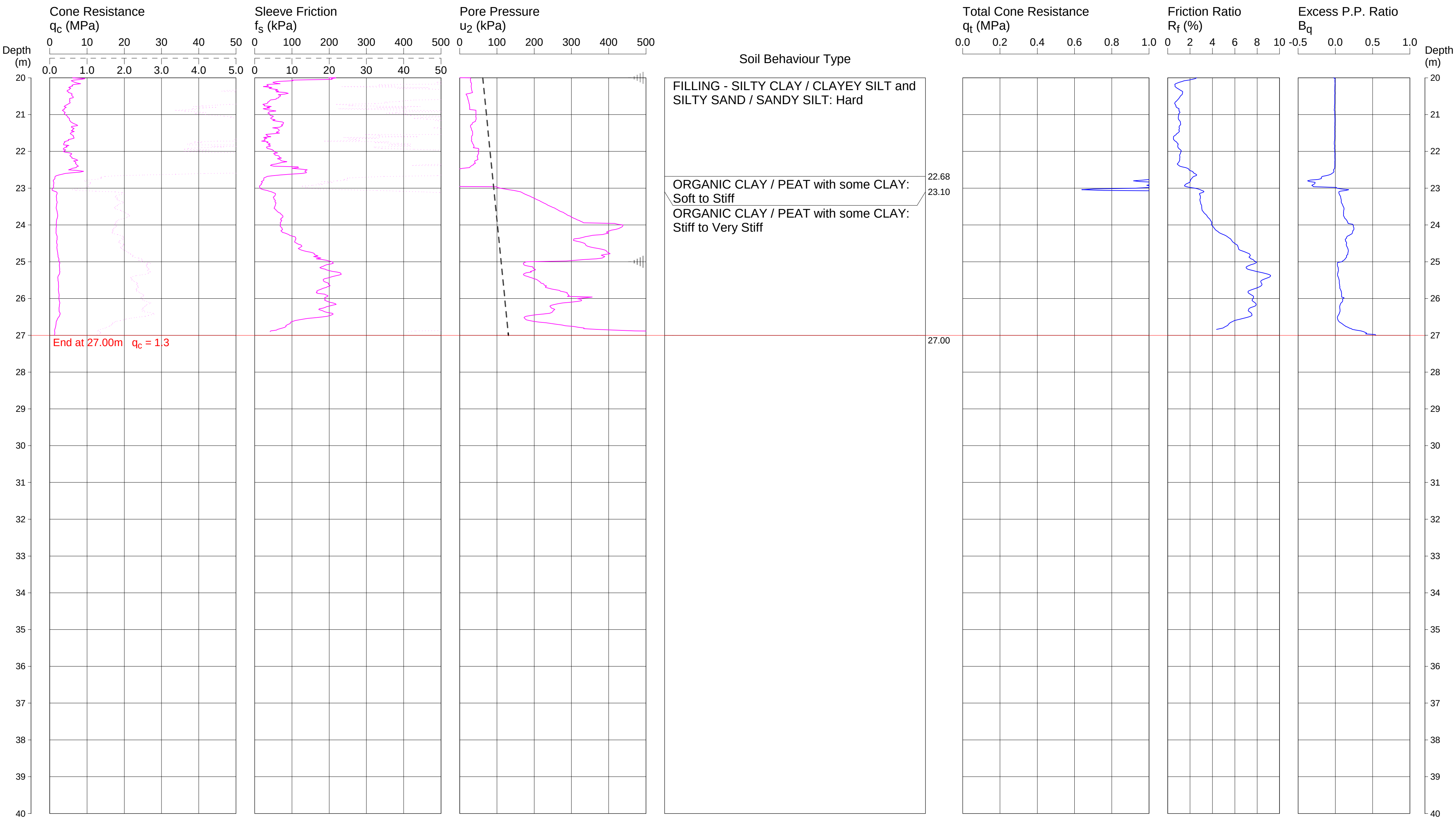
LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 89.6

COORDINATES:

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caved at surface

Water depth after test: 13.67m depth (assumed)

File: P:\40950.05 Glenlee\Field\40950-107.CP5
Cone ID: 1734 **Type:** 5 Piezocone

ConePlot Version 5.9.1

Dissipation Test

Douglas Partners
Geotechnics / Environment / Groundwater

DISSIPATION TEST

CLIENT SADA SERVICES PTY LTD

PROJECT GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION GLENLEE ROAD, GLENLEE

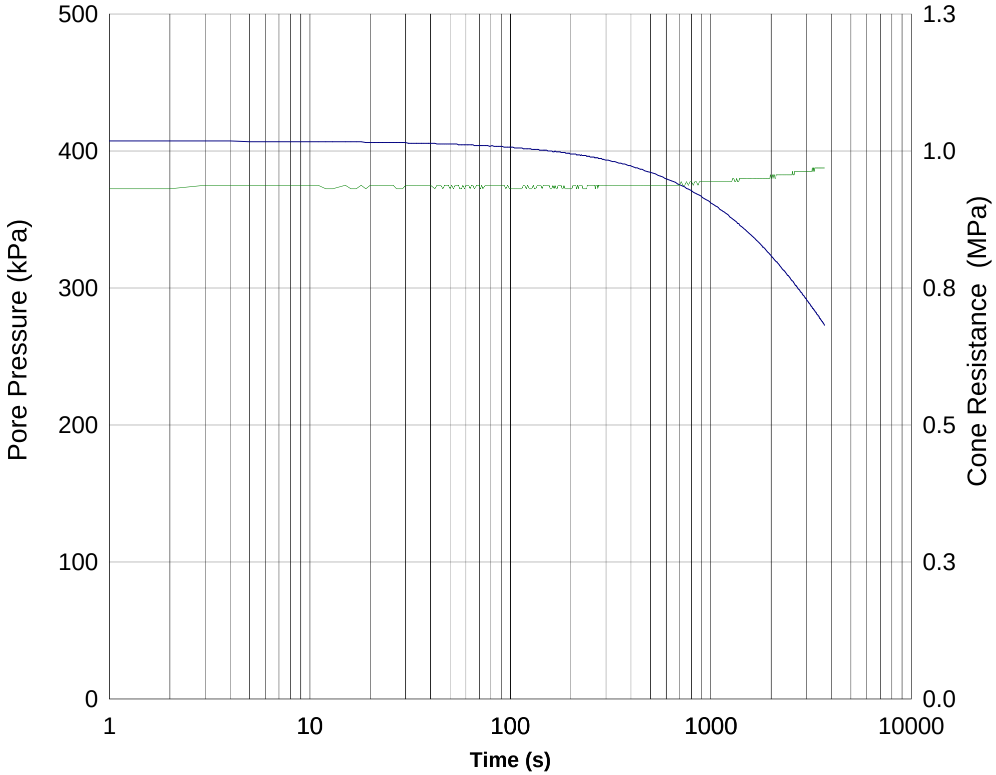
PROJECT No 40950.05

107

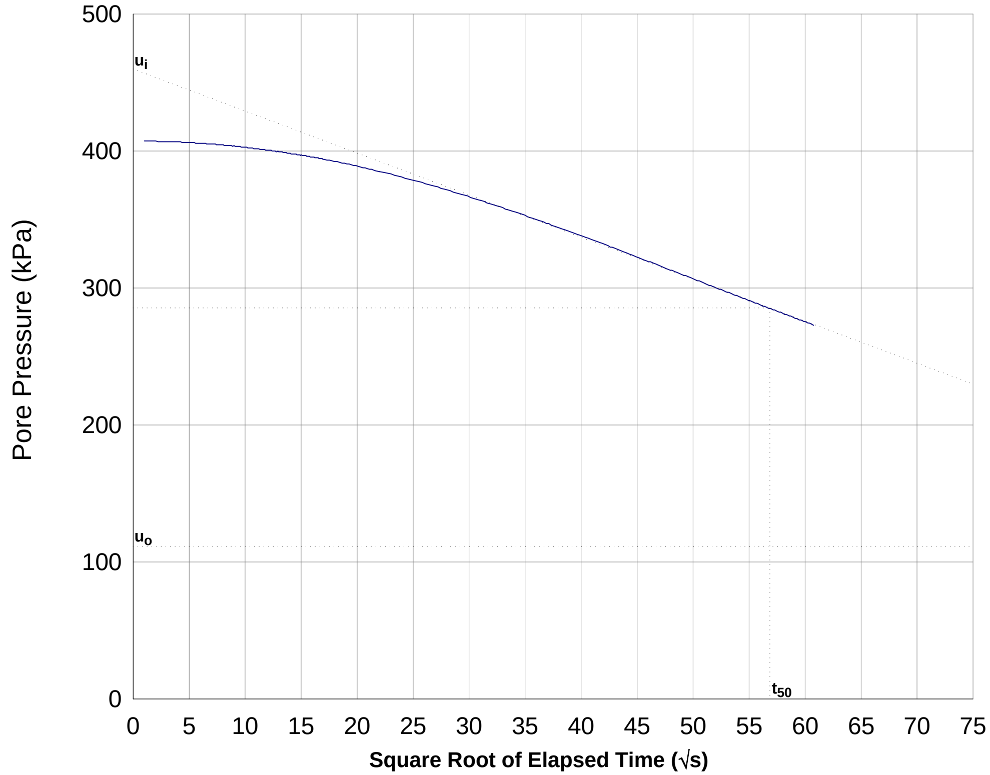
DEPTH 25.0m

DATE 17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test:	13.67	
Equilibrium 'in situ' pore pressure (u_0):	111.1	**kPa**
Pore Pressure (u_i):	459.9	**kPa**
Time for 50% pore pressure reduction (t_{50}):	3233	**seconds**
	53.9	**minutes**

Location of Filter Element:	2 (behind tip)	
Diameter of Cone:	35.7	**mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

REMARKS:

File: 40950-107.T06
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

DISSIPATION TEST

CLIENT SADA SERVICES PTY LTD

PROJECT GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION GLENLEE ROAD, GLENLEE

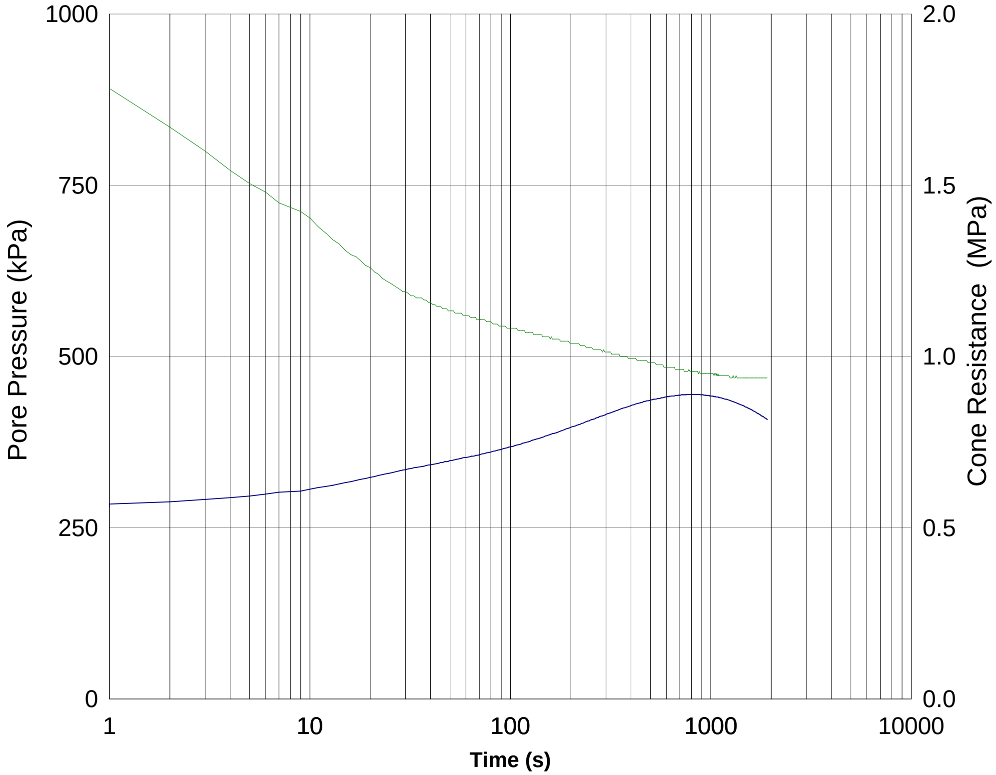
PROJECT No 40950.05

107

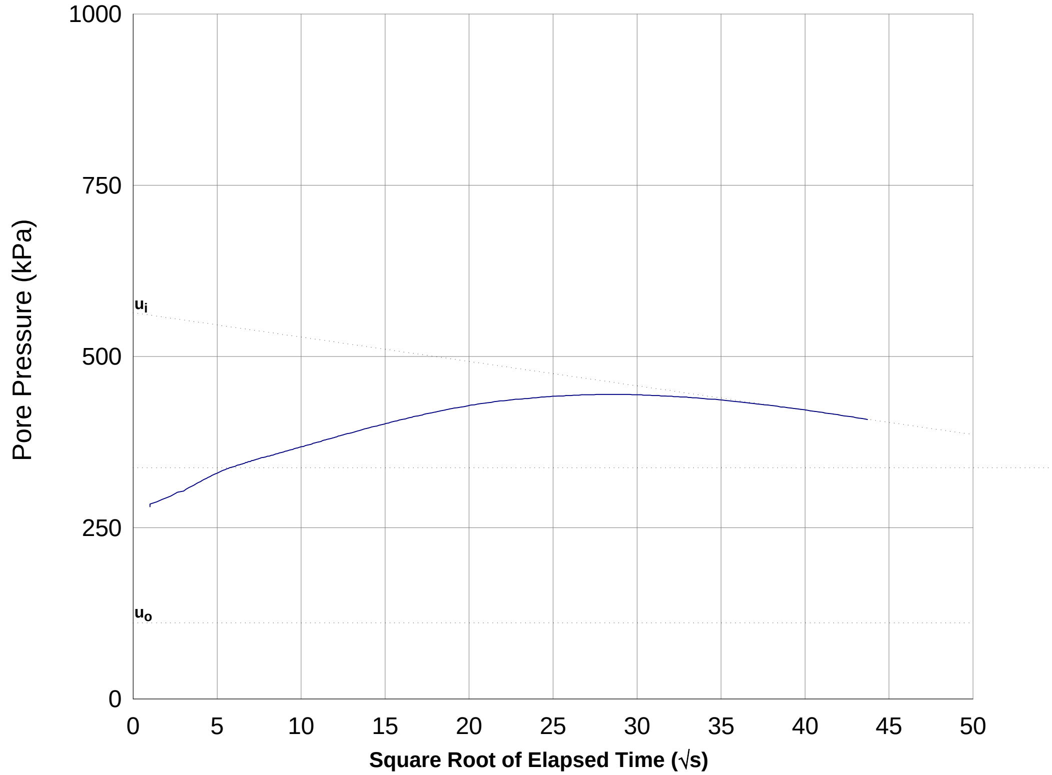
DEPTH 25.0m

DATE 17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test:	13.67	
Equilibrium 'in situ' pore pressure (u_0):	111.1	**kPa**
Pore Pressure (u_i):	564.2	**kPa**
Time for 50% pore pressure reduction (t_{50}):	4045 67.4	**seconds** **minutes**

Location of Filter Element:	2 (behind tip)	
Diameter of Cone:	35.7	**mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

REMARKS:

File: 40950-107.T05
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

DISSIPATION TEST

CLIENT SADA SERVICES PTY LTD

PROJECT GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION GLENLEE ROAD, GLENLEE

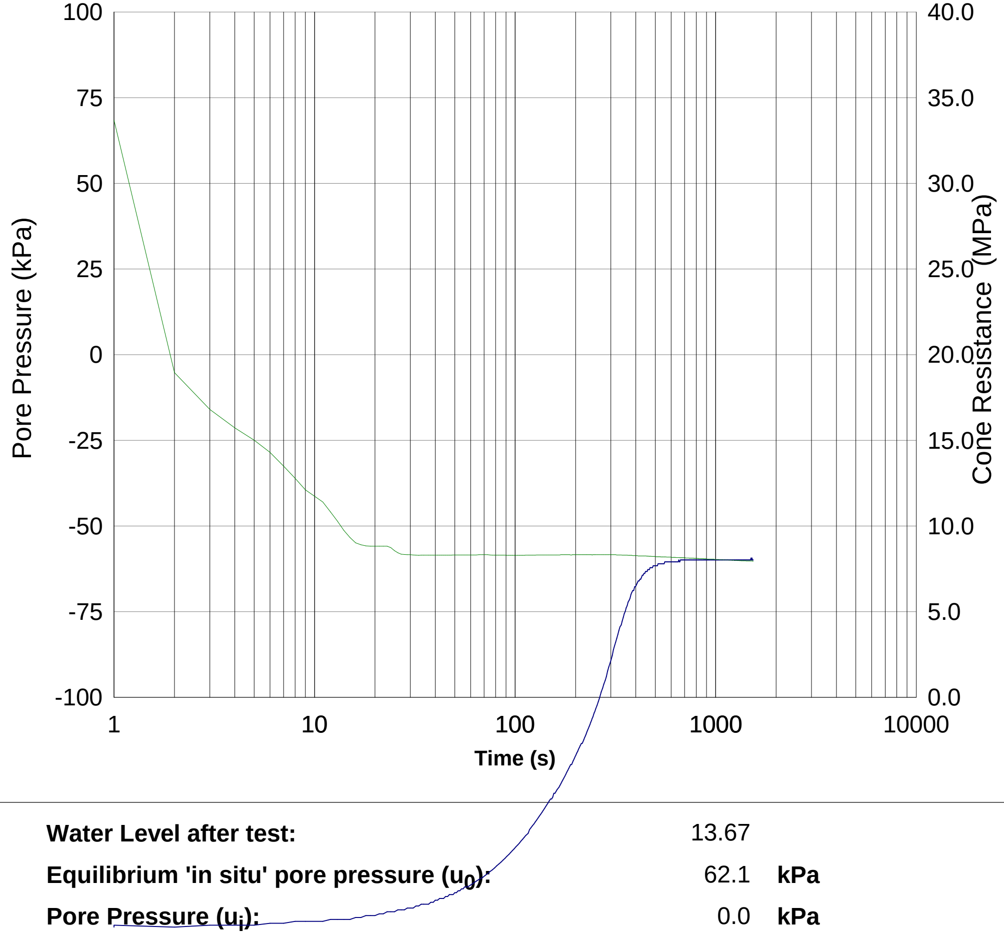
PROJECT No 40950.05

107

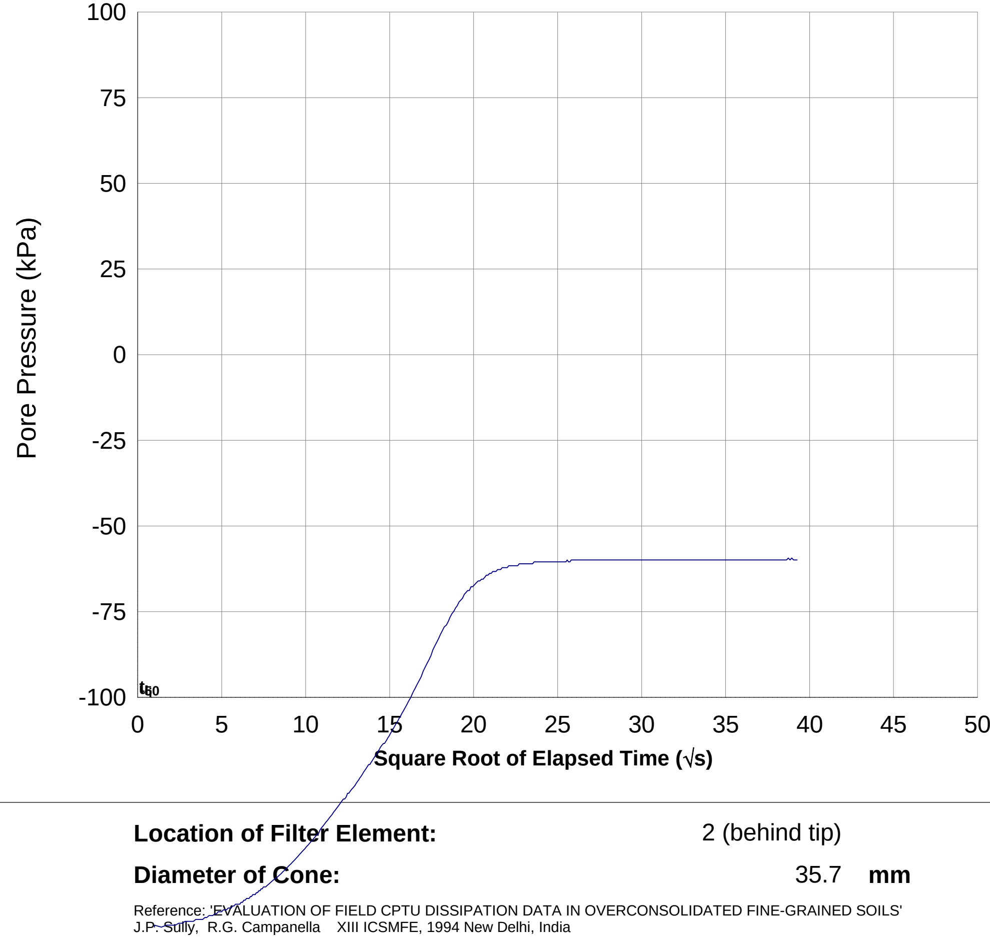
DEPTH 20.0m

DATE 17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test: 13.67

Equilibrium 'in situ' pore pressure (u_0): 62.1 **kPa**

Pore Pressure (u_i): 0.0 **kPa**

Time for 50% pore pressure reduction (t_{50}): 0 **seconds**
0.0 **minutes**

Location of Filter Element: 2 (behind tip)

Diameter of Cone: 35.7 **mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

REMARKS:

File: 40950-107.T04
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

DISSIPATION TEST

CLIENT SADA SERVICES PTY LTD

PROJECT GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION GLENLEE ROAD, GLENLEE

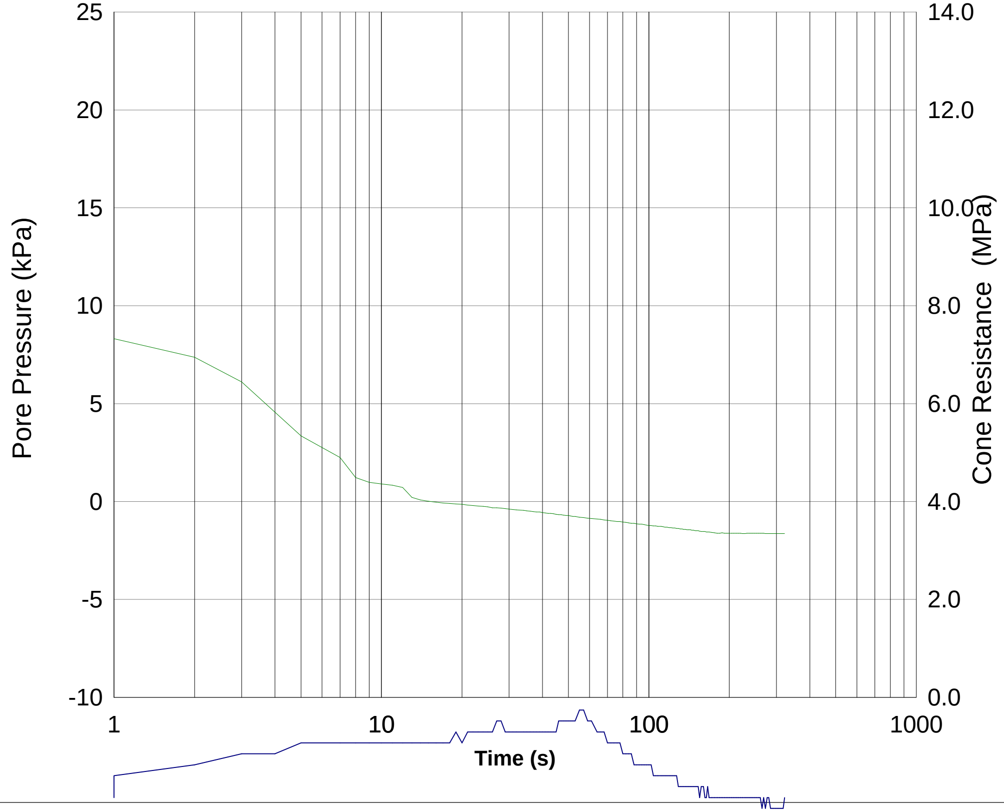
PROJECT No 40950.05

107

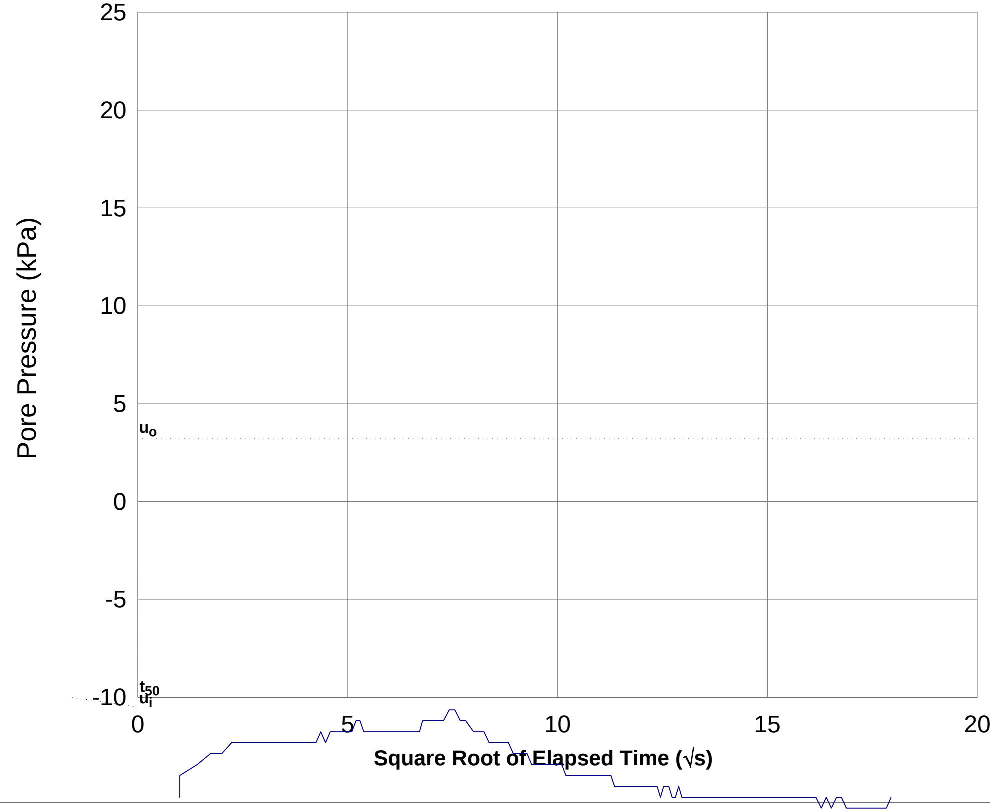
DEPTH 15.02m

DATE 17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test: 13.67

Equilibrium 'in situ' pore pressure (u_0): 13.2 **kPa**

Pore Pressure (u_i): -0.5 **kPa**

Time for 50% pore pressure reduction (t_{50}): 0 **seconds** 0.0 **minutes**

Location of Filter Element: 2 (behind tip)

Diameter of Cone: 35.7 **mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

REMARKS:

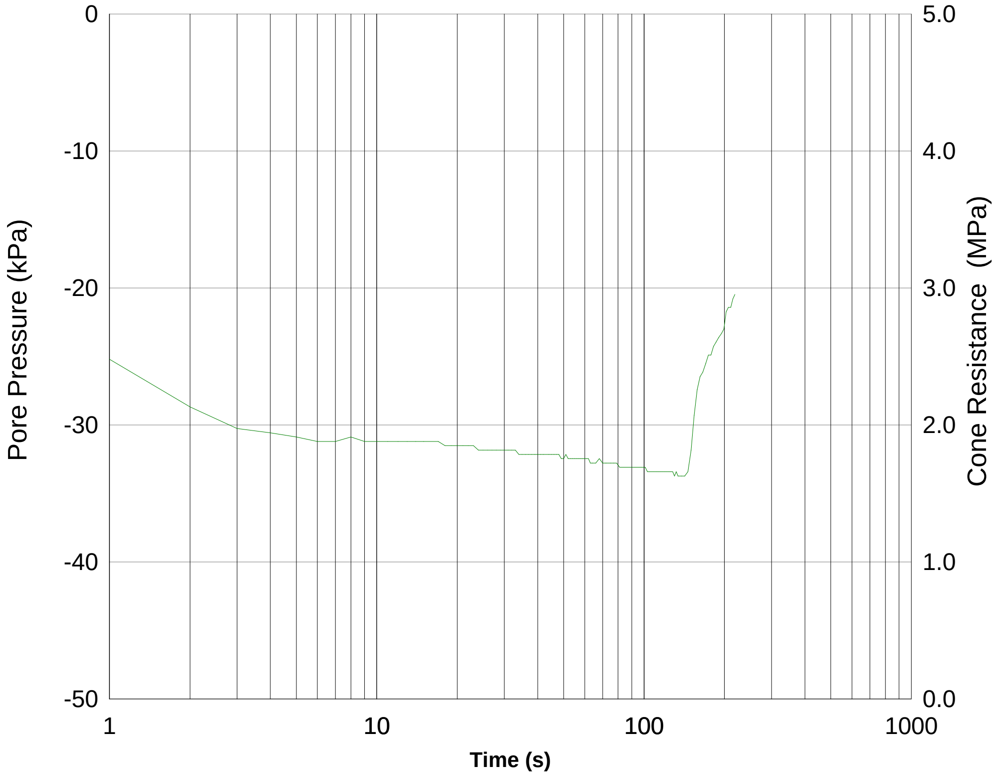
File: 40950-107.T03
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

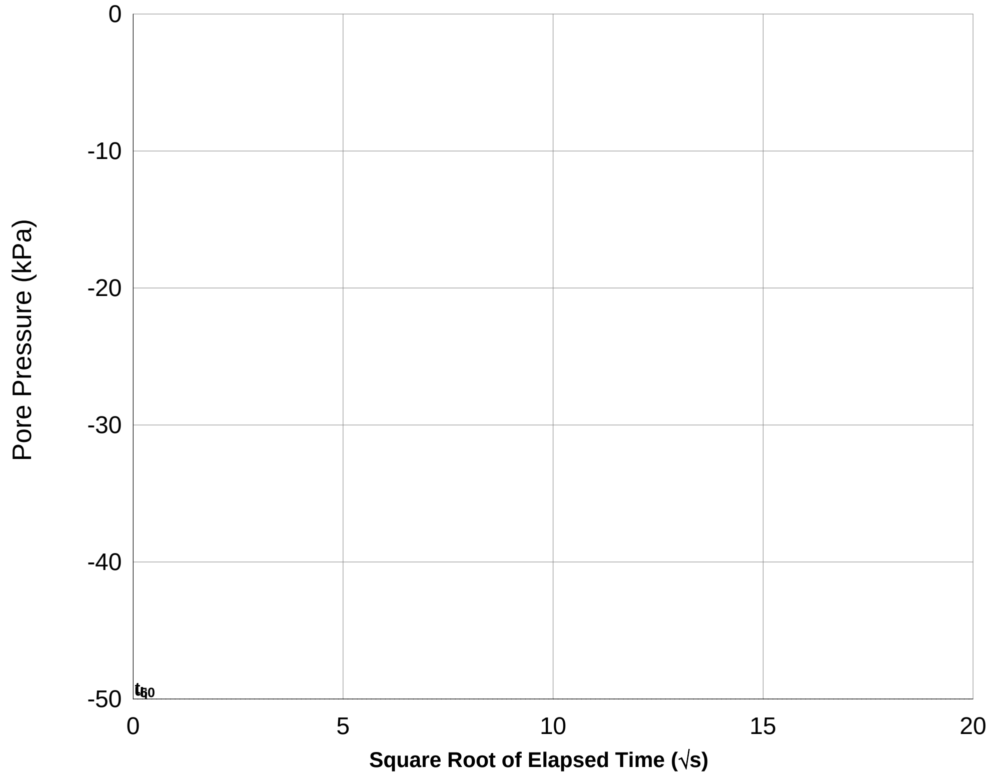
DISSIPATION TEST

CLIENT	SADA SERVICES PTY LTD	**PROJECT**	GLENLEE EMPLACEMENT - ADDITIONAL S. I.	**107**	
		LOCATION	GLENLEE ROAD, GLENLEE	**DEPTH**	**10.0m**
		PROJECT No	40950.05	**DATE**	17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test:	13.67	
Equilibrium 'in situ' pore pressure (u_0):	-36.0	**kPa**
Pore Pressure (u_i):	0.0	**kPa**
Time for 50% pore pressure reduction (t_{50}):	0	**seconds**
	0.0	**minutes**

Location of Filter Element: 2 (behind tip)

Diameter of Cone: 35.7 **mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

REMARKS:

File: 40950-107.T02
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

DISSIPATION TEST

CLIENT SADA SERVICES PTY LTD

PROJECT GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION GLENLEE ROAD, GLENLEE

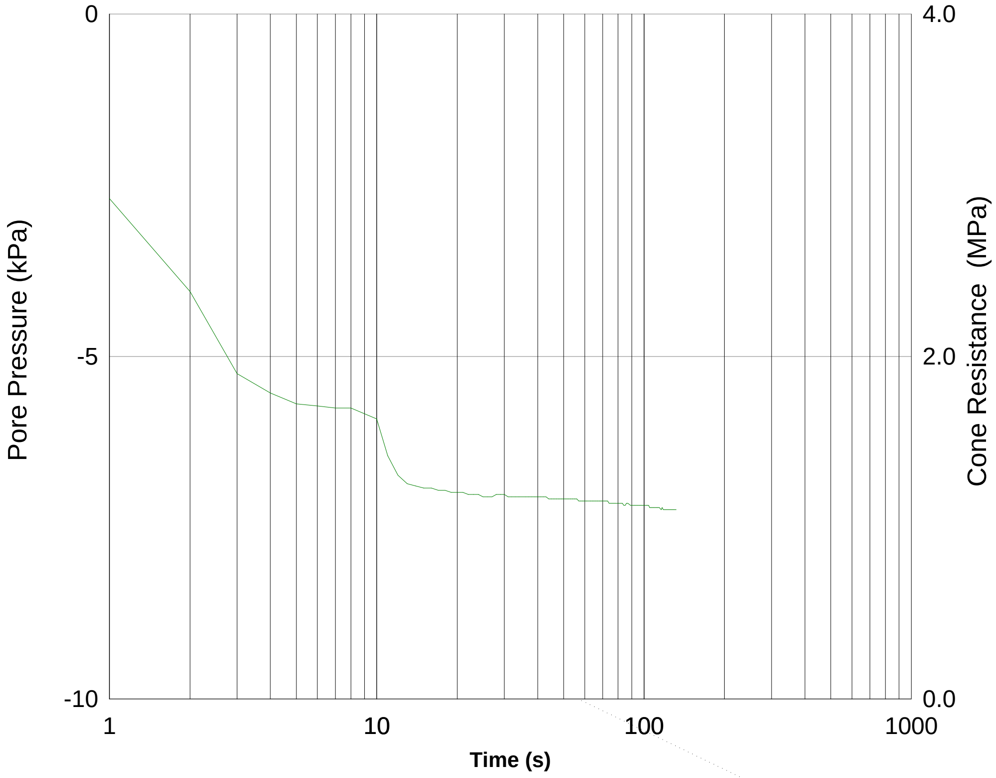
PROJECT No 40950.05

107

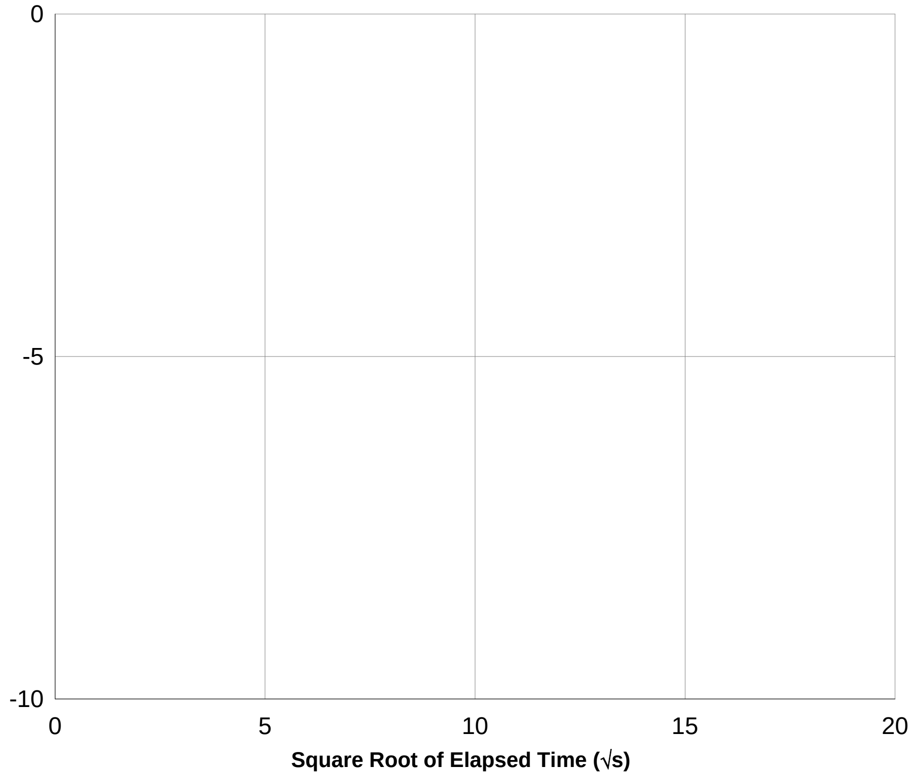
DEPTH 5.0m

DATE 17/02/2011

PORE PRESSURE / CONE RESISTANCE



ROOT-TIME GRAPH



Water Level after test:	13.67	
Equilibrium 'in situ' pore pressure (u_0):	-85.1	**kPa**
Pore Pressure (u_i):	-4.4	**kPa**
Time for 50% pore pressure reduction (t_{50}):	18669	**seconds**
	311.2	**minutes**

Location of Filter Element:	2 (behind tip)	
Diameter of Cone:	35.7	**mm**

Reference: 'EVALUATION OF FIELD CPTU DISSIPATION DATA IN OVERCONSOLIDATED FINE-GRAINED SOILS'
J.P. Sully, R.G. Campanella XIII ICSMFE, 1994 New Delhi, India

u_i

REMARKS:

File: 40950-107.T01
Cone ID: 1734 **Type:** 5 Piezocone

Date
Plotted
Checked

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

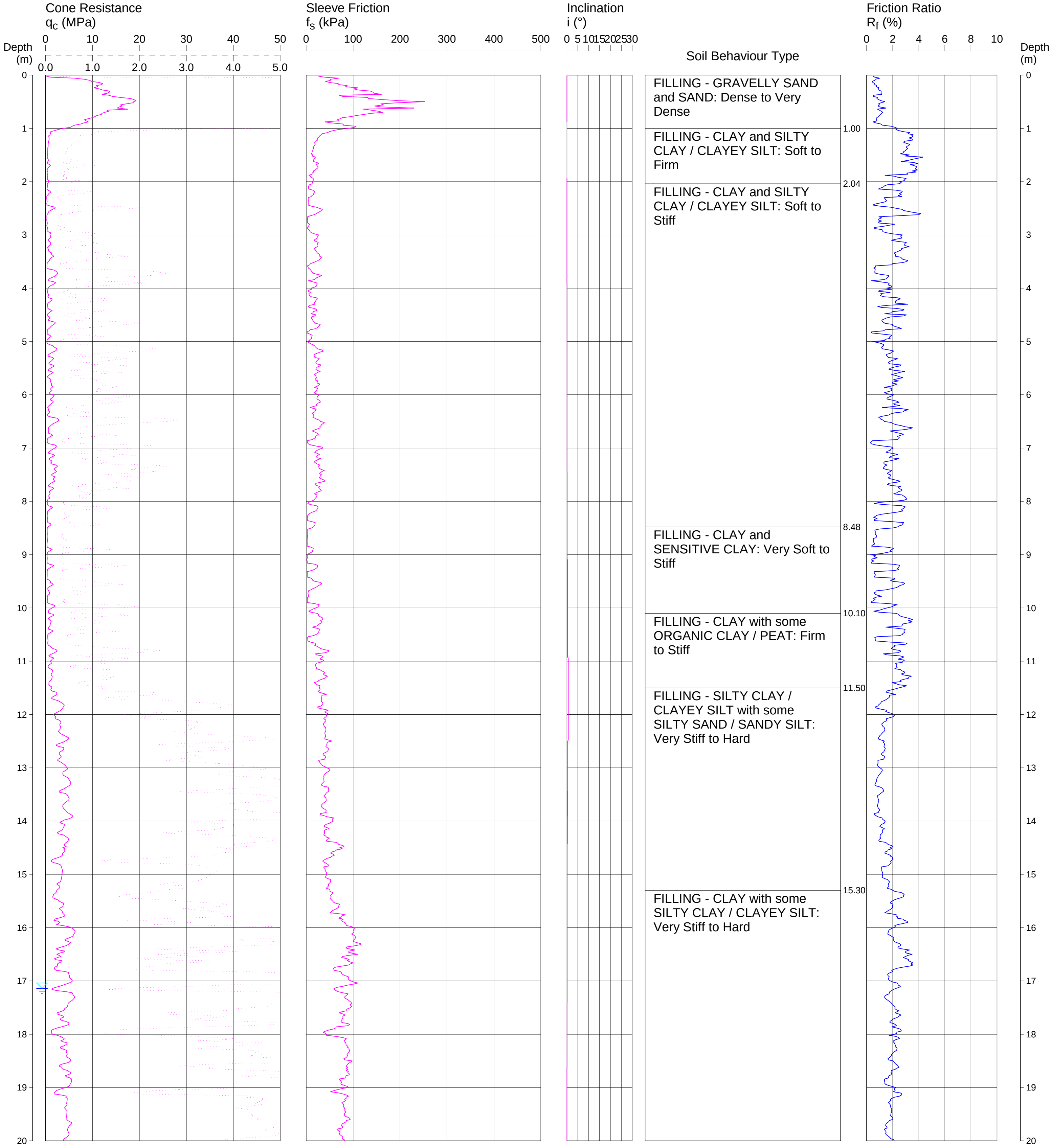
REDUCED LEVEL: 91.9

COORDINATES:

108

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 2.0m

File: P:\40950.05 Glenlee\Field\40950-108.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

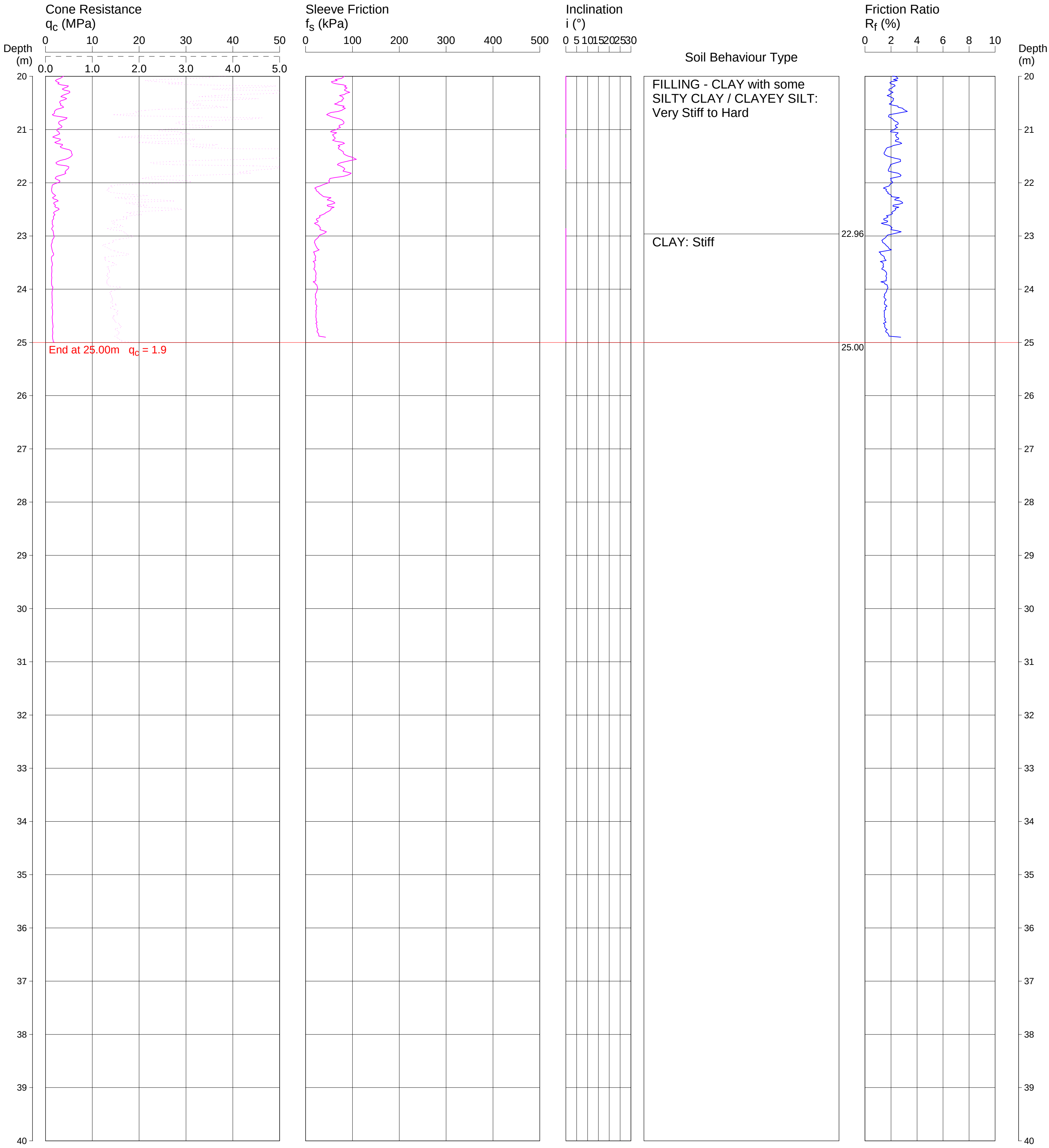
REDUCED LEVEL: 91.9

COORDINATES:

108

DATE 18/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 2.0m

File: P:\40950.05 Glenlee\Field\40950-108.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

Douglas Partners
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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

LOCATION: SPRINGS ROAD, GLENLEE

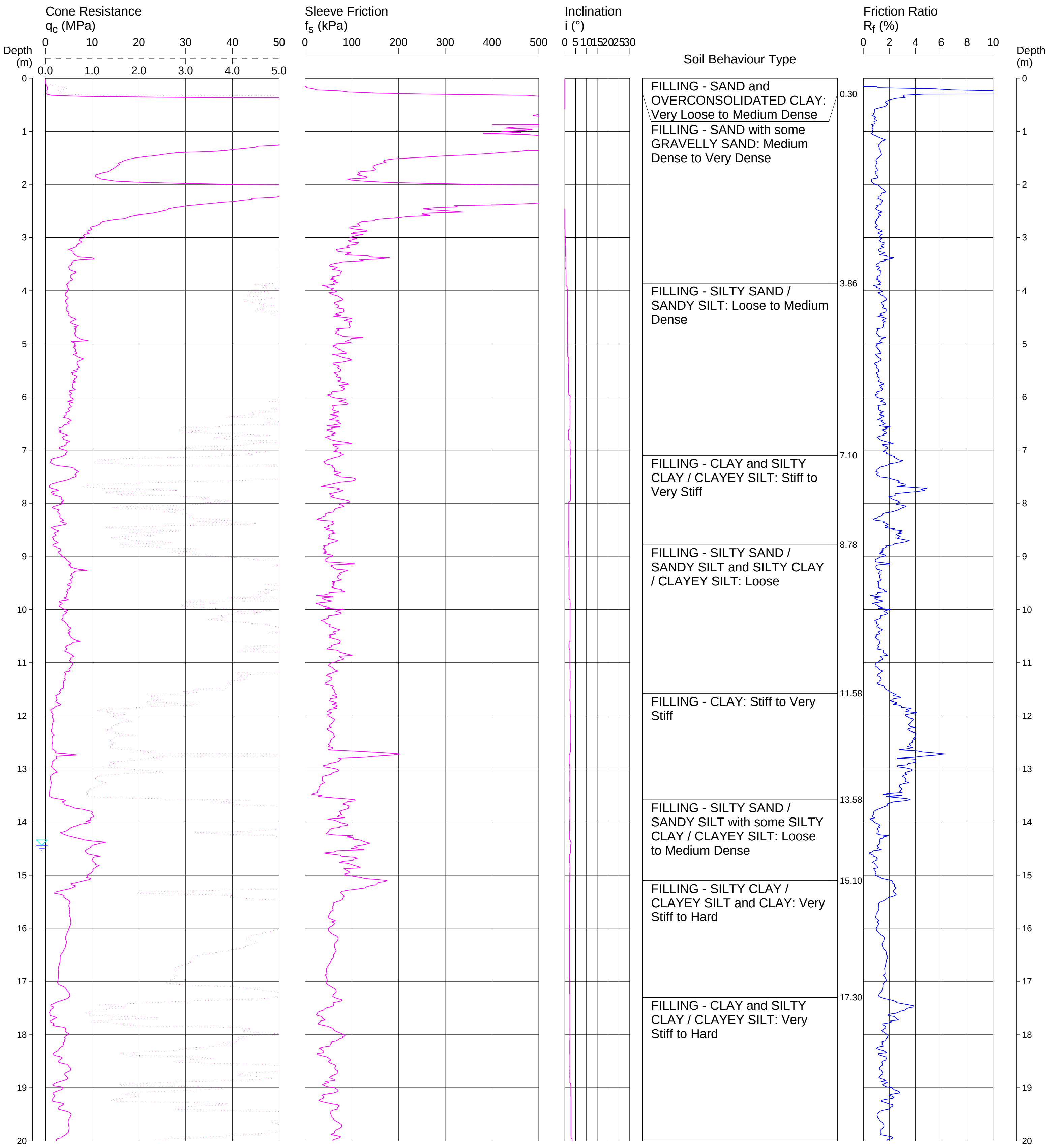
REDUCED LEVEL: 892.

COORDINATES:

109

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 6.8m

File: P:\40950.05 Glenlee\Field\40950-109.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

Douglas Partners
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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: AREA 1 GLENLEE EMPLACEMENT

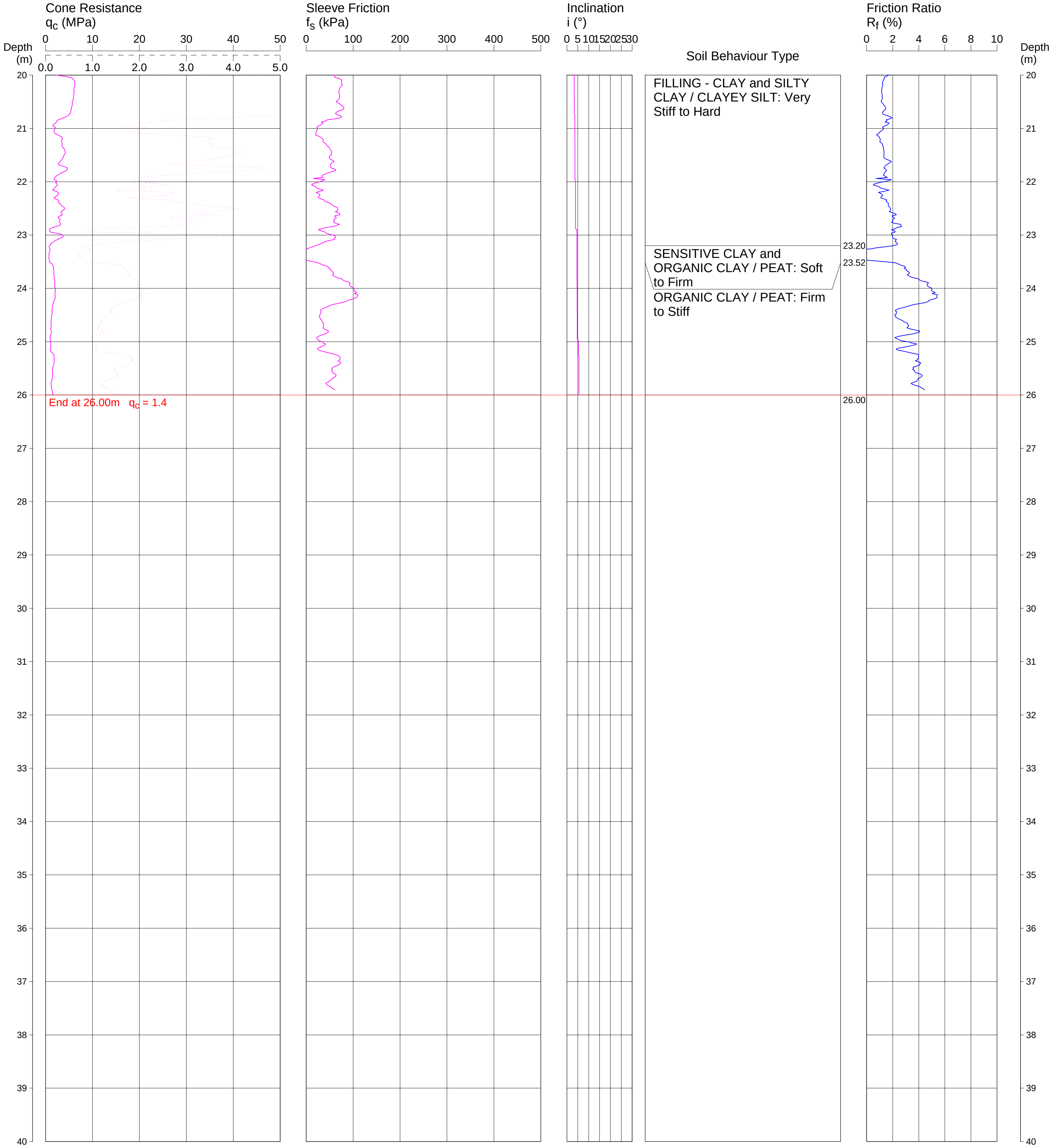
LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 892.

COORDINATES:

DATE 17/02/2011

PROJECT No: 40950.05



REMARKS: Hole caving 6.8m

File: P:\40950.05 Glenlee\Field\40950-109.CP5
Cone ID: CONE-402 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: GLENLEE EMPLACEMENT - ADDITIONAL S. I.

LOCATION: GLENLEE ROAD, GLENLEE

REDUCED LEVEL: 80.4

COORDINATES:

110

DATE 18/02/2011

PROJECT No: 40950.05

Depth (m)	Soil Behaviour Type
0 – 1.30	FILLING - CEMENTED SAND / CLAYEY SAND: Dense to Very Dense
1.30 – 2.68	FILLING - CEMENTED SAND / CLAYEY SAND and SAND: Dense to Very Dense
2.68 – 4.12	FILLING - SAND with some CEMENTED SAND / CLAYEY SAND: Medium Dense to Dense
4.12 – 5.34	FILLING - SAND and CEMENTED SAND / CLAYEY SAND: Dense to Very Dense
5.34 – 6.22	FILLING - FILLING - SILTY SAND / SANDY SILT and SAND: Medium Dense
6.22 – 7.90	FILLING - SILTY SAND / SANDY SILT with some SAND: Loose to Dense

REMARKS: Holecaving 3.0m

File: P:\40950.05 Glenlee\Field\40950-110.CP5
Cone ID: CONE-HH4 **Type:** 2 Standard

ConePlot Version 5.9.1

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.43

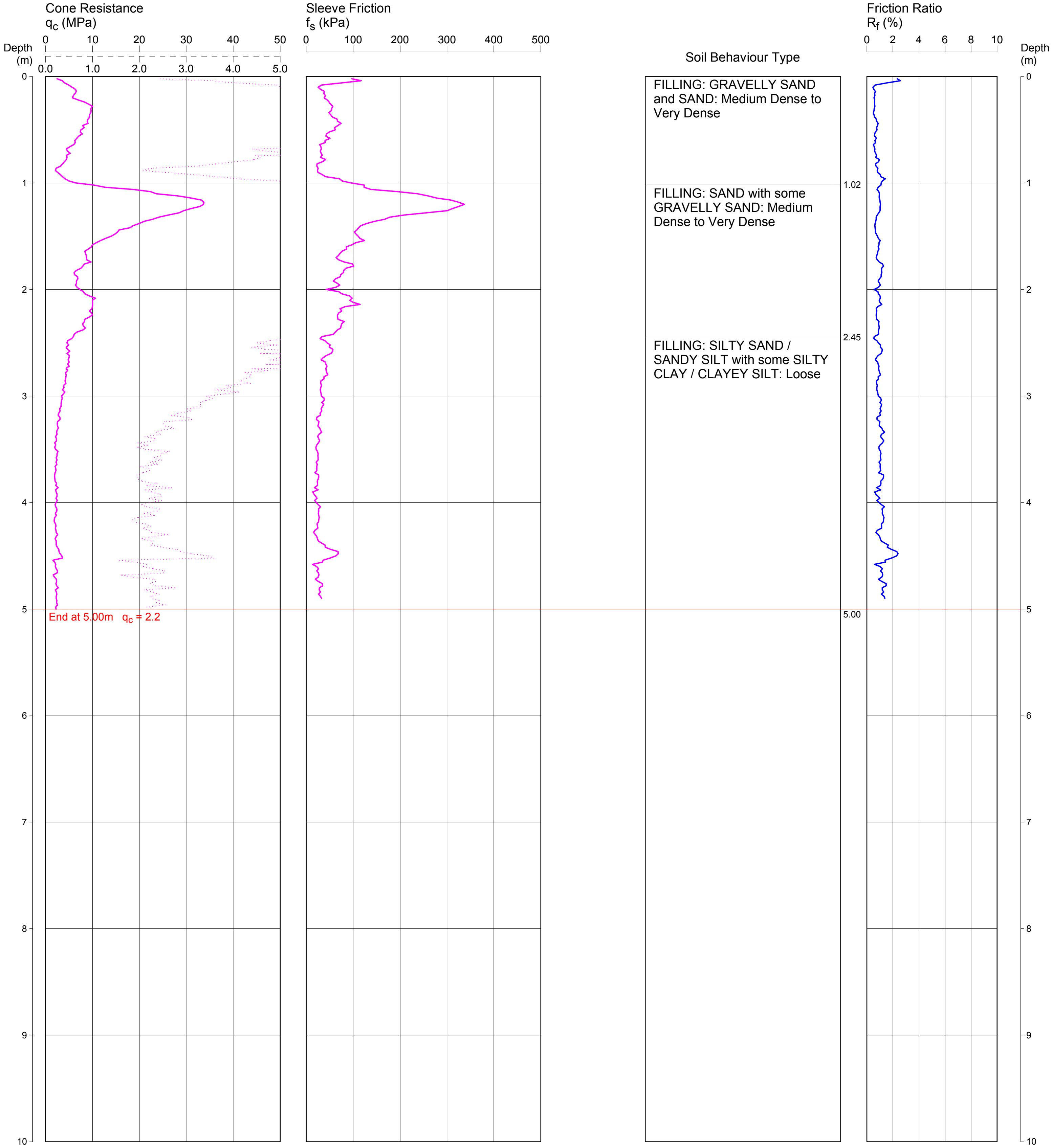
COORDINATES: 291858.05E 6226504.61N

CPT 201

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.3m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-201.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

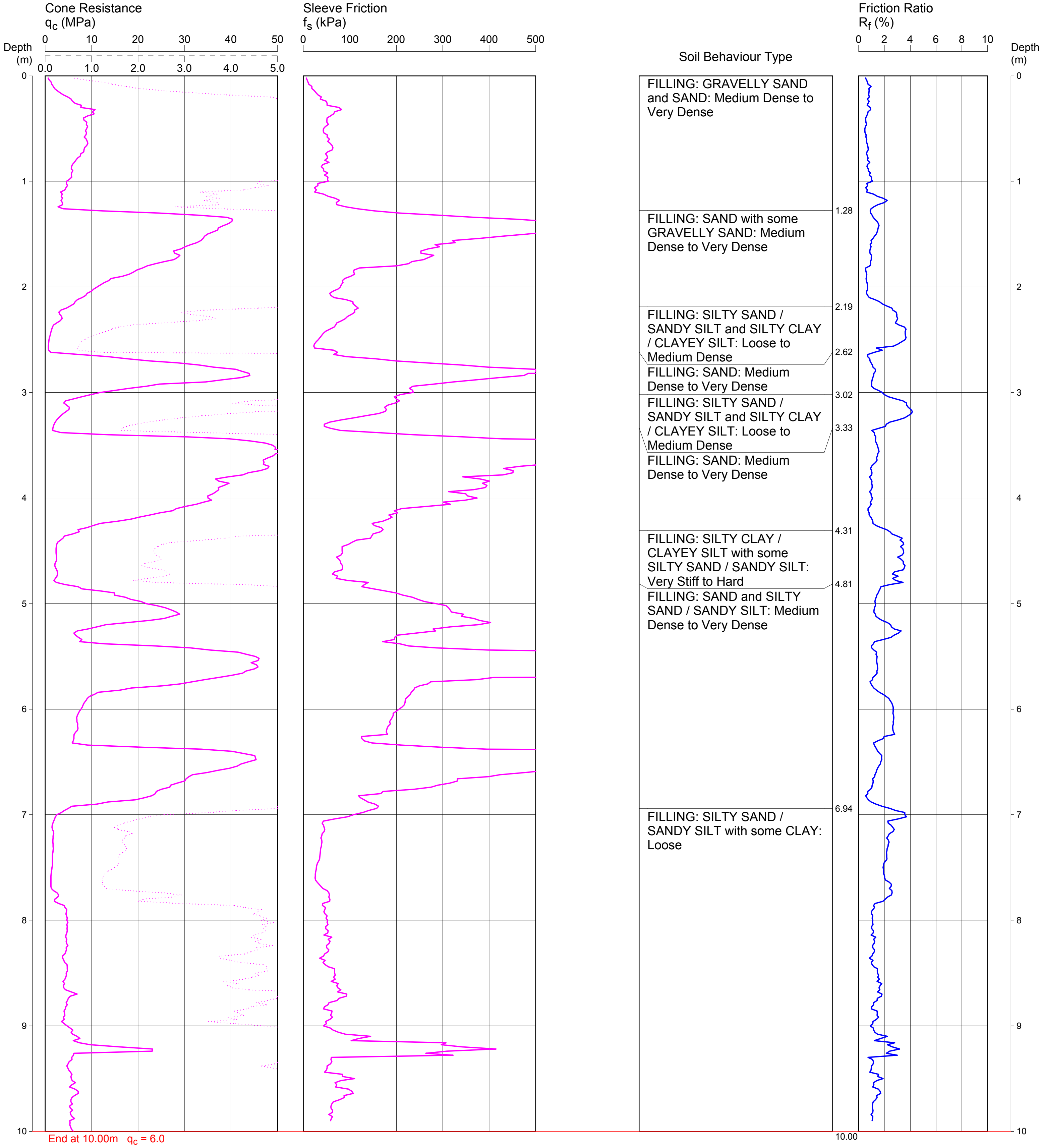
REDUCED LEVEL: 88.52

COORDINATES: 291847.39E 6226461.76N

CPT 202

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.0m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-202.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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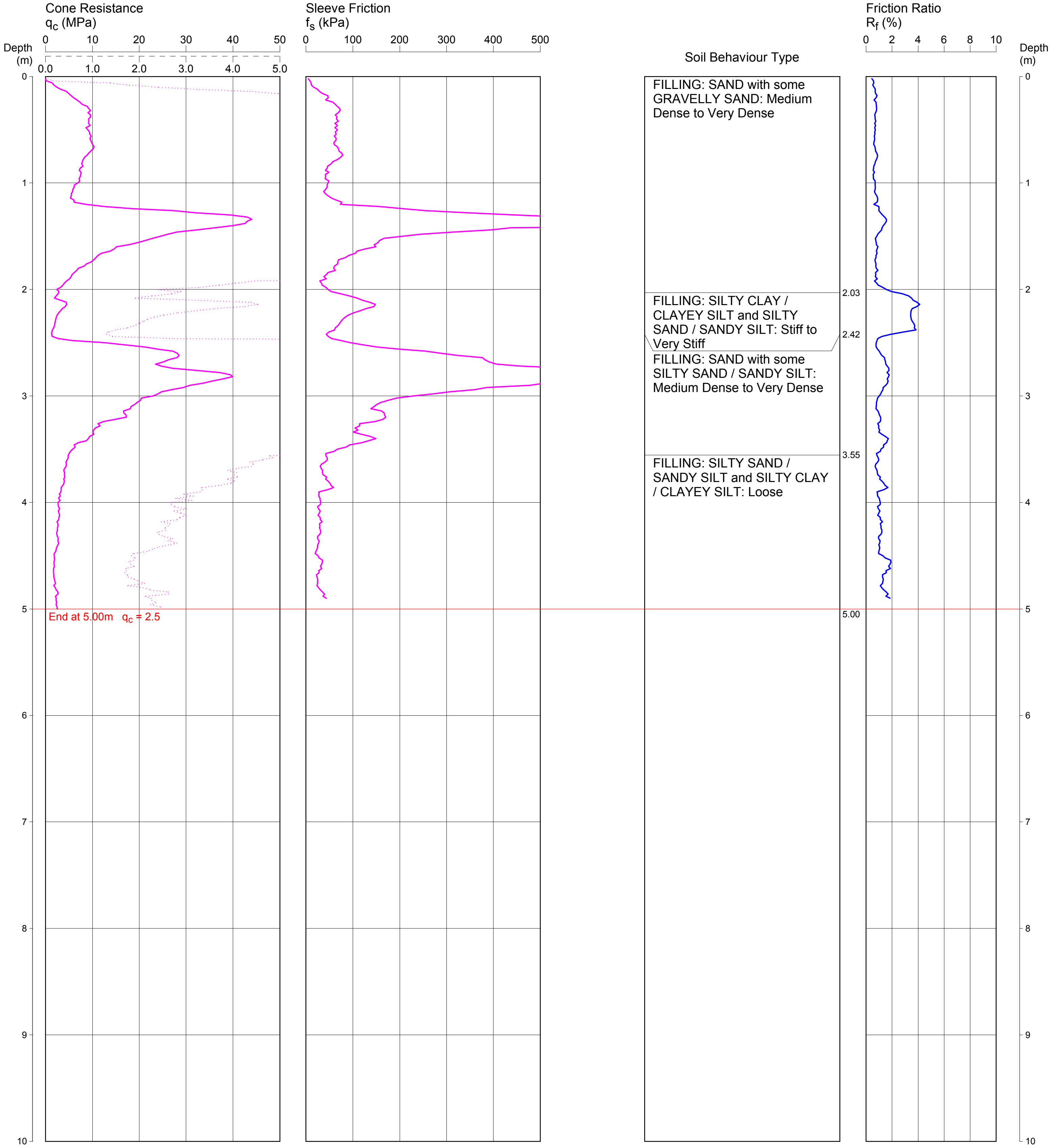
CONE PENETRATION TEST		
CLIENT: SADA SERVICES PTY LTD	**LOCATION:** SPRINGS ROAD, GLENLEE	**CPT 203** Page 1 of 1
PROJECT: IMPACT ROLLING TRIALS	**REDUCED LEVEL:** 86.80	**DATE** 4/07/2011
	COORDINATES: 291841.60E 6226414.50N	**PROJECT No:** 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.5m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-203.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

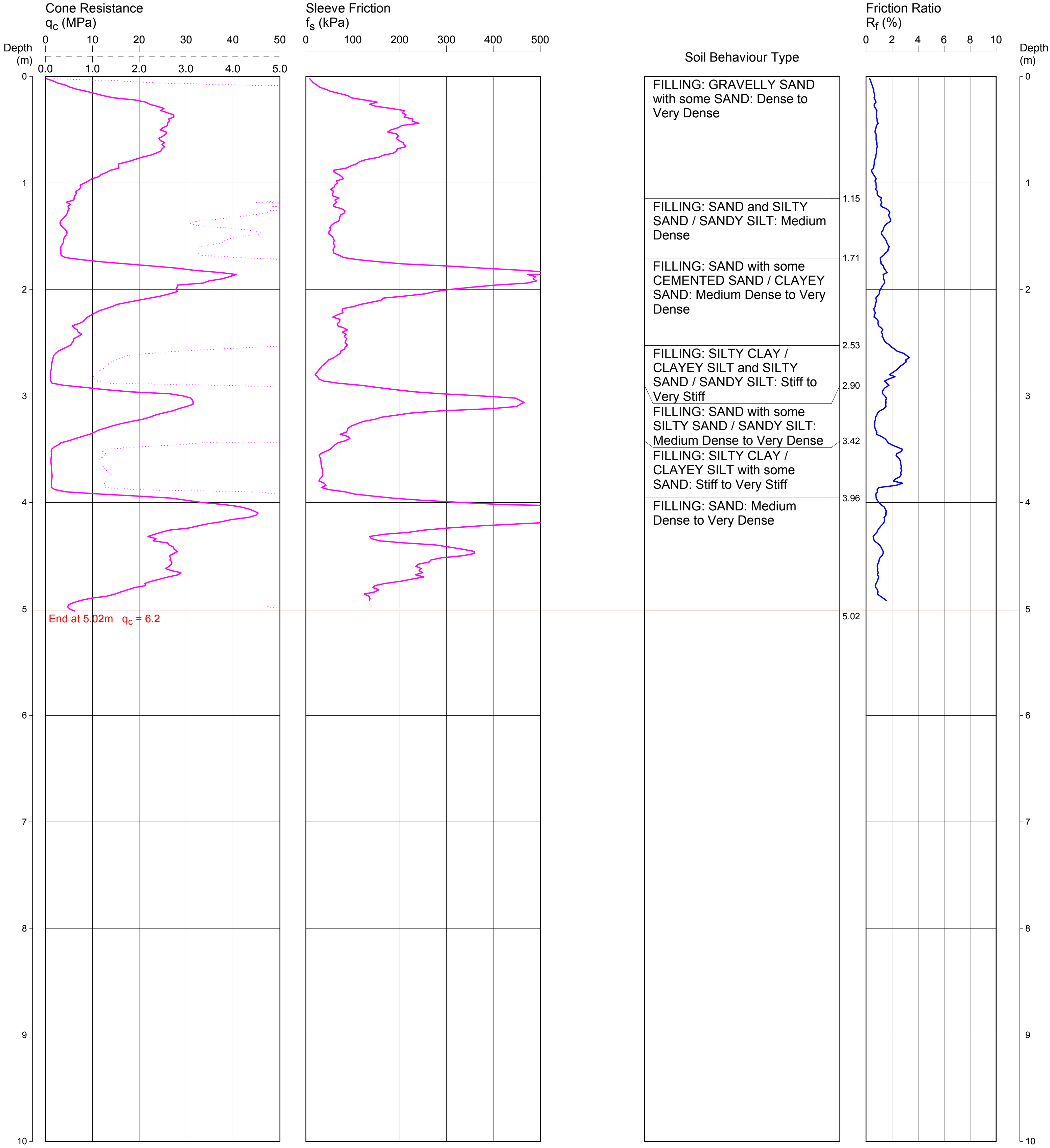
REDUCED LEVEL: 90.91

COORDINATES: 291873.27E 6226402.23N

CPT 204

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.2m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-204.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

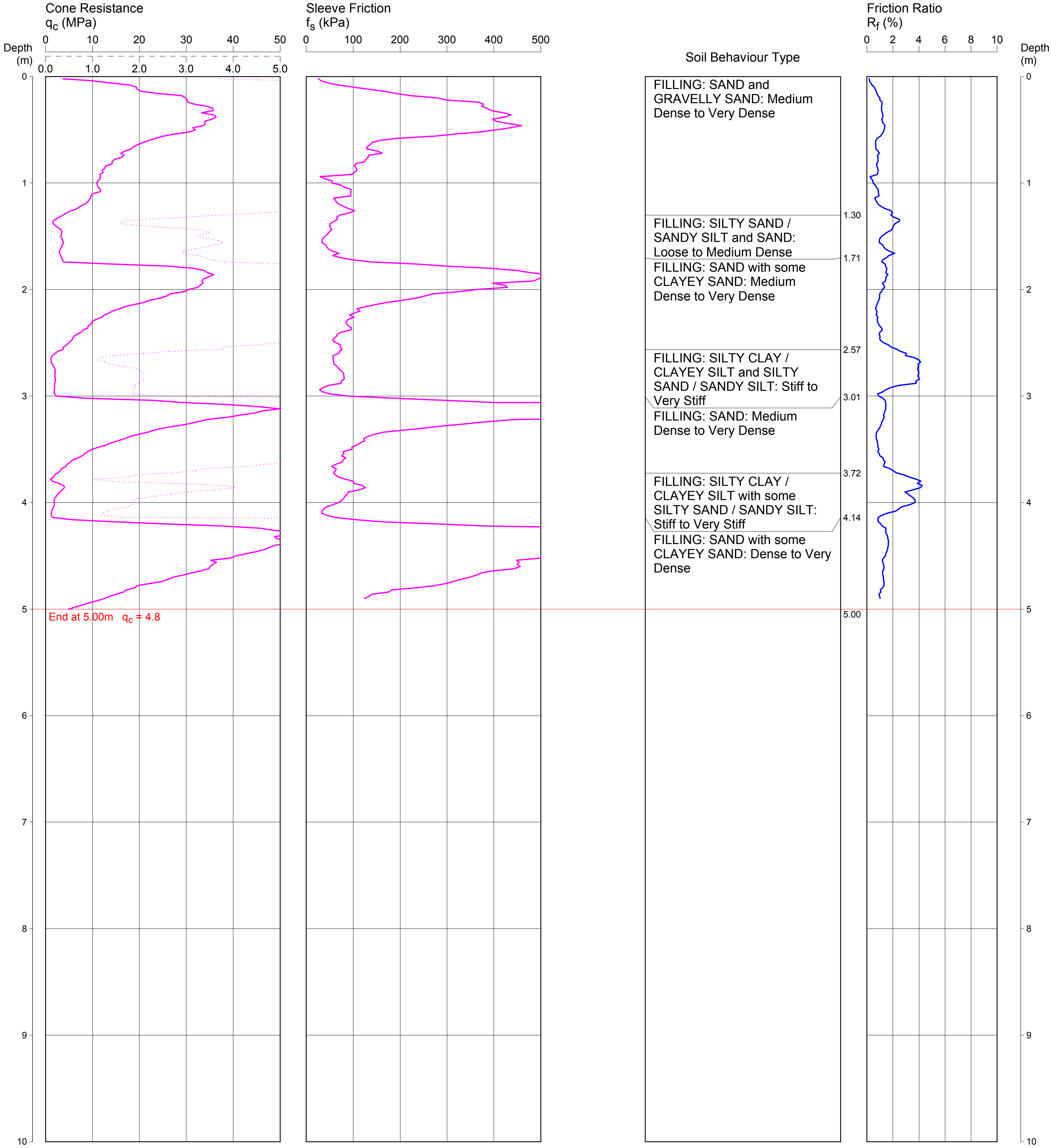
REDUCED LEVEL: 88.73

COORDINATES: 291871.18E 6226442.32N

CPT 205

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.8m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-205.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 87.95

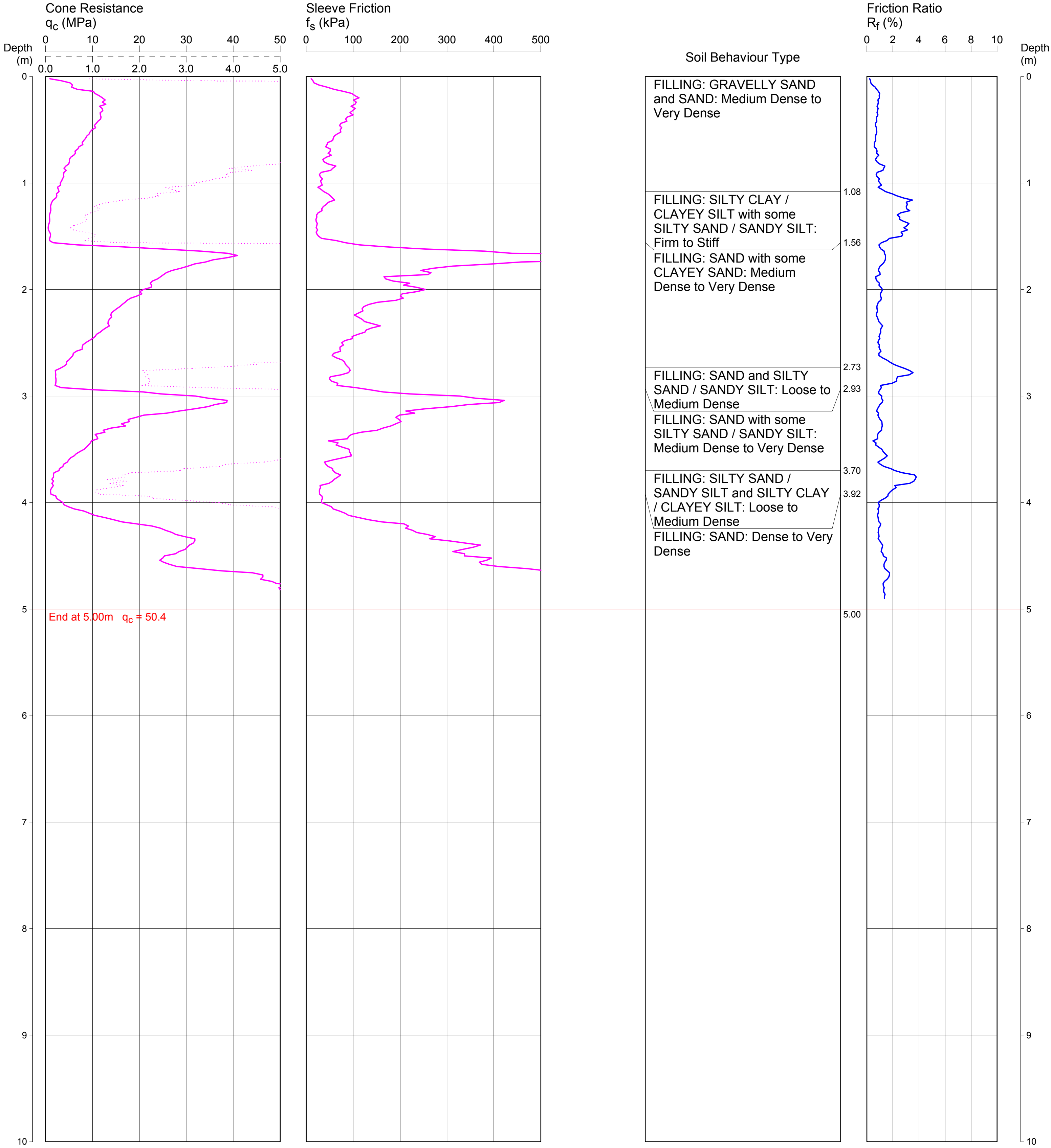
COORDINATES: 291874.45E 6226485.04N

CPT 206

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.5m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-206.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

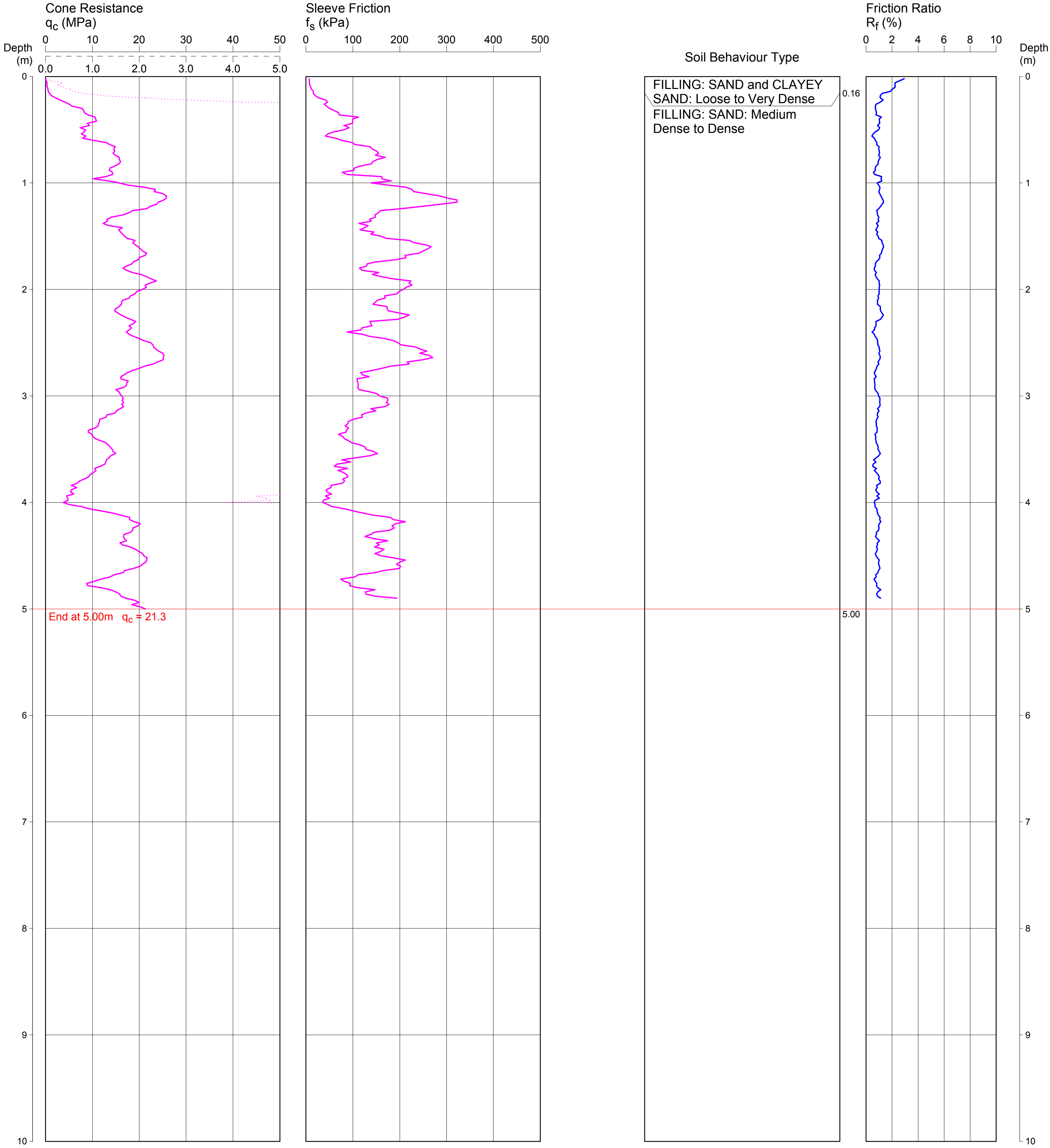
REDUCED LEVEL: 89.28

COORDINATES: 292270.48E 6226551.97N

CPT 207

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.0m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-207.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

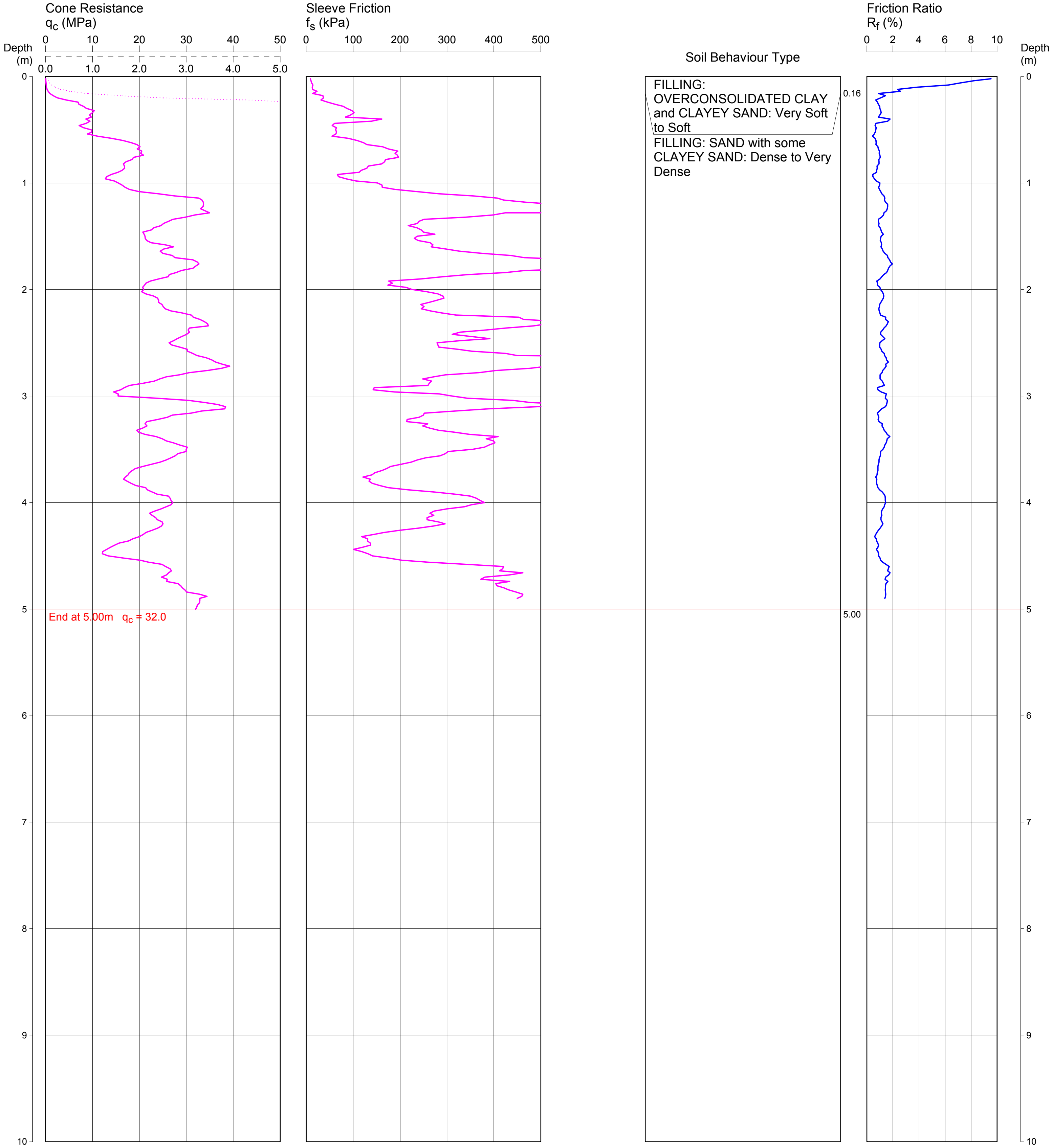
REDUCED LEVEL: 89.47

COORDINATES: 292277.32E 6226578.87N

CPT 208

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.4m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-208.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 89.43

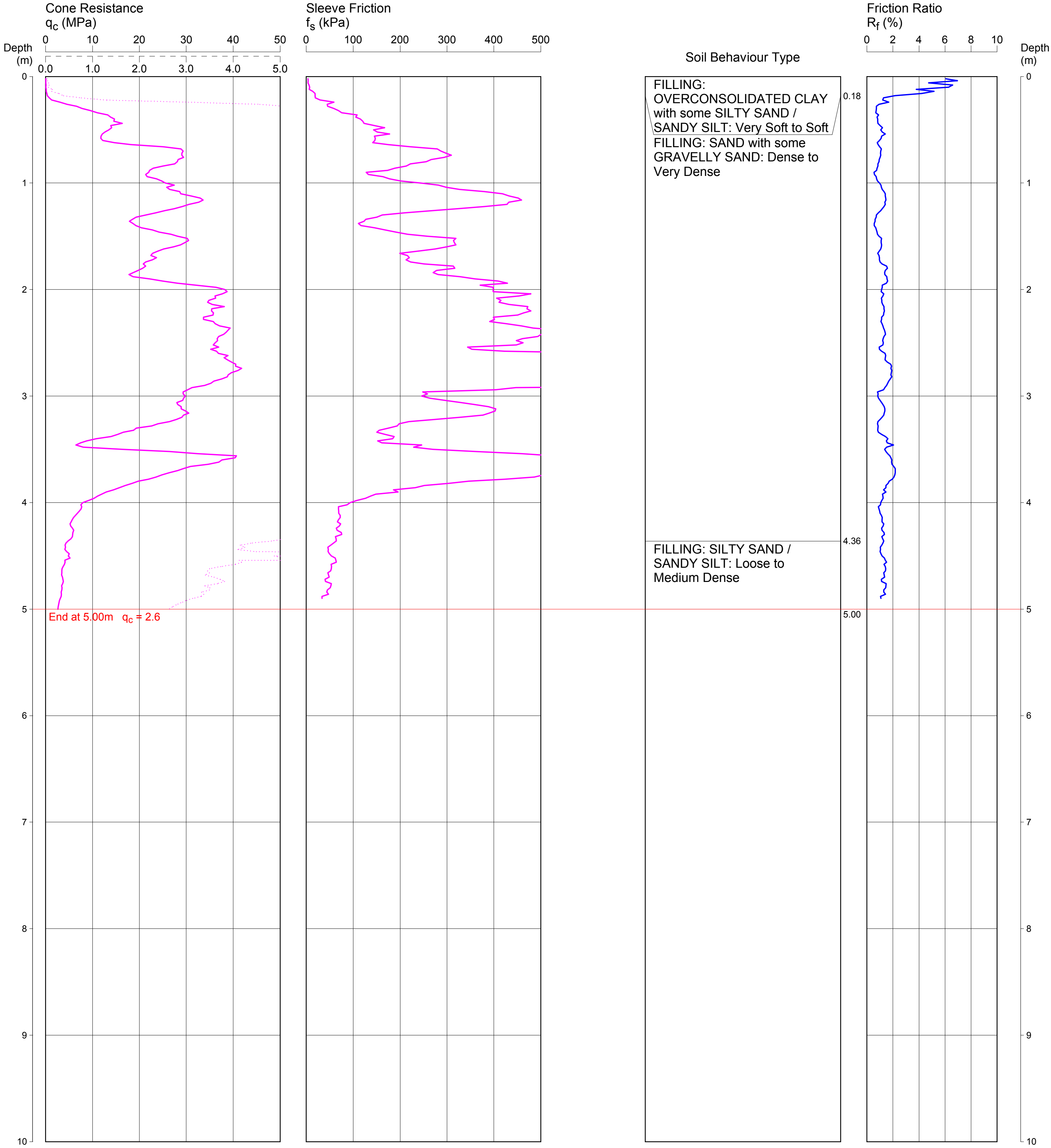
COORDINATES: 292284.37E 6226604.08N

CPT 209

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.4m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-209.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 90.59

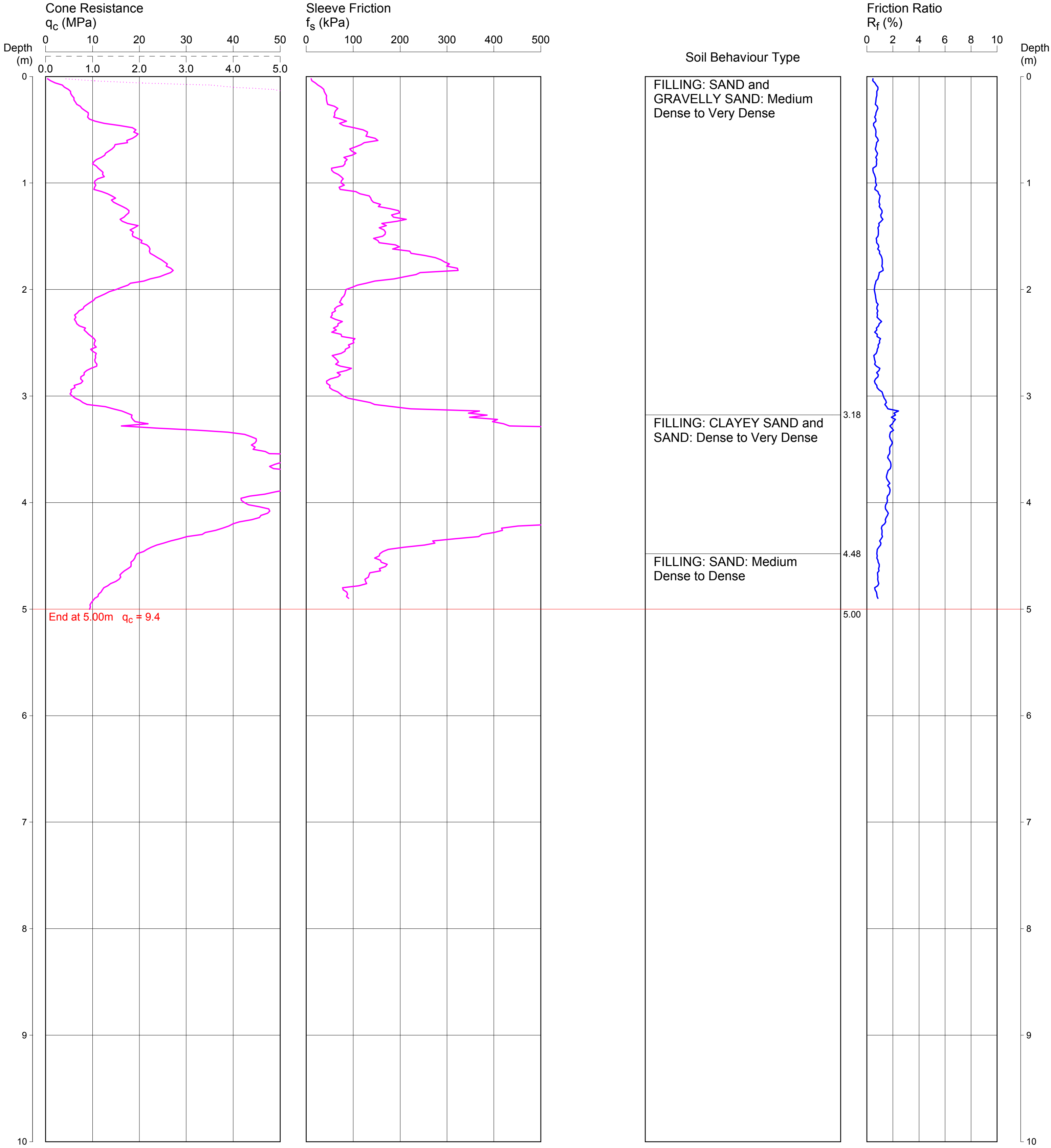
COORDINATES: 292263.04E 6226614.83N

CPT 210

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.1m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-210.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 89.20

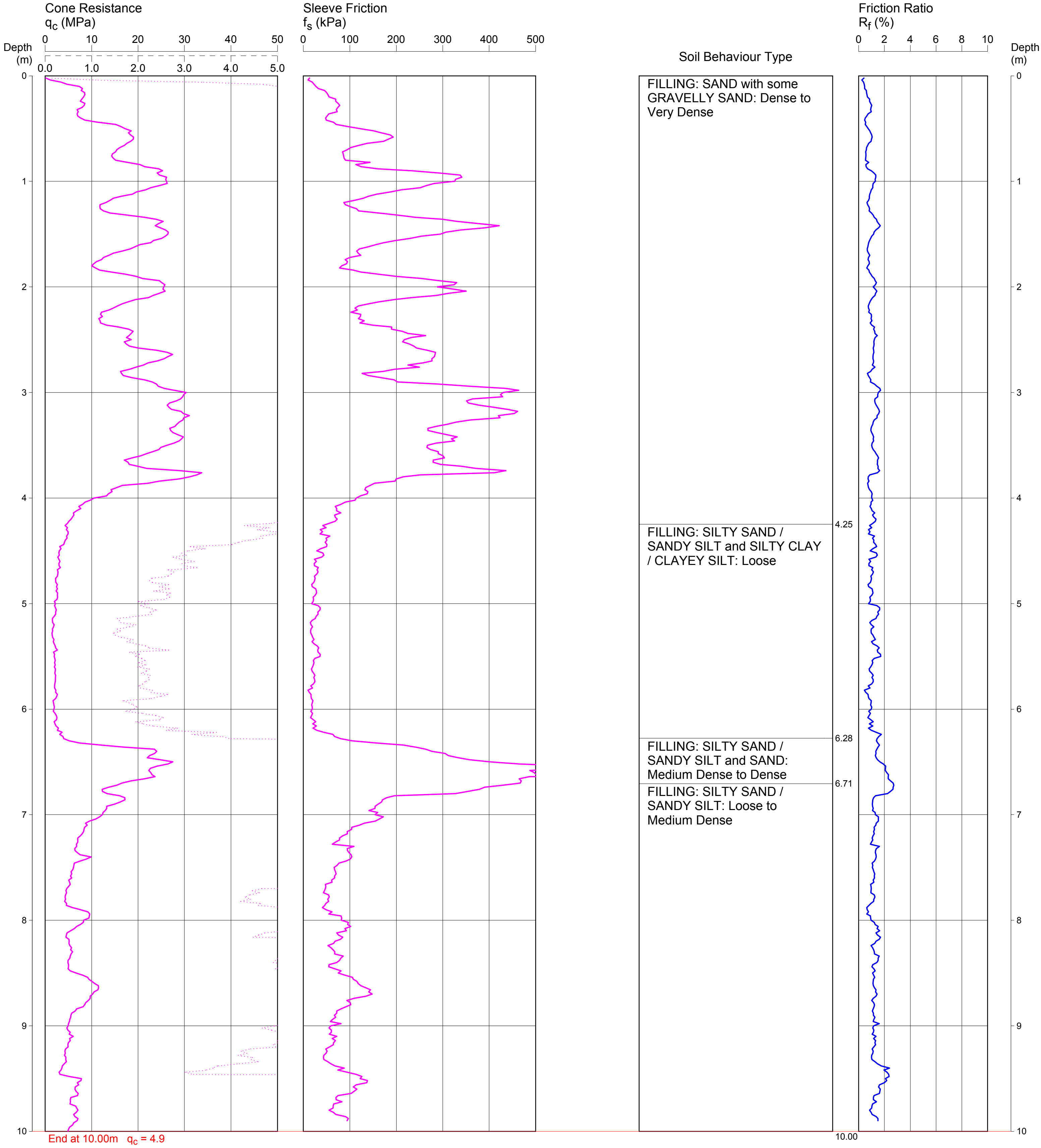
COORDINATES: 292240.86E 6226572.51N

CPT 211

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.0m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-211.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.22

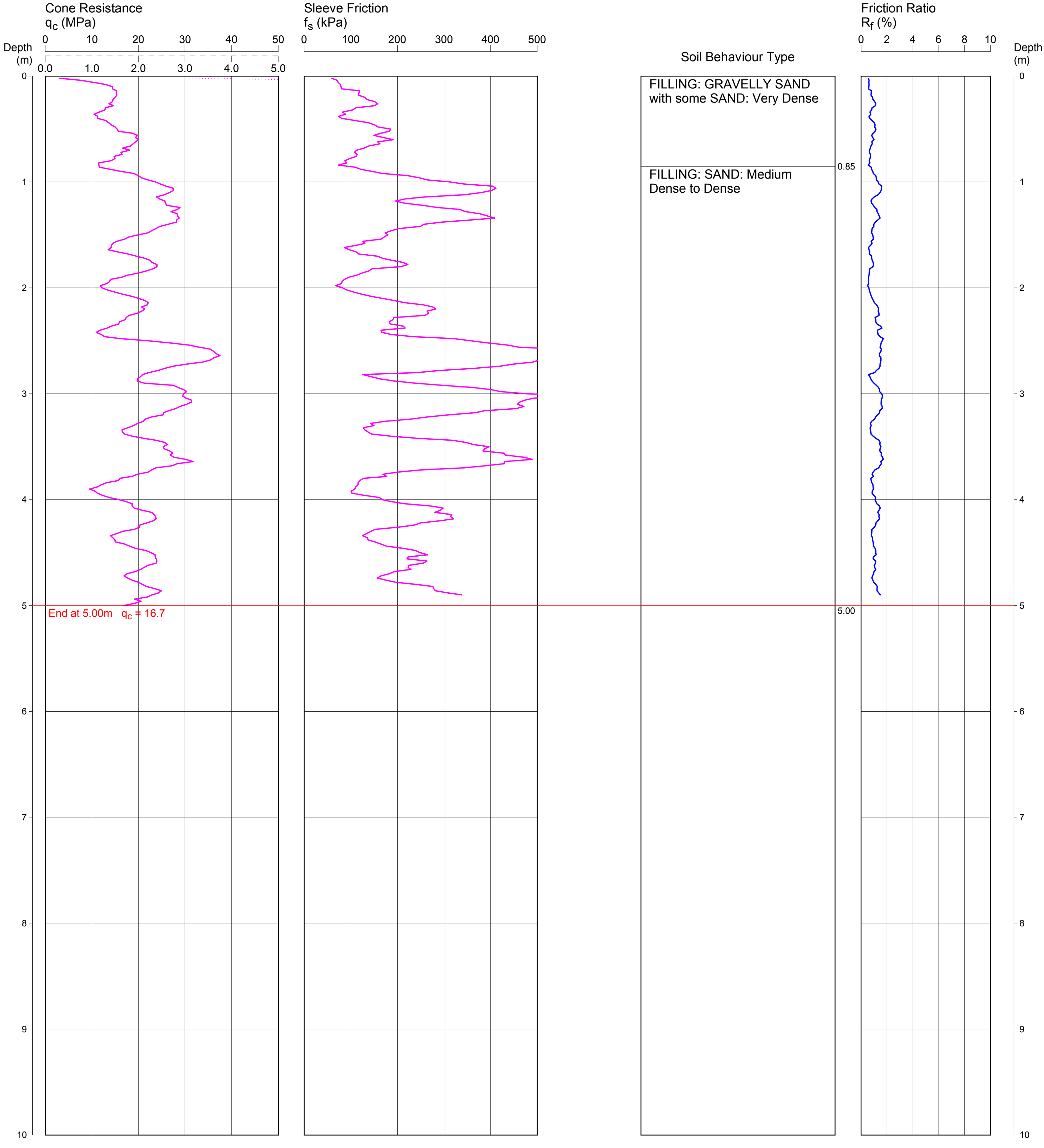
COORDINATES: 292230.14E 6226556.60N

CPT 212

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.8m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-212.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

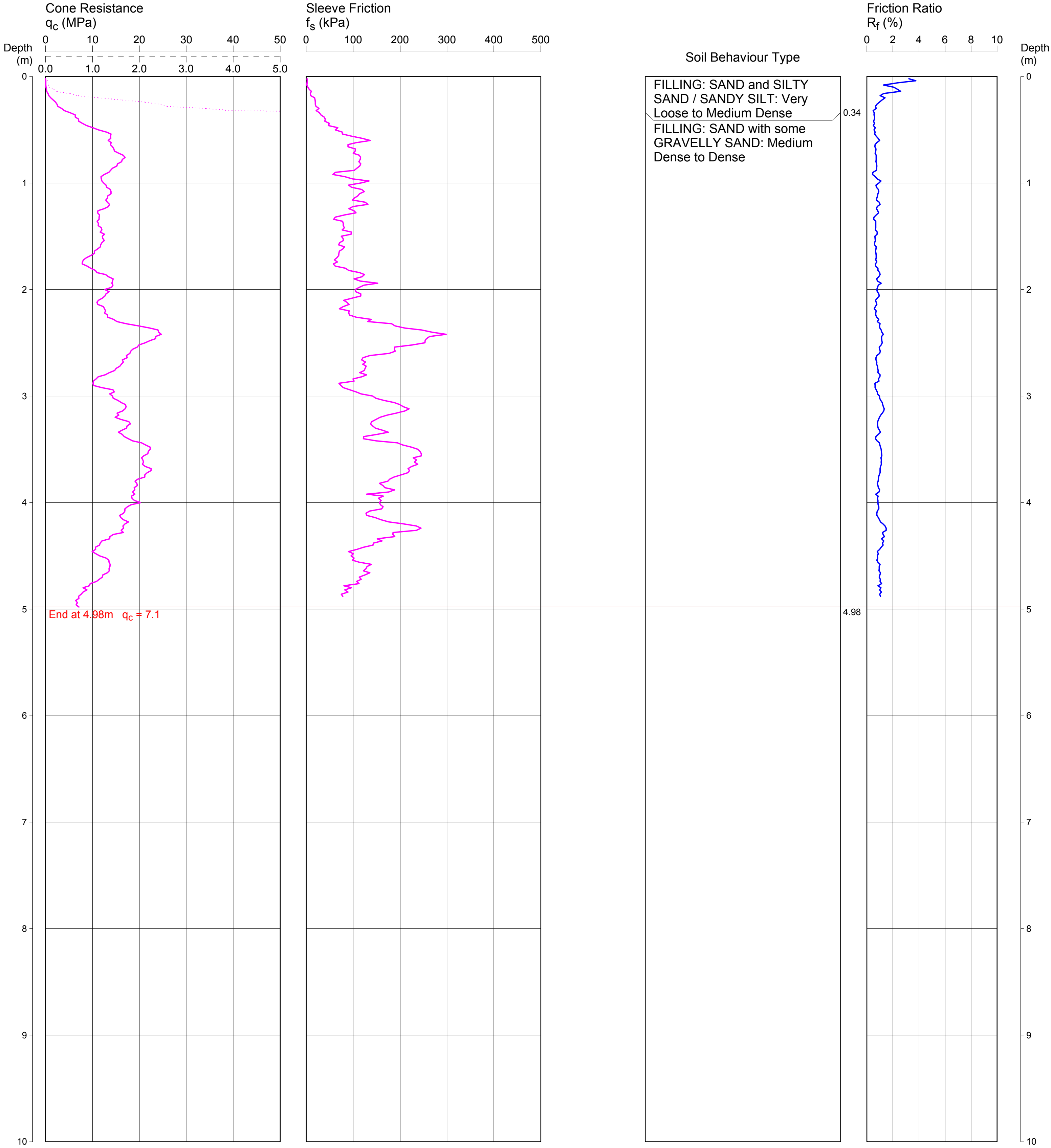
REDUCED LEVEL: 88.66

COORDINATES: 292230.60E 6226590.87N

CPT 213

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.7m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-213.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 90.35

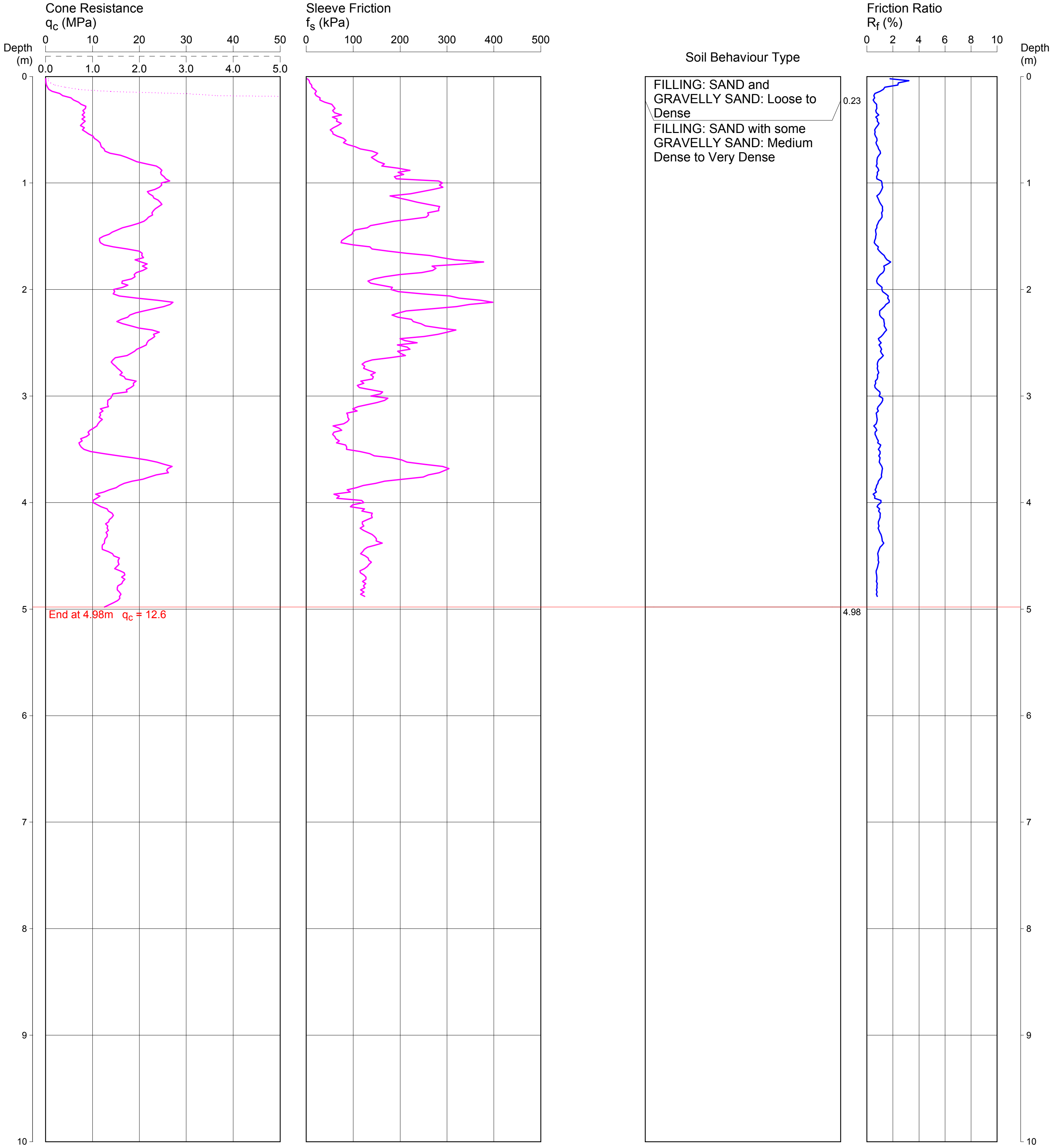
COORDINATES: 292208.99E 6226564.17N

CPT 214

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.6m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT Before\40950.05-214.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

Douglas Partners
Geotechnics | Environment | Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.23

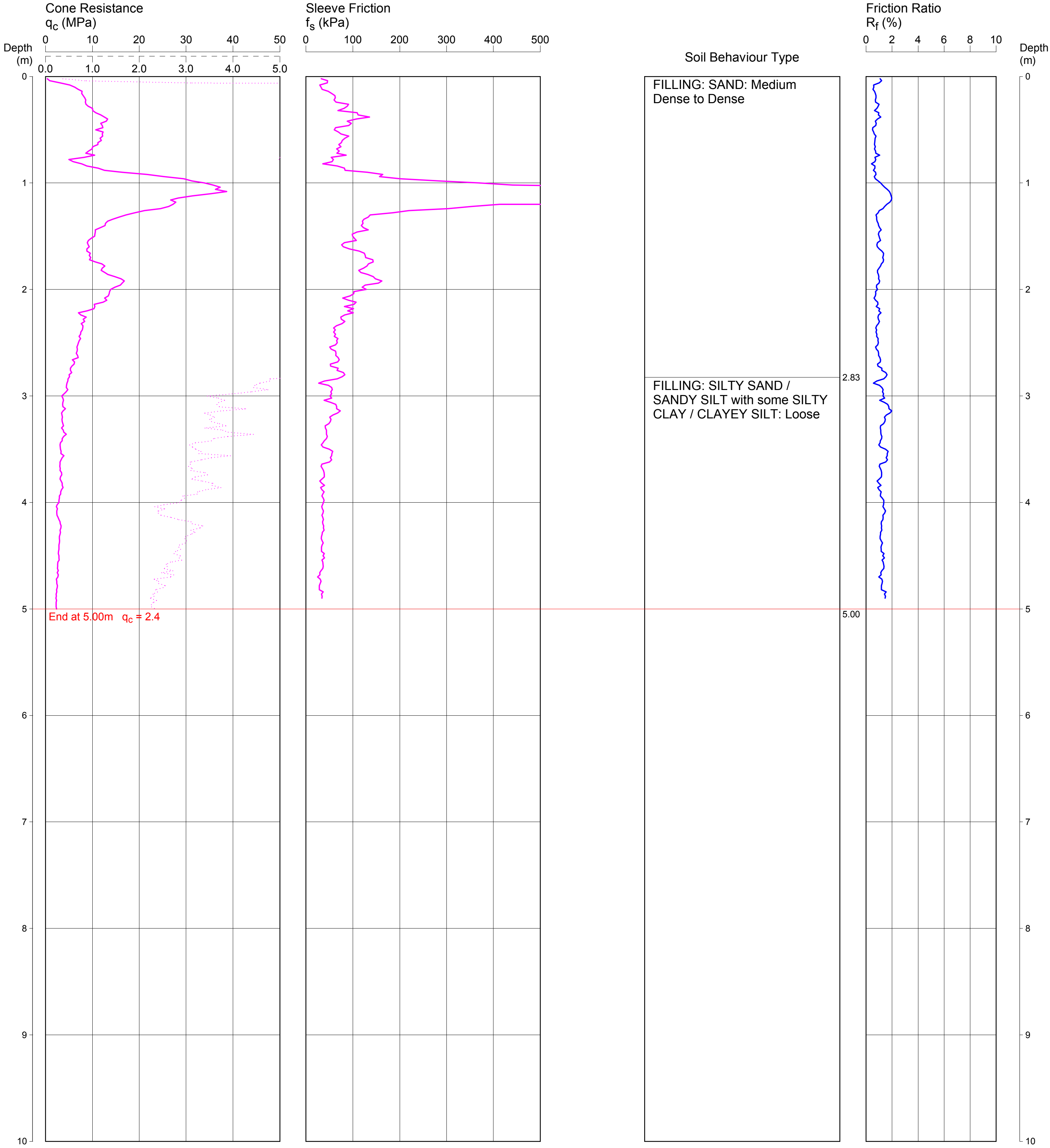
COORDINATES: 291858.05E 6226504.61N

CPT 201A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 2.2m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-201A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

Douglas Partners
Geotechnics | Environment | Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.48

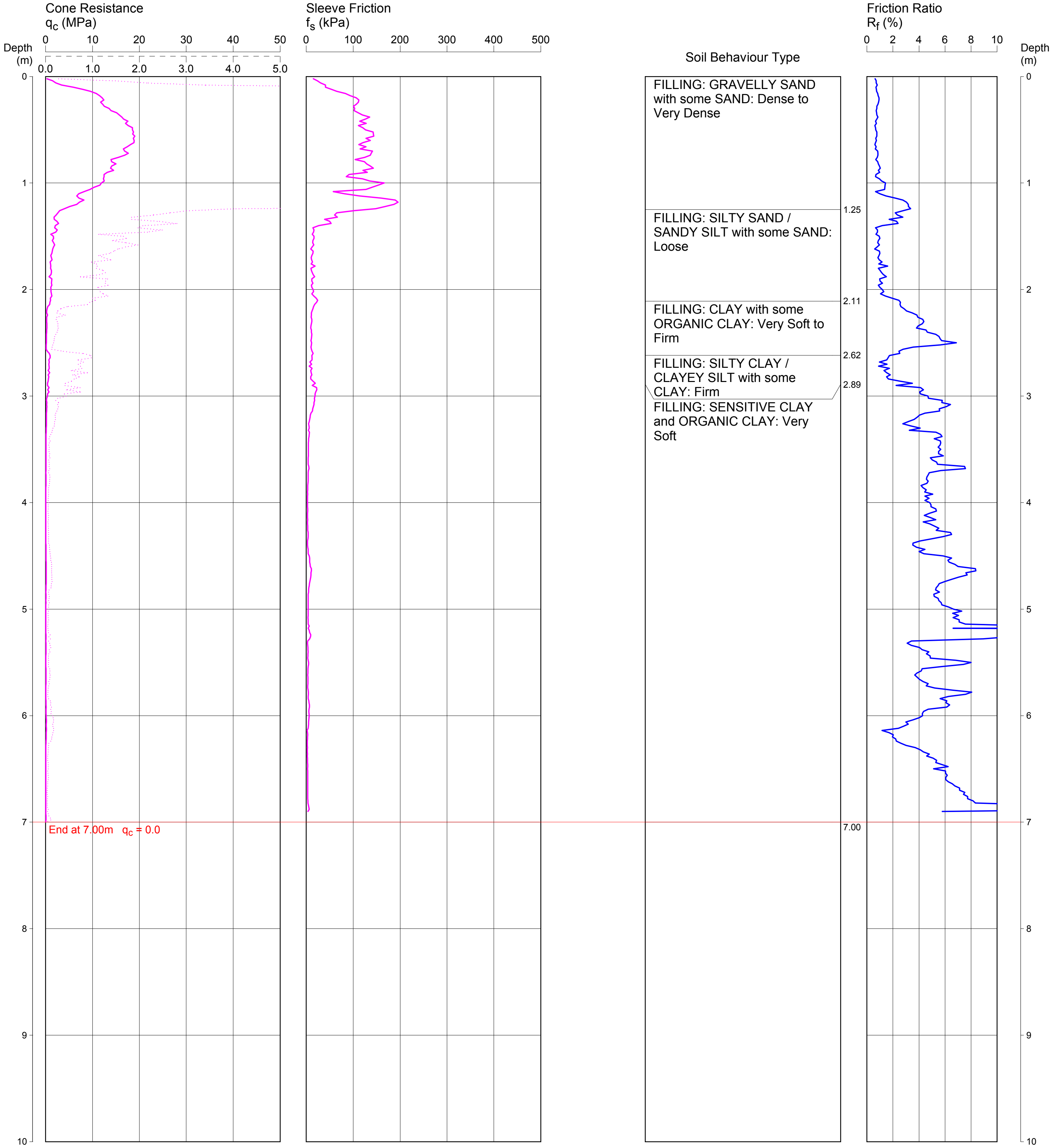
COORDINATES: 291847.39E 6226461.76N

CPT 202A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: TEST DISCONTINUED AT 7.0m DEPTH - RESULTS INDICATED CONE WAS RUNNING DOWN THE OLD TEST HOLE

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-202A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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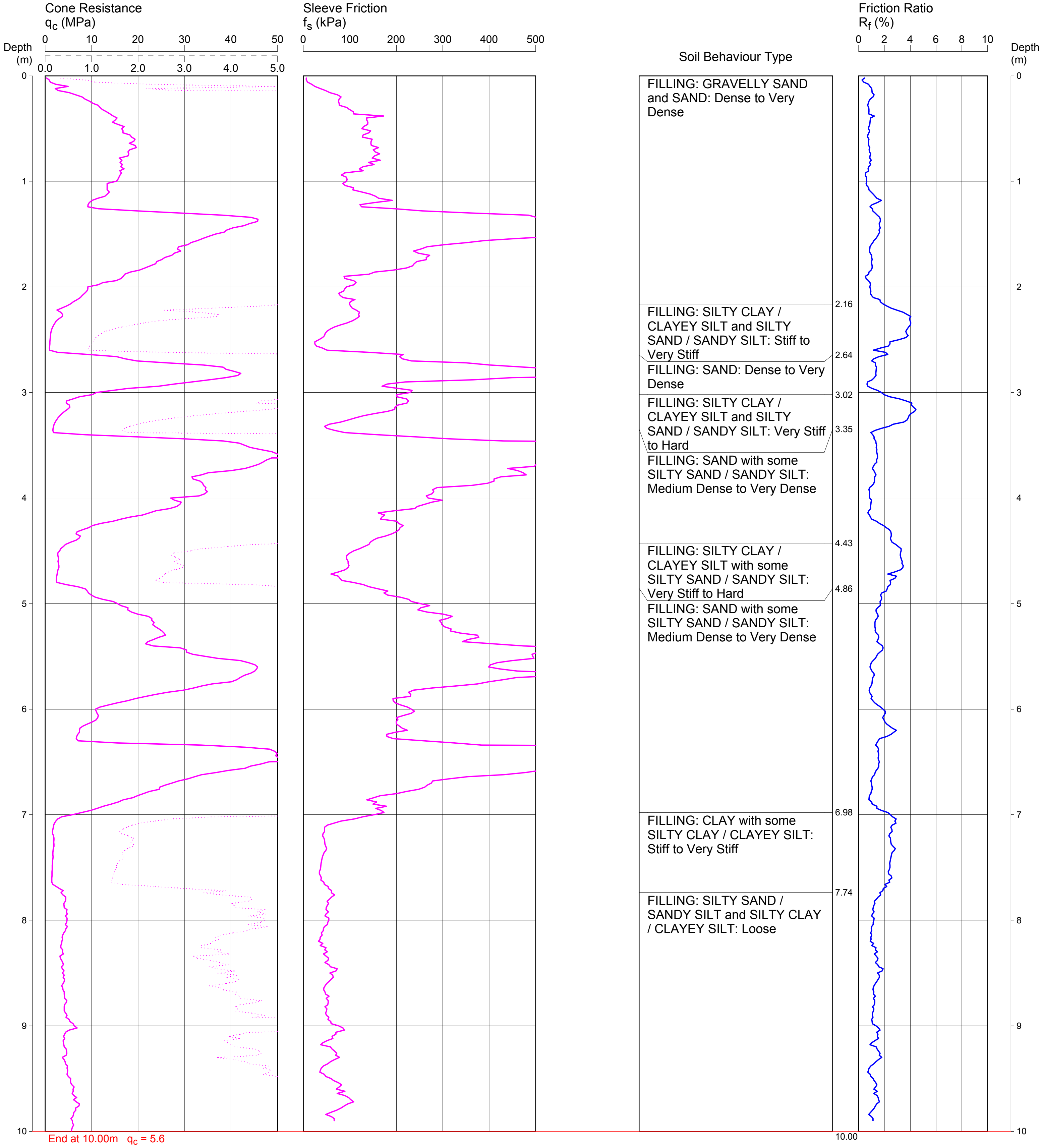
CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD	**LOCATION:** SPRINGS ROAD, GLENLEE	**CPT 202AA** Page 1 of 1
PROJECT: IMPACT ROLLING TRIALS	**REDUCED LEVEL:** 88.48	**DATE** 7/07/2011
	COORDINATES: 291847.39E 6226461.76N	**PROJECT No:** 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 7.5m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-202AA.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 86.70

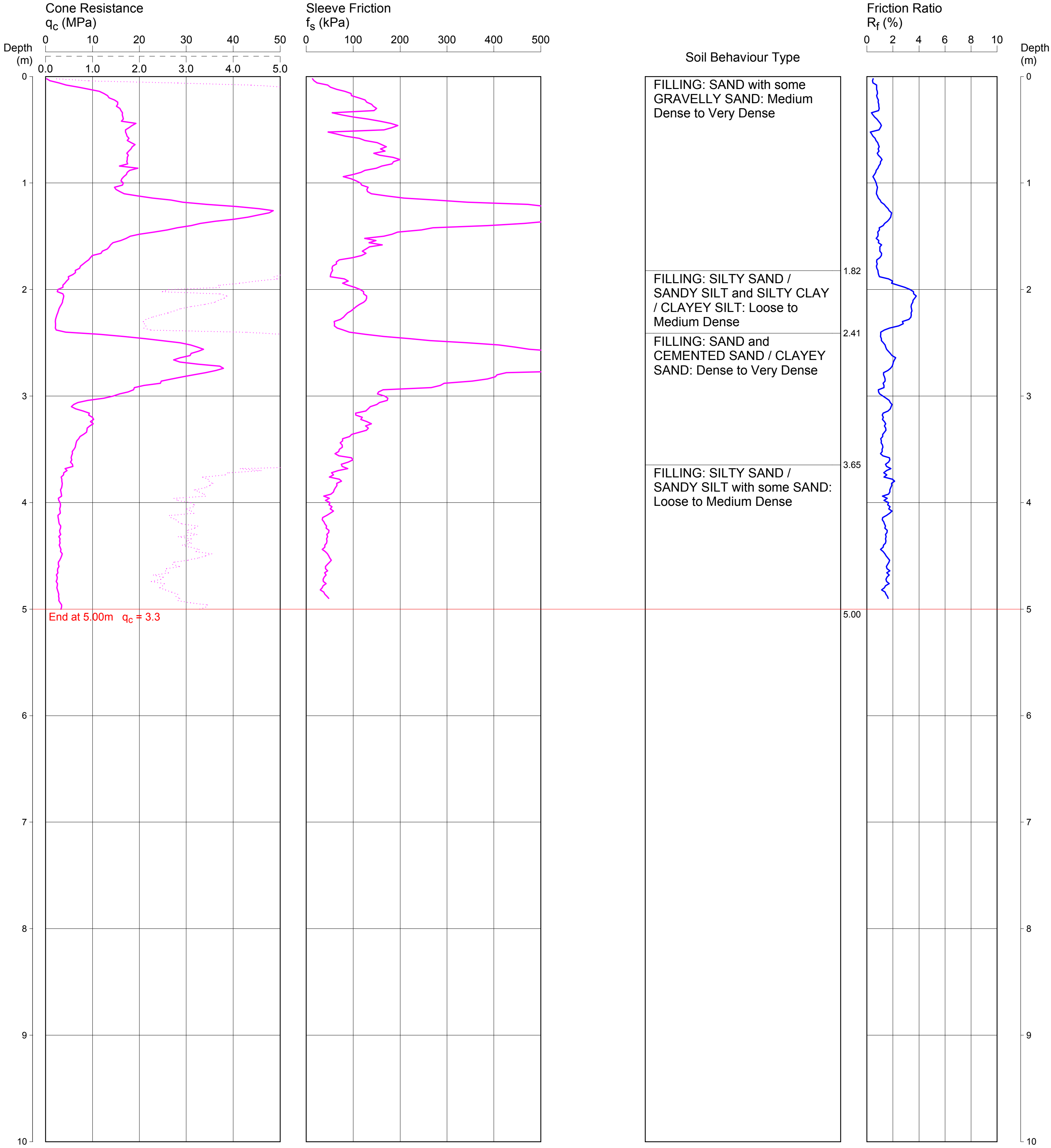
COORDINATES: 291841.60E 6226414.50N

CPT 203A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 3.1m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-203A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 90.81

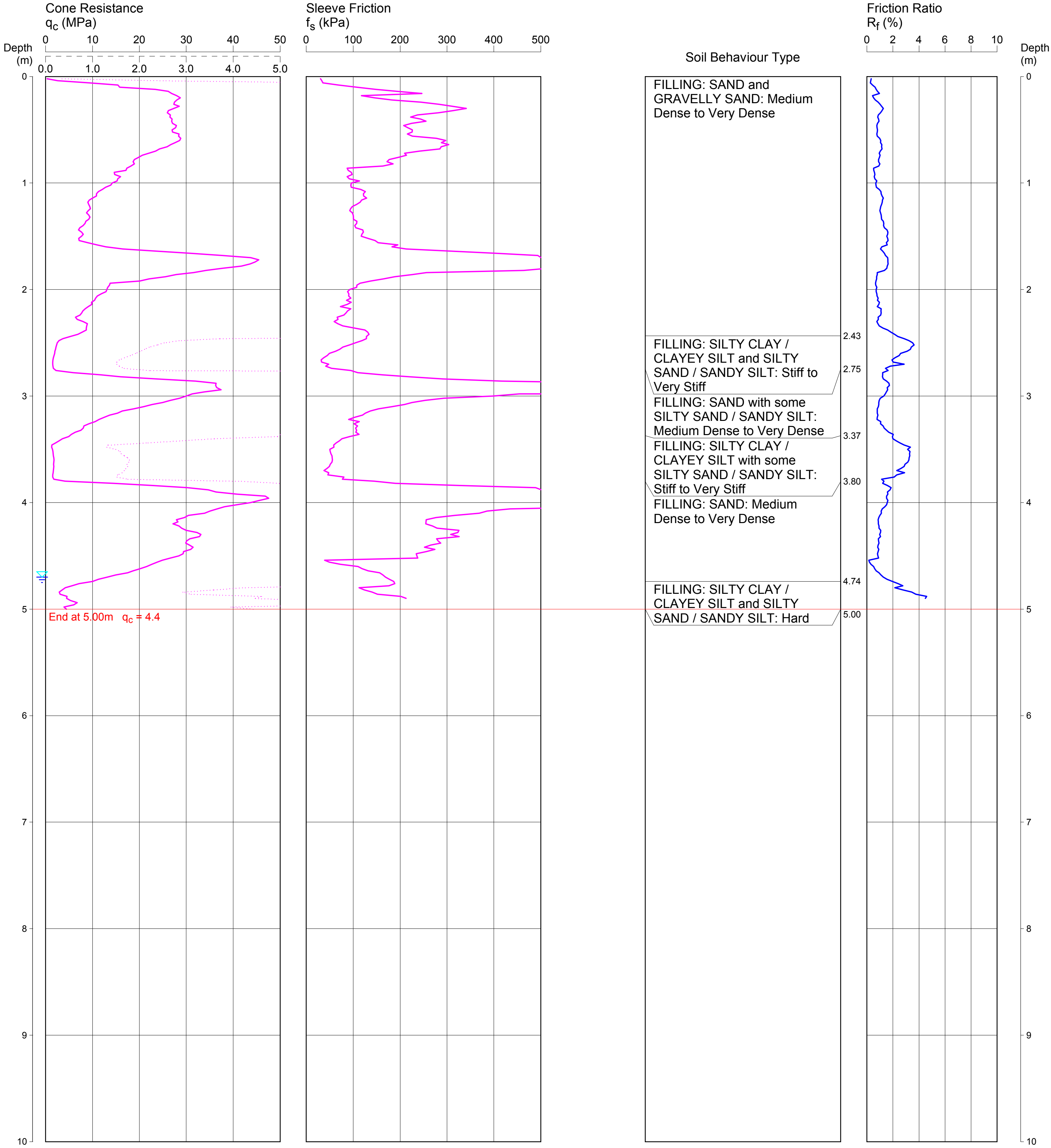
COORDINATES: 291873.27E 6226402.23N

CPT 204A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: WATER MEASURED AT 4.7m DEPTH BGL AFTER WITHDRAWAL OF RODS

Water depth after test: 4.70m depth (assumed)

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-204A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.69

COORDINATES: 291871.18E 6226442.32N

CPT 205A

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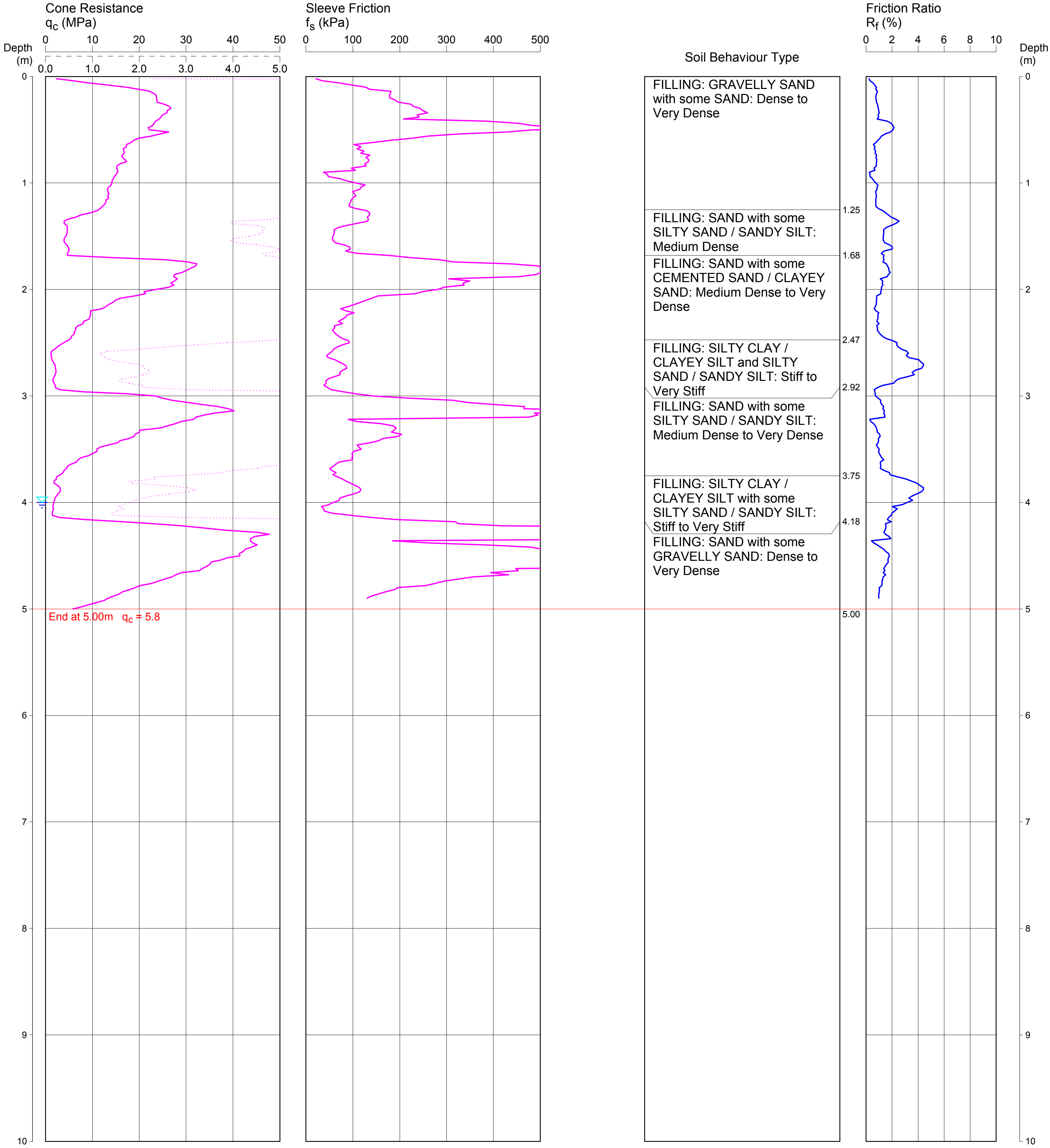
DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: WATER MEASURED AT 4.0m DEPTH BGL AFTER WITHDRAWAL OF RODS

Water depth after test: 4.00m depth (assumed)

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-205A.CP5

Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

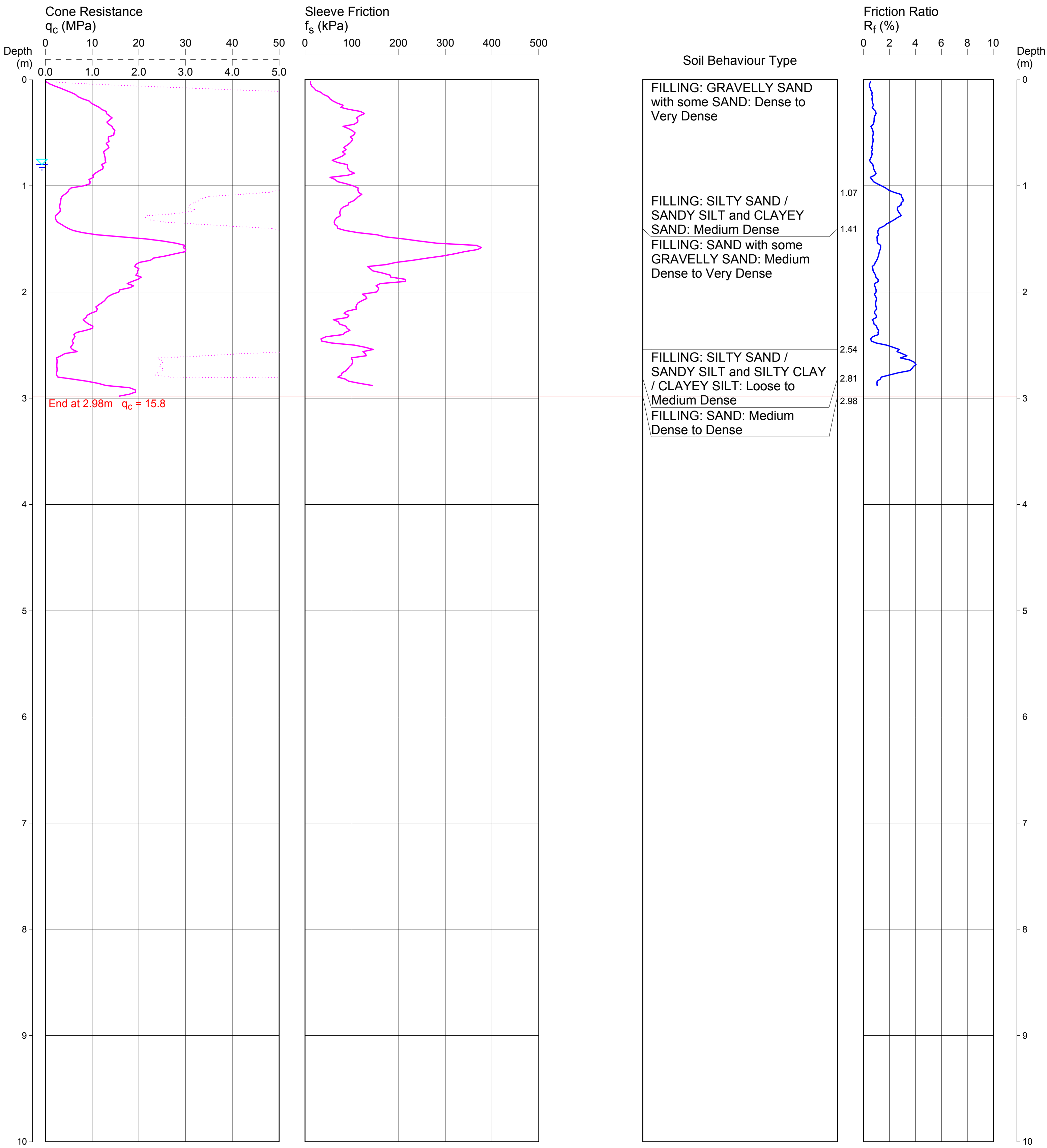
REDUCED LEVEL: 87.75

COORDINATES: 291874.45E 6226485.04N

CPT 206A

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: TEST DISCONTINUED AT 2.98m DEPTH DUE TO EXCESSIVE BENDING
WATER MEASURED AT 0.8m DEPTH BGL AFTER WITHDRAWAL OF RODS

Water depth after test: 0.80m depth (assumed)

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-206A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 90.51

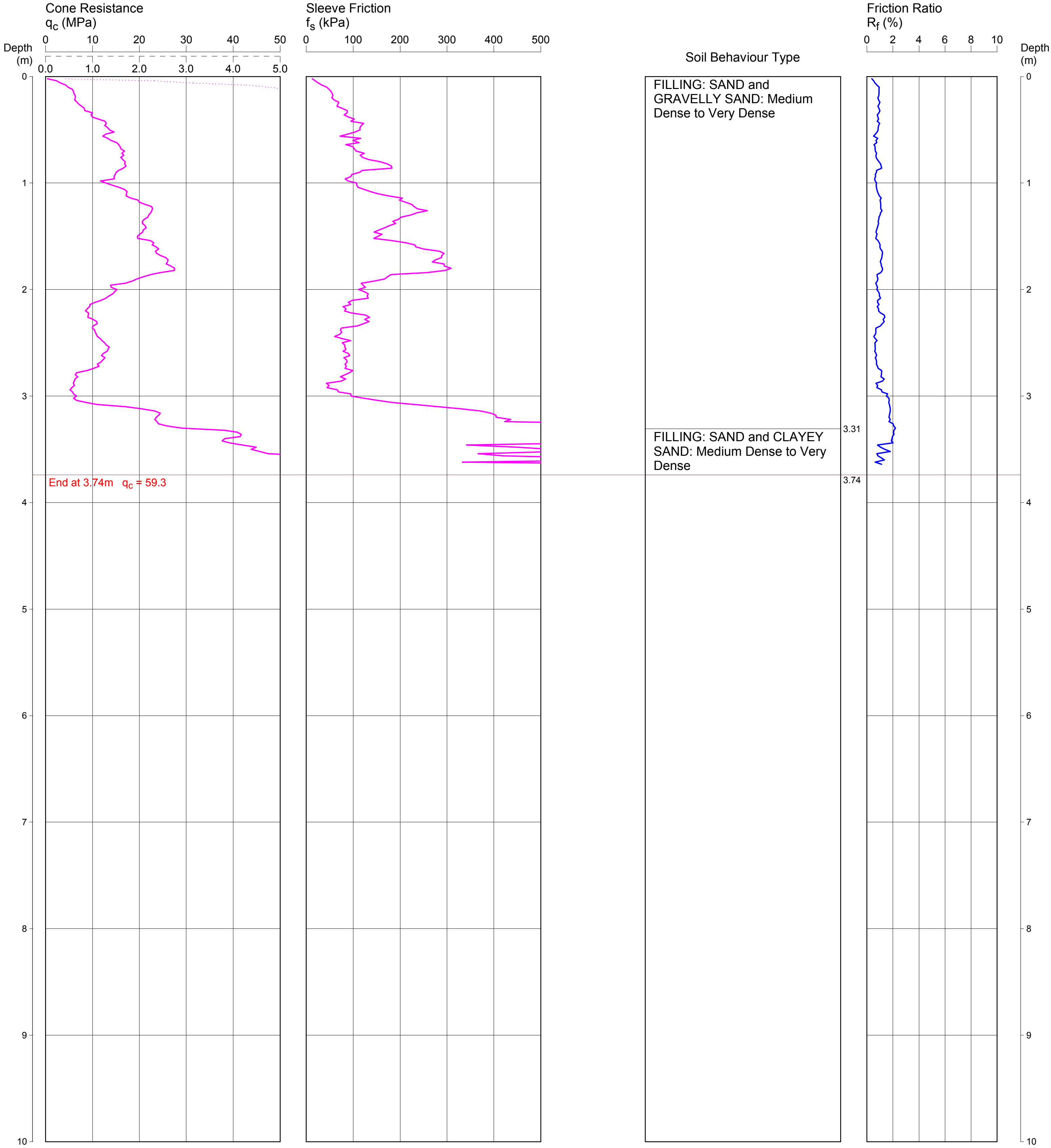
COORDINATES: 292263.04E 6226614.83N

CPT 210A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: TEST DISCONTINUED AT 3.74m DEPTH - PRACTICAL REFUSAL
HOLE COLLAPSE MEASURED AT 3.8m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-210A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

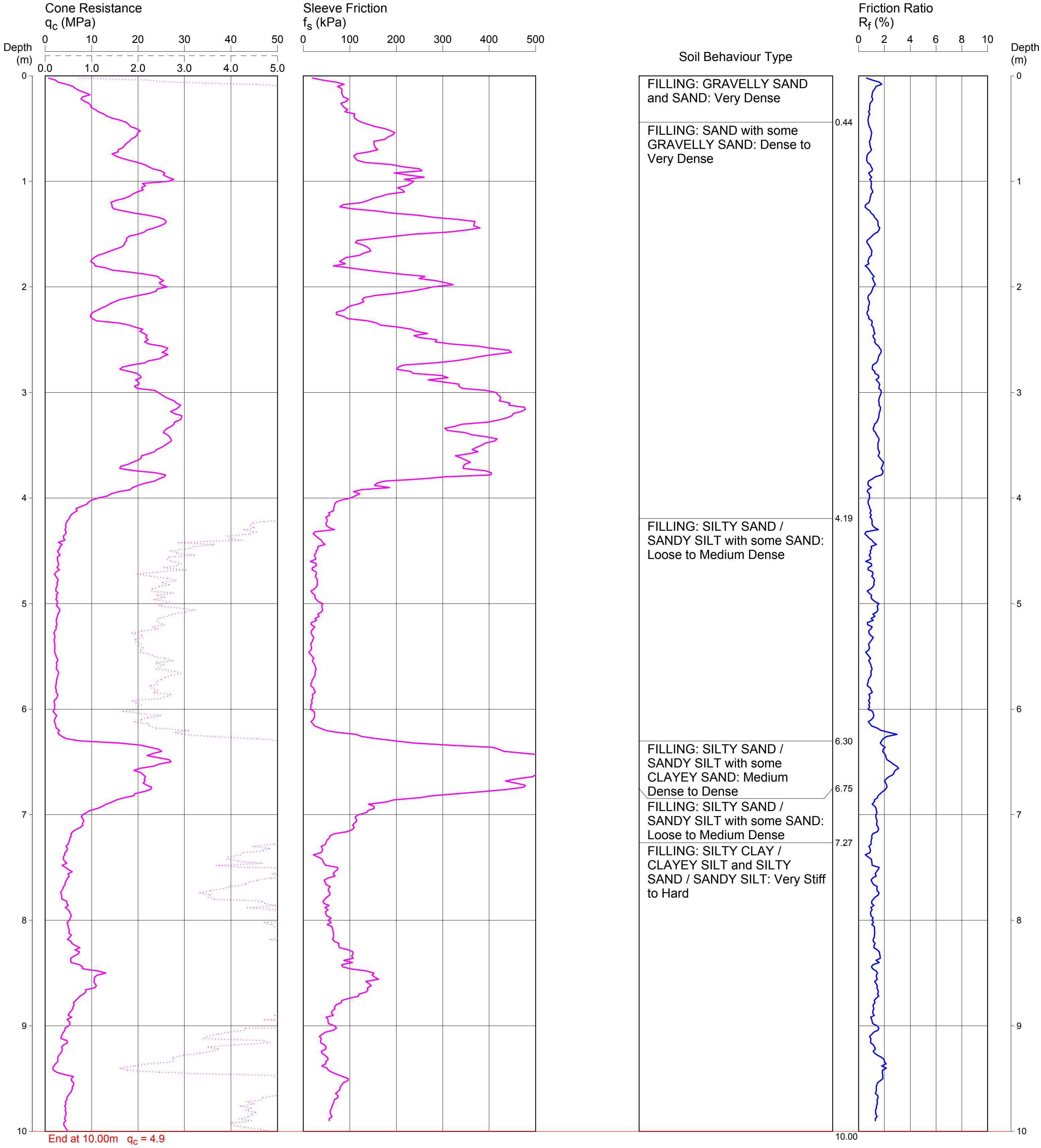
REDUCED LEVEL: 89.10

COORDINATES: 292240.86E 6226572.51N

CPT 211A

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 5.8m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-211A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

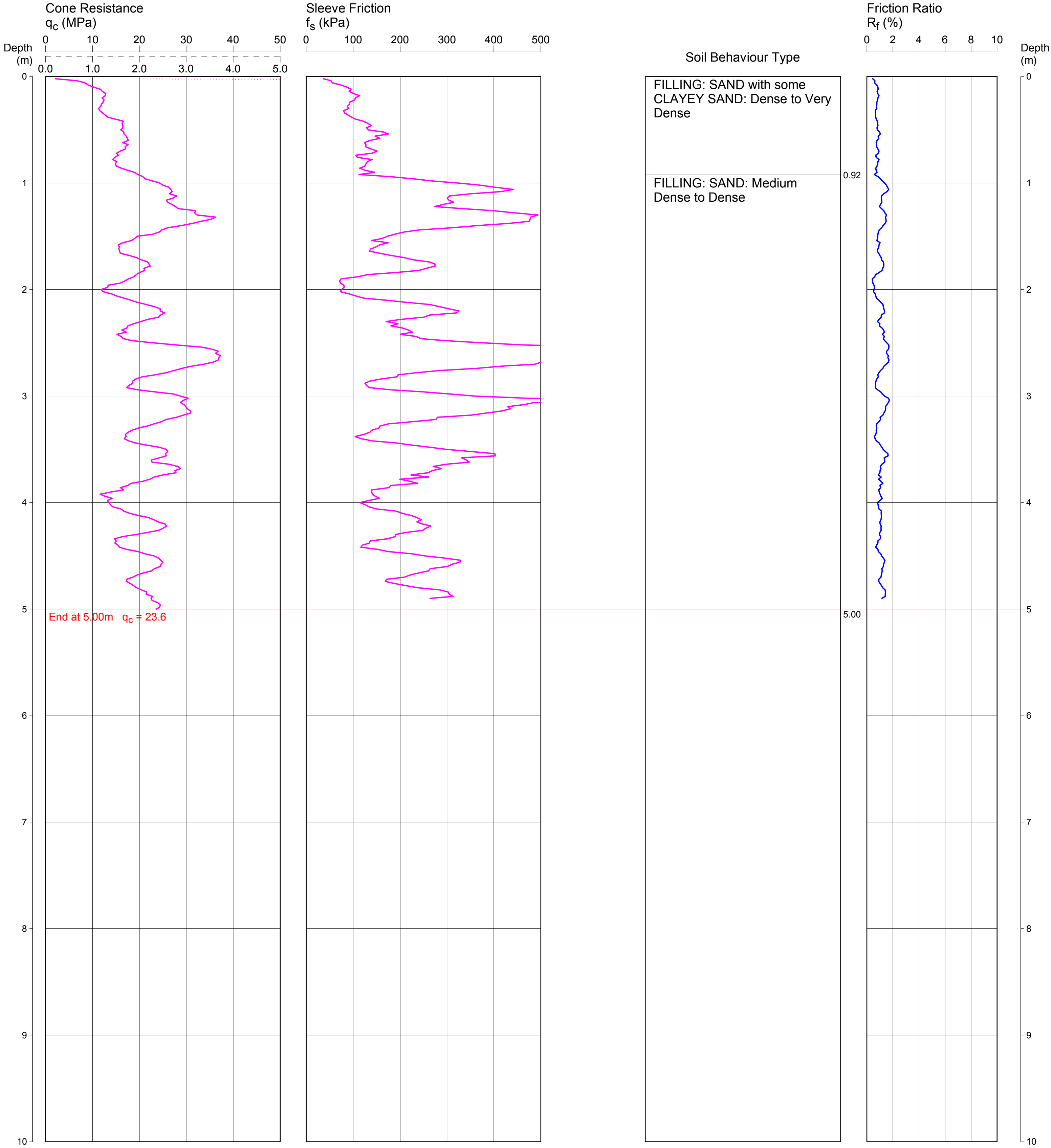
REDUCED LEVEL: 88.02

COORDINATES: 292230.14E 6226556.60N

CPT 212A

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: NO WATER ENCOUNTERED TO 5.0m DEPTH - DRY

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-212A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

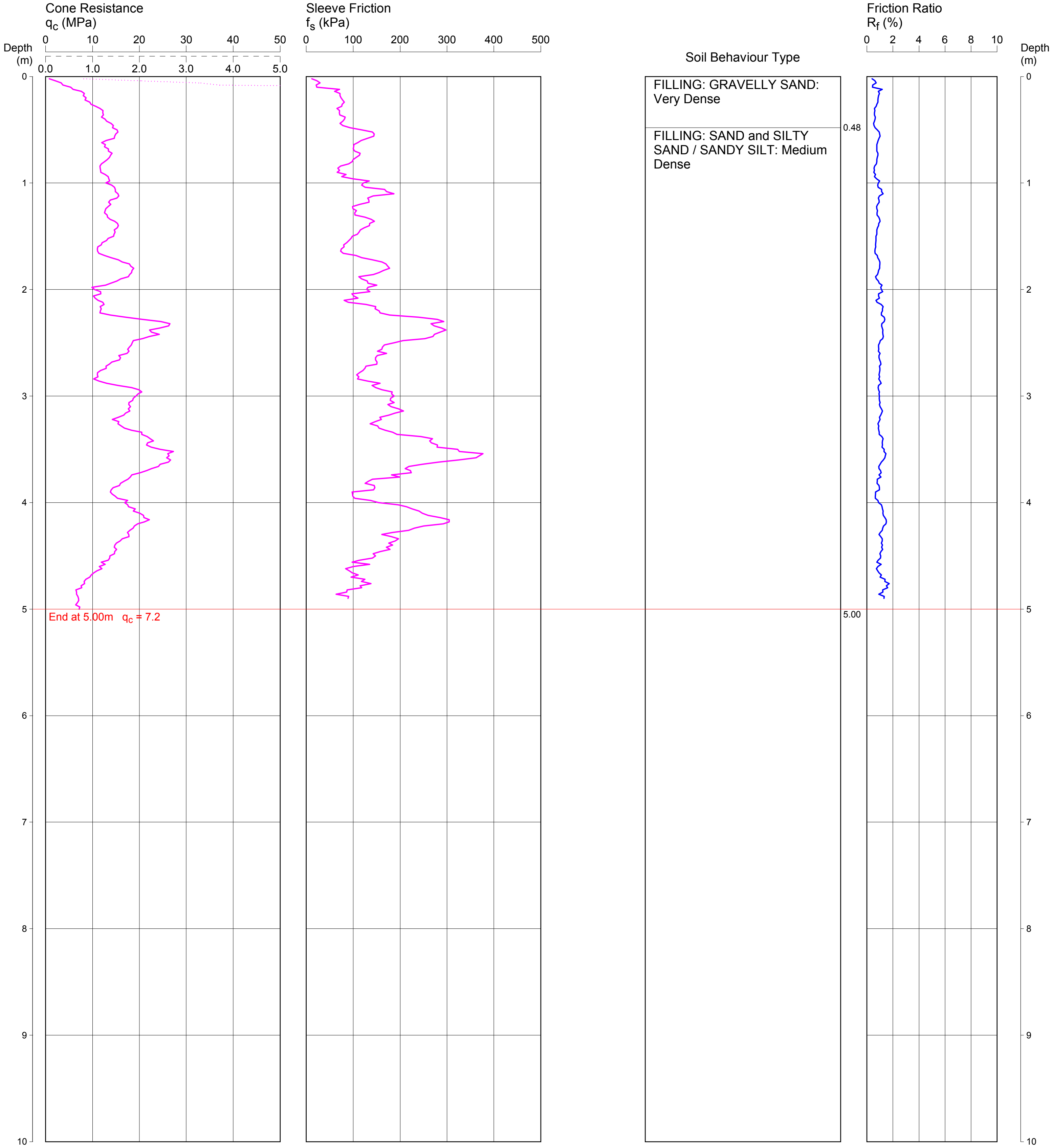
REDUCED LEVEL: 88.02

COORDINATES: 292230.60E 6226590.87N

CPT 213A

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 4.5m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-213A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 90.31

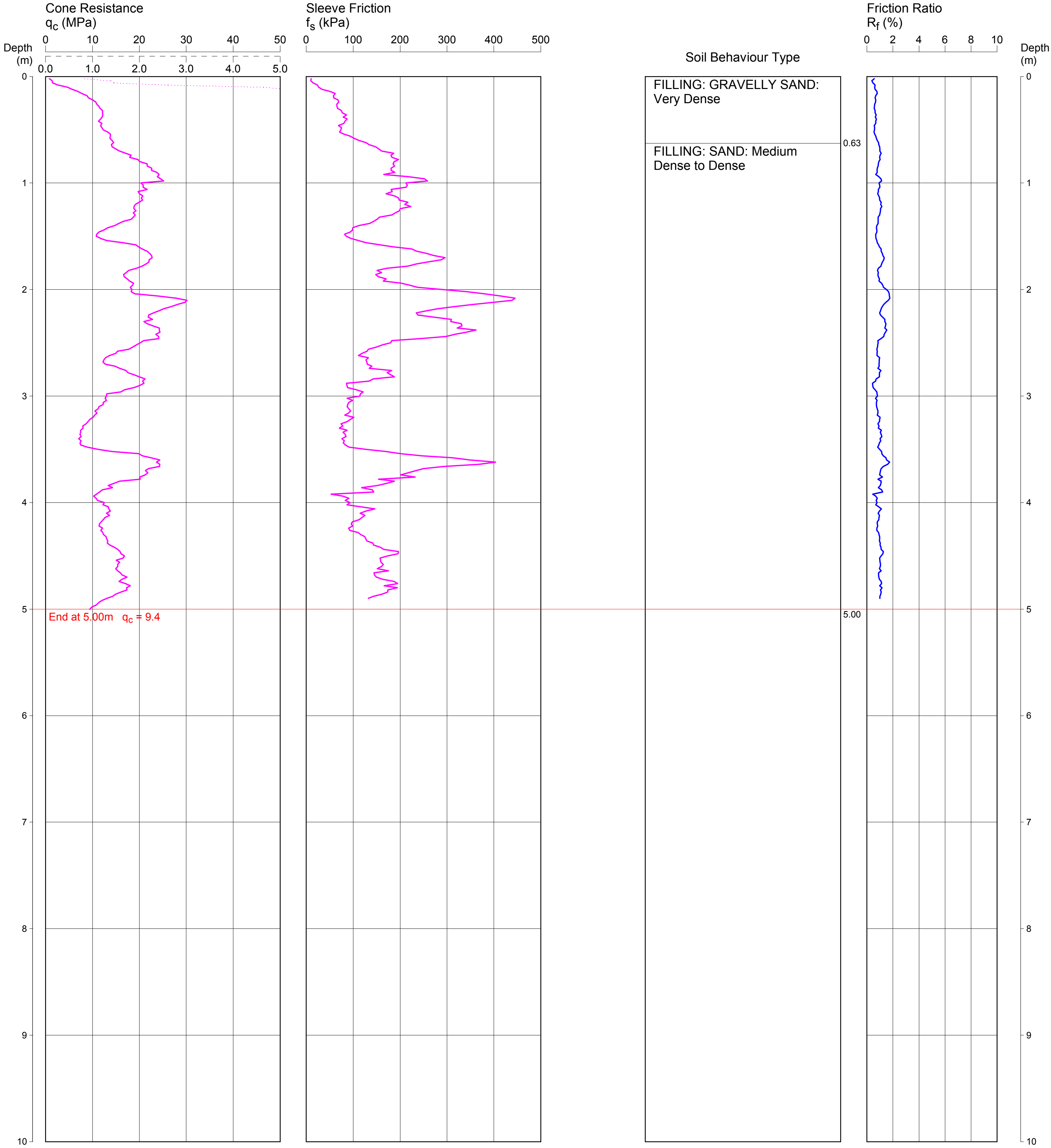
COORDINATES: 292208.99E 6226564.17N

CPT 214A

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 2.7m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Impact Rolling Trial\CPT After\40950.05-214A.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 87.57

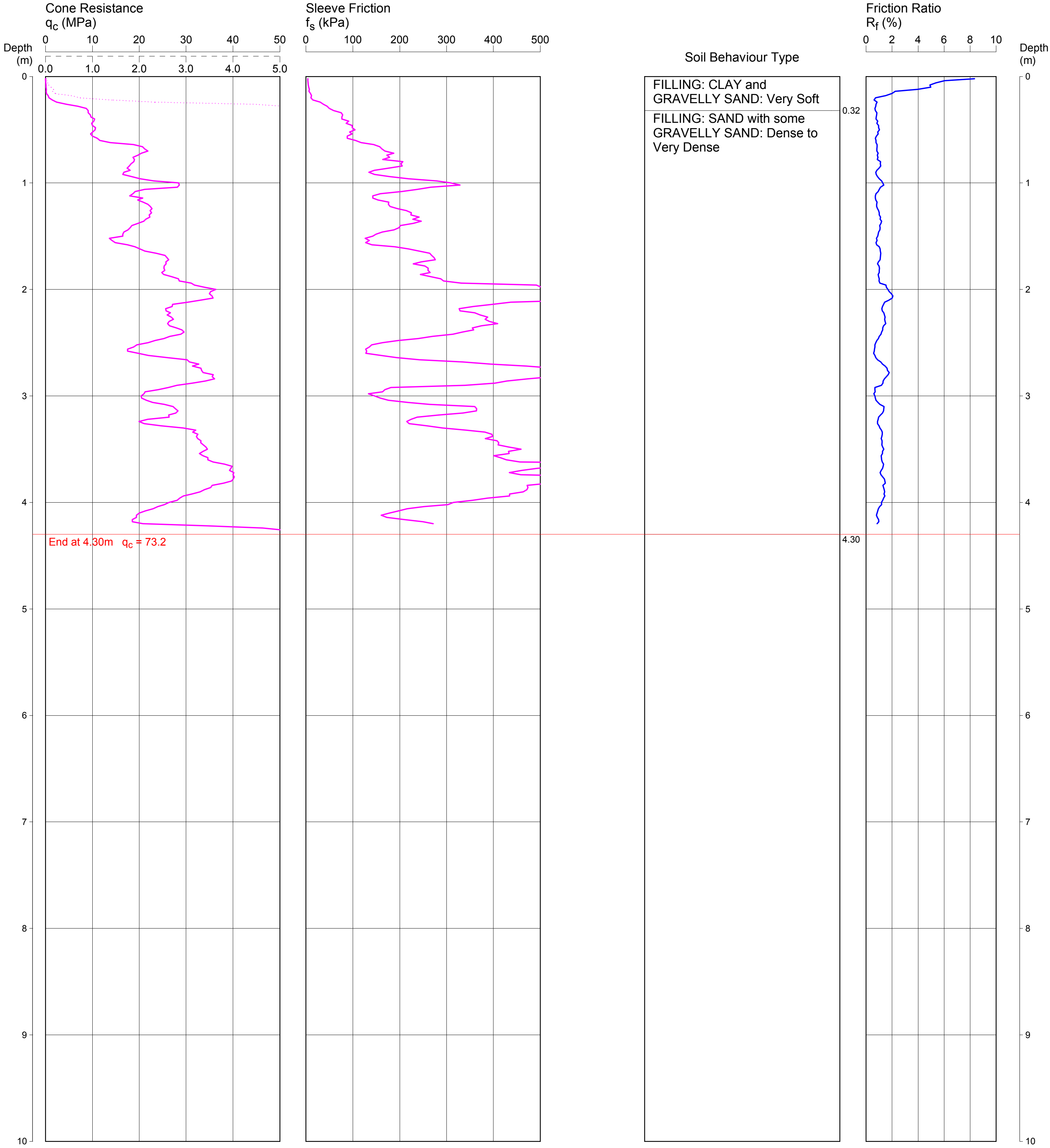
COORDINATES: 292189.54E 6226531.64N

CPT 215

Page 1 of 1

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: REFUSAL AT 4.30m - OBSTRUCTION IN FILLING
HOLE COLLAPSE MEASURED AT 4.4m DEPTH AT COMPLETION OF TESTING

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-215.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

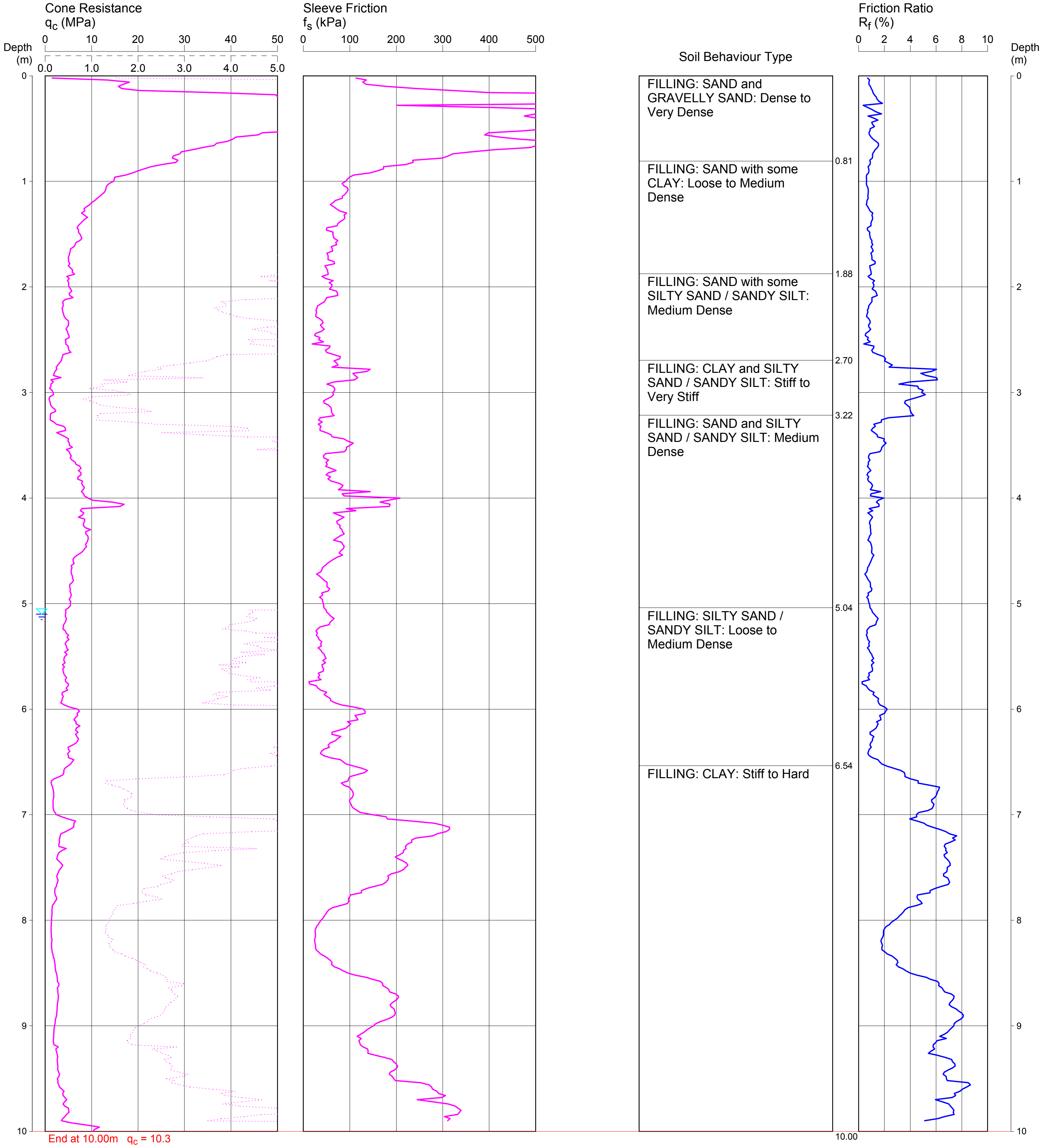
REDUCED LEVEL: 84.23

COORDINATES: 292155.84E 6226613.26N

CPT 216

DATE 4/07/2011

PROJECT No: 40950.05



REMARKS: WATER MEASURED AT 5.1m BGL AT COMPLETION OF TESTING

Water depth after test: 5.10m depth (assumed)

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-216.CP5

Cone ID: CONEHH11 **Type:** 2 Standard

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

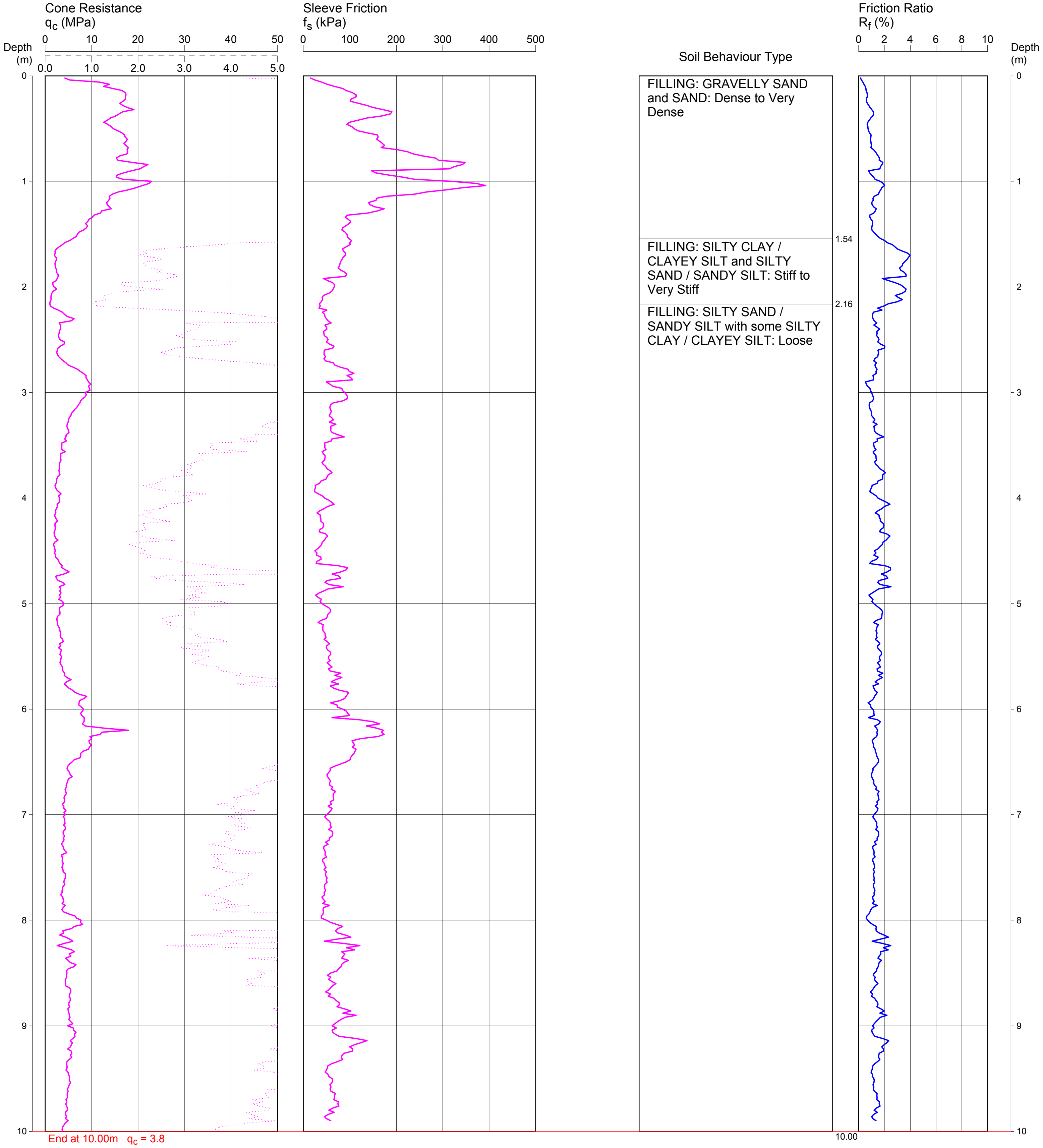
REDUCED LEVEL: 89.03

COORDINATES: 291865.97E 6226288.50N

CPT 217

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 9.2m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-217.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

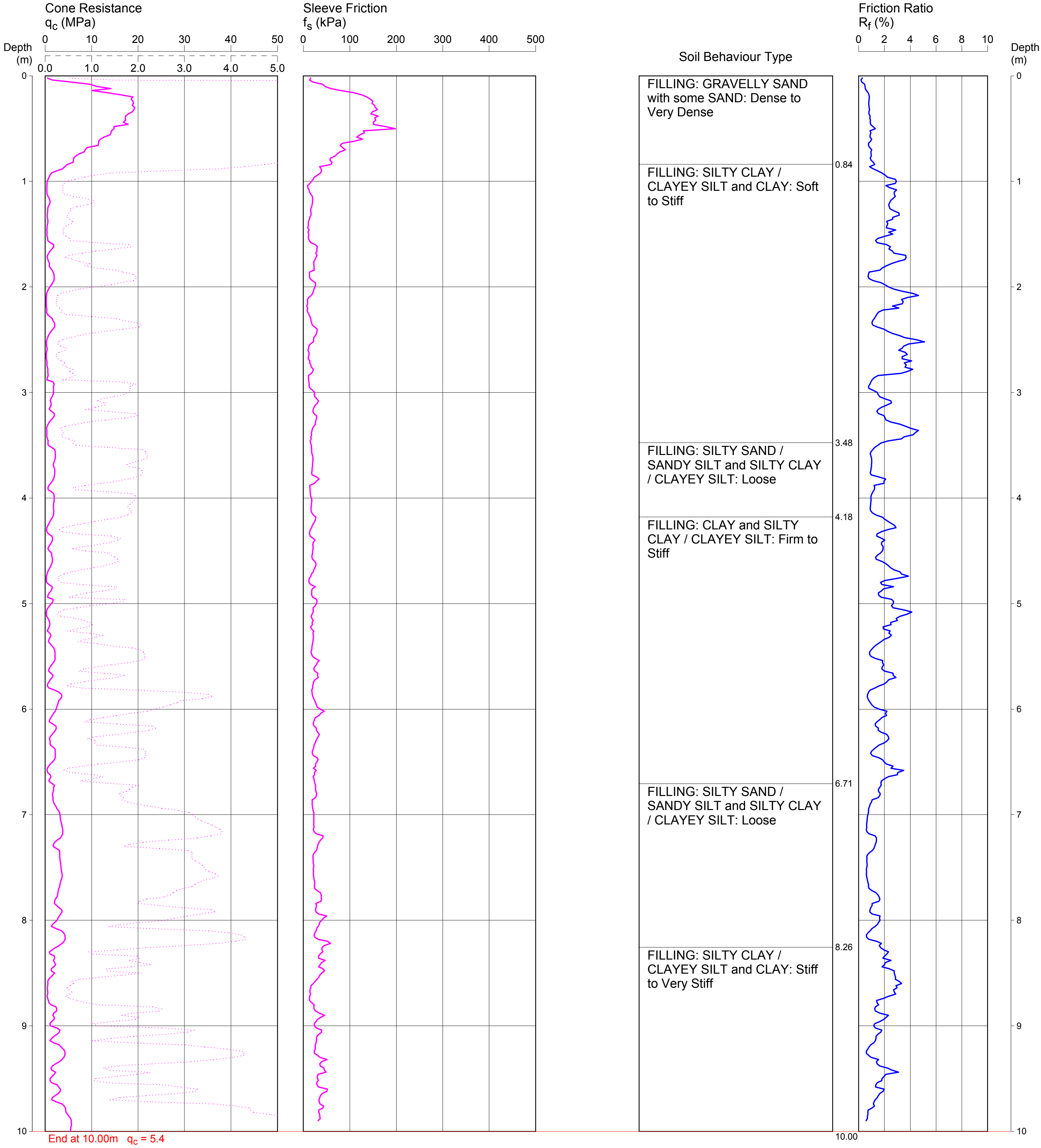
REDUCED LEVEL: 90.83

COORDINATES: 291880.00E 6226189.00N

CPT 218

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 0.8m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-218.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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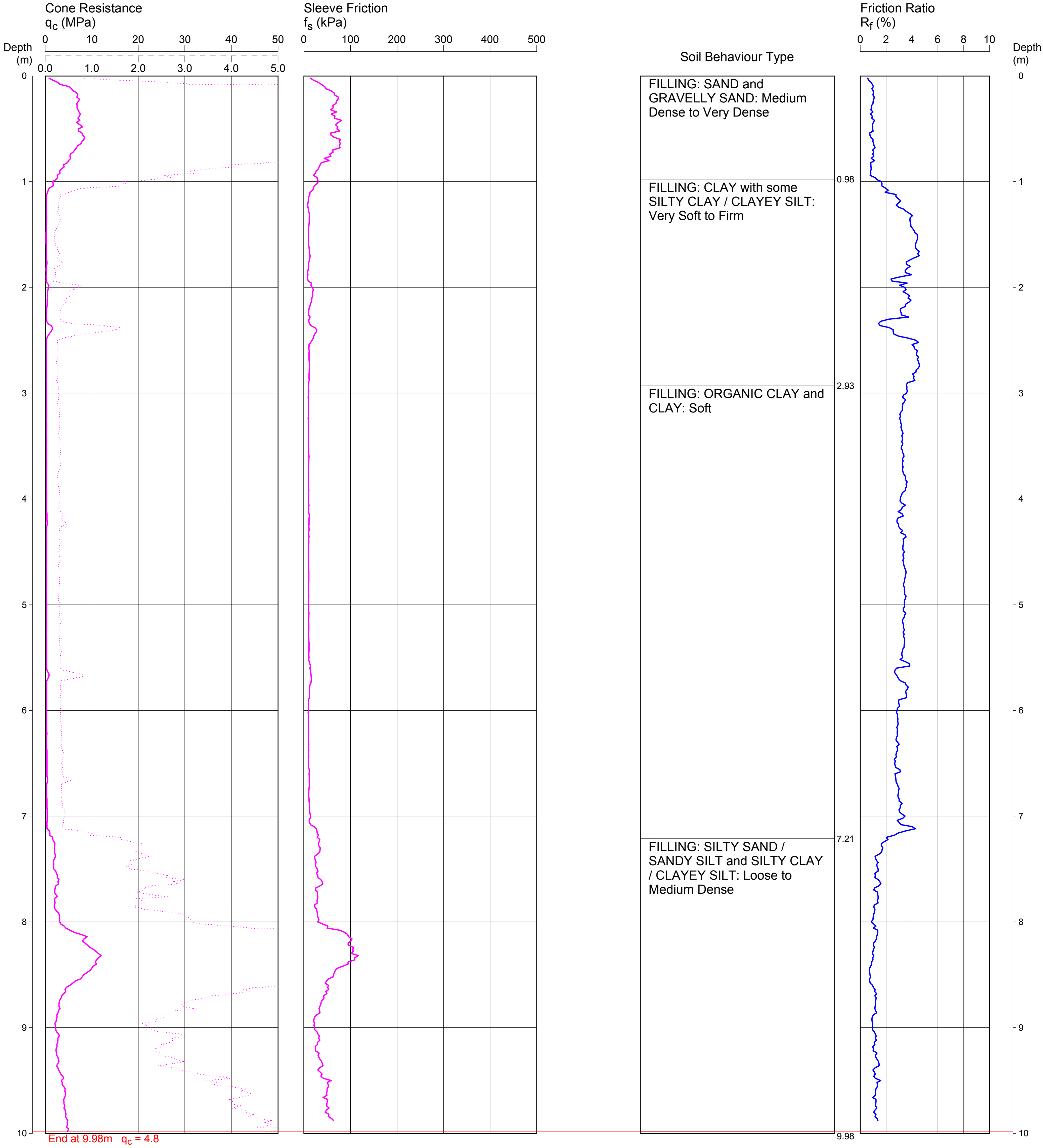
CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD	**LOCATION:** SPRINGS ROAD, GLENLEE	**CPT 219** Page 1 of 1
	REDUCED LEVEL: 92.48	**DATE** 7/07/2011
PROJECT: IMPACT ROLLING TRIALS	**COORDINATES:** 291914.67E 6226102.57N	**PROJECT No:** 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 1.8m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-219.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

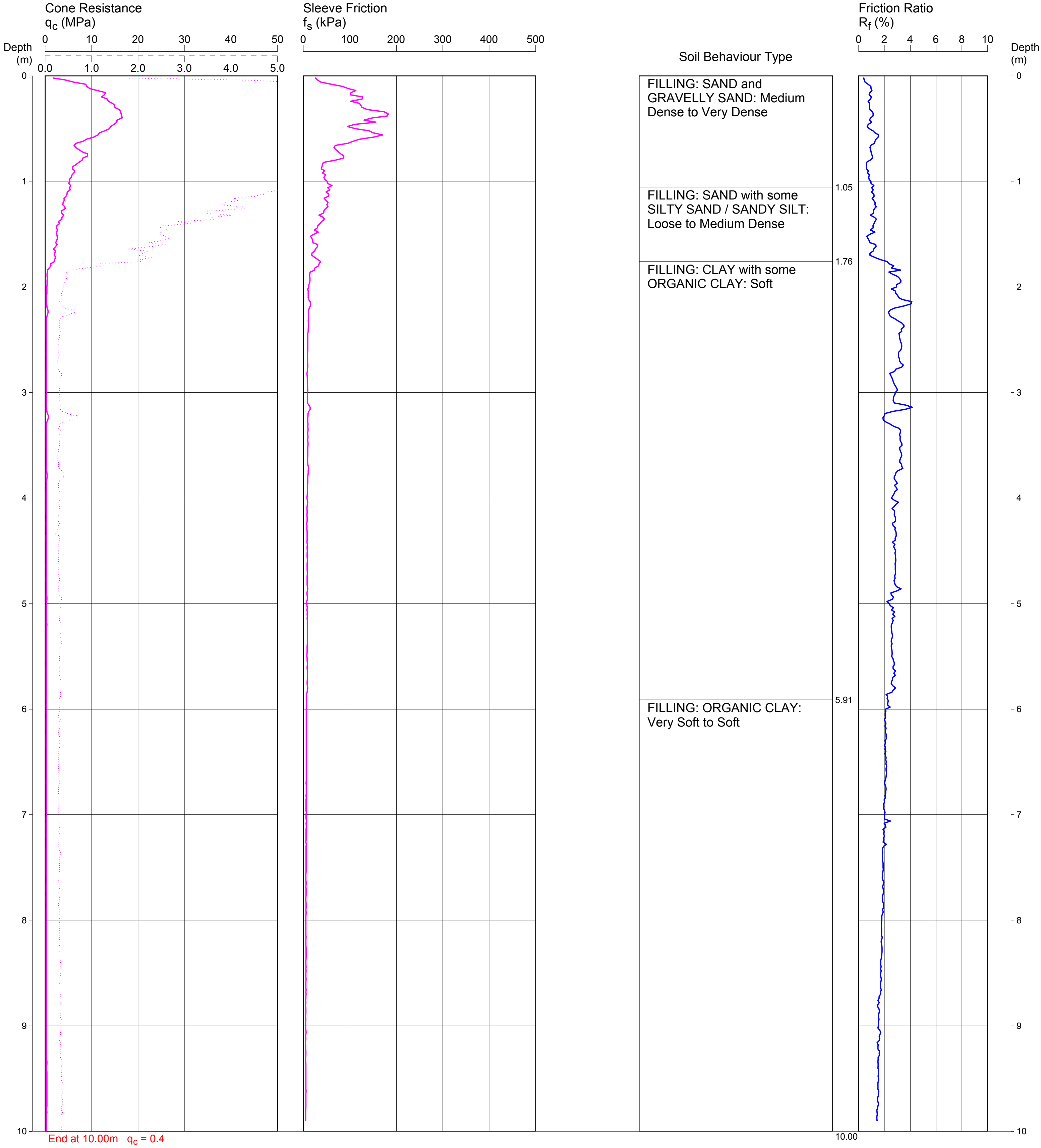
REDUCED LEVEL: 89.48

COORDINATES: 292000.89E 6226140.77N

CPT 220

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 1.7m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-220.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 94.68

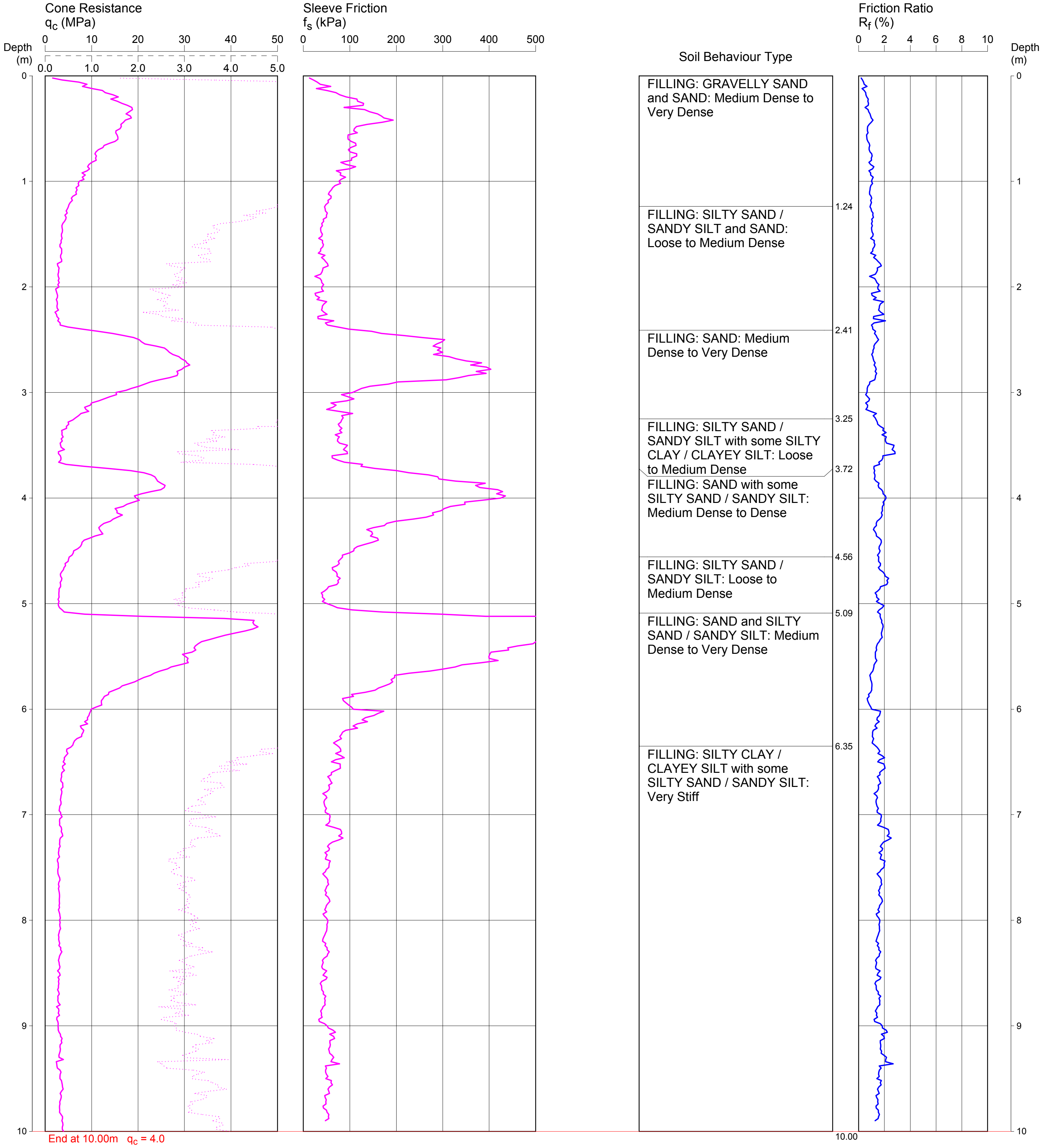
COORDINATES: 292008.43E 6226231.14N

CPT 221

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: HOLE COLLAPSE MEASURED AT 9.2m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-221.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: IMPACT ROLLING TRIALS

LOCATION: SPRINGS ROAD, GLENLEE

REDUCED LEVEL: 88.63

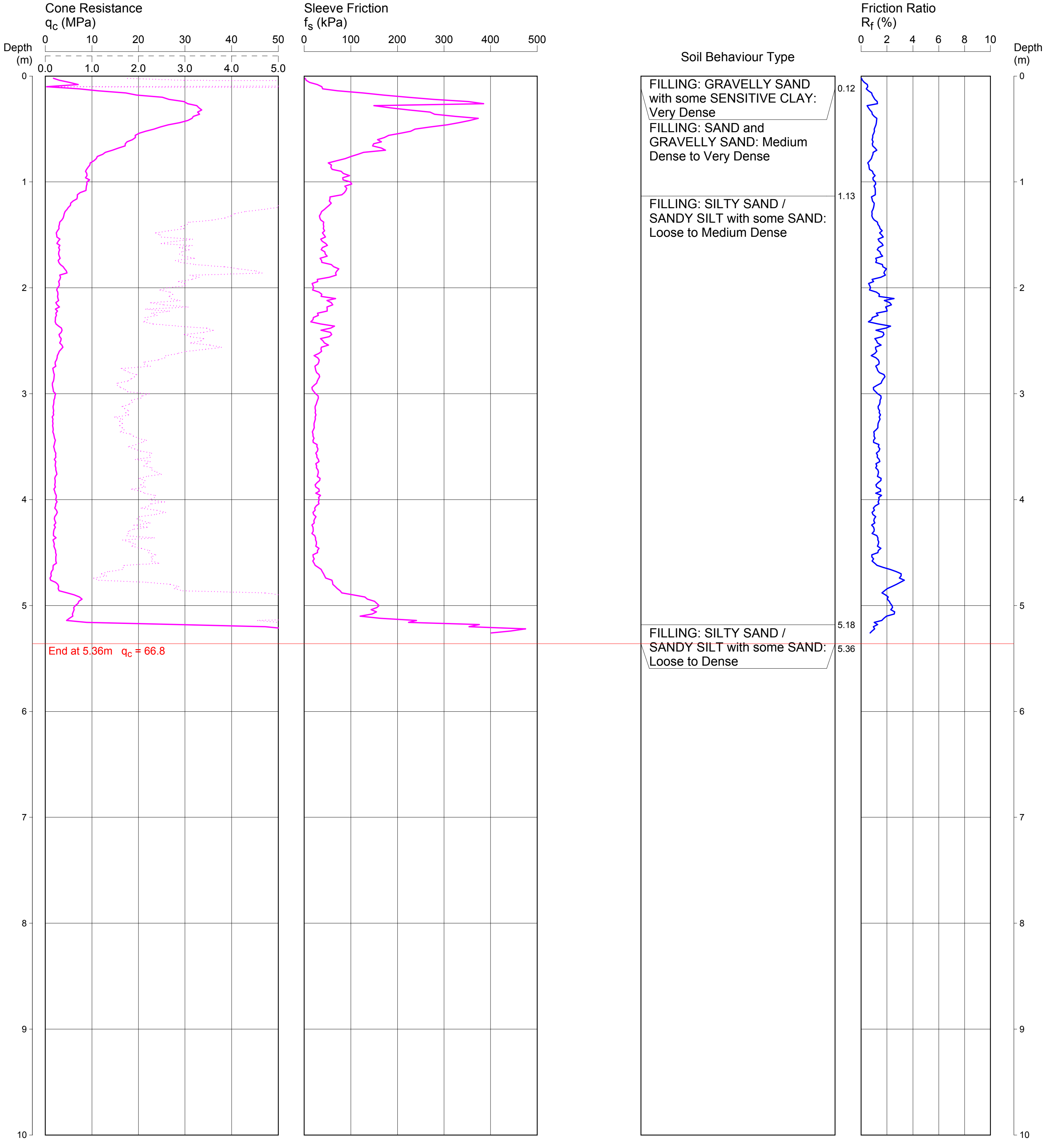
COORDINATES: 292173.08E 6226337.73N

CPT 222

Page 1 of 1

DATE 7/07/2011

PROJECT No: 40950.05



REMARKS: TEST DISCONTINUED AT 5.36m DEPTH - REFUSAL
HOLE COLLAPSE MEASURED AT 1.5m DEPTH AFTER WITHDRAWAL OF RODS

File: P:\40950.05 Glenlee\Settlement Calcs July 2011\40950.05-222.CP5
Cone ID: CONEHH11 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

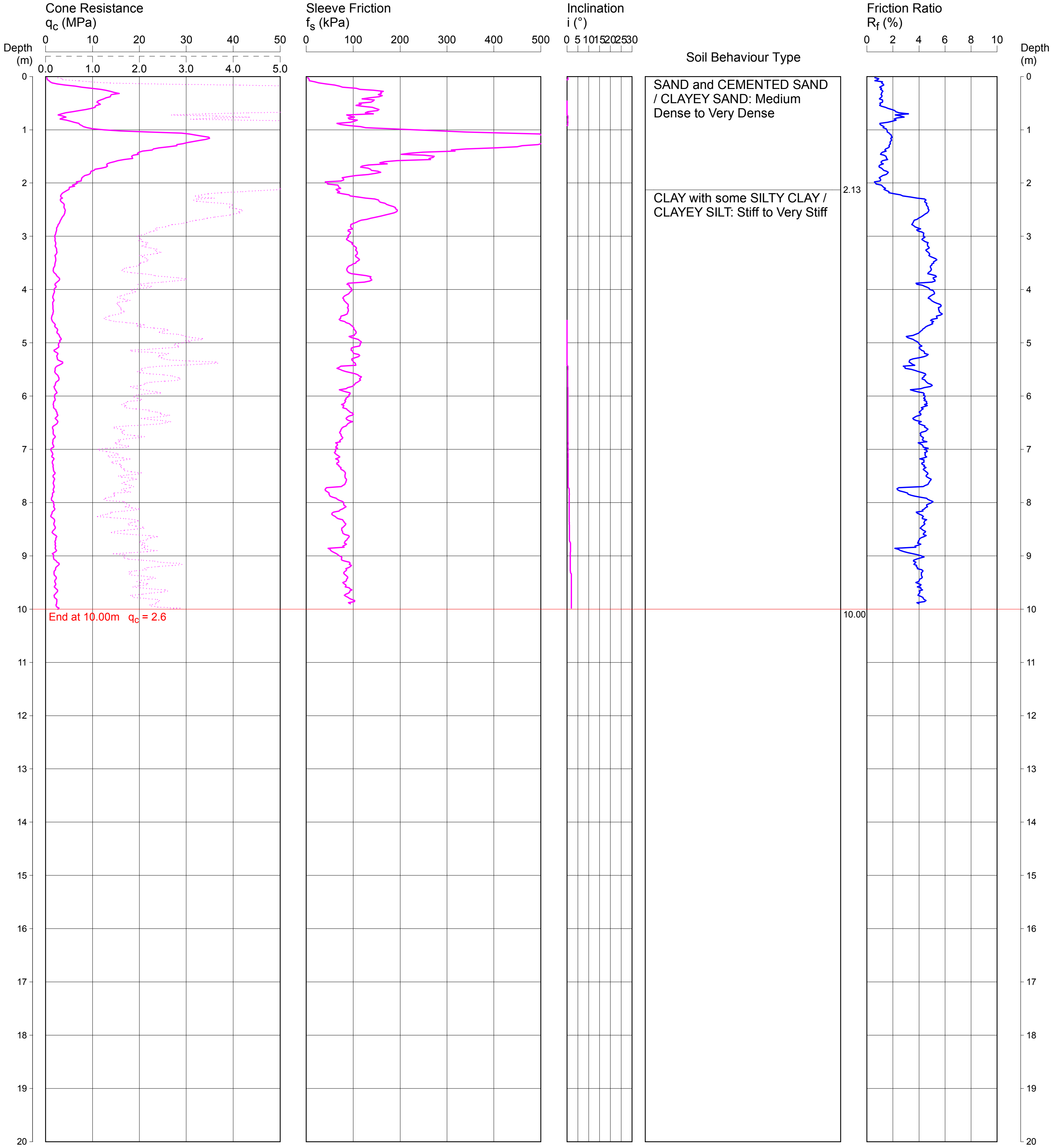
REDUCED LEVEL: 89.50

COORDINATES: 291934.80E 6226338.87N AHD

CPT 301

DATE 2/04/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 9.0 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\40950.06\Field\CPT 300's\CPT301.CP5
Cone ID: CONE-421 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

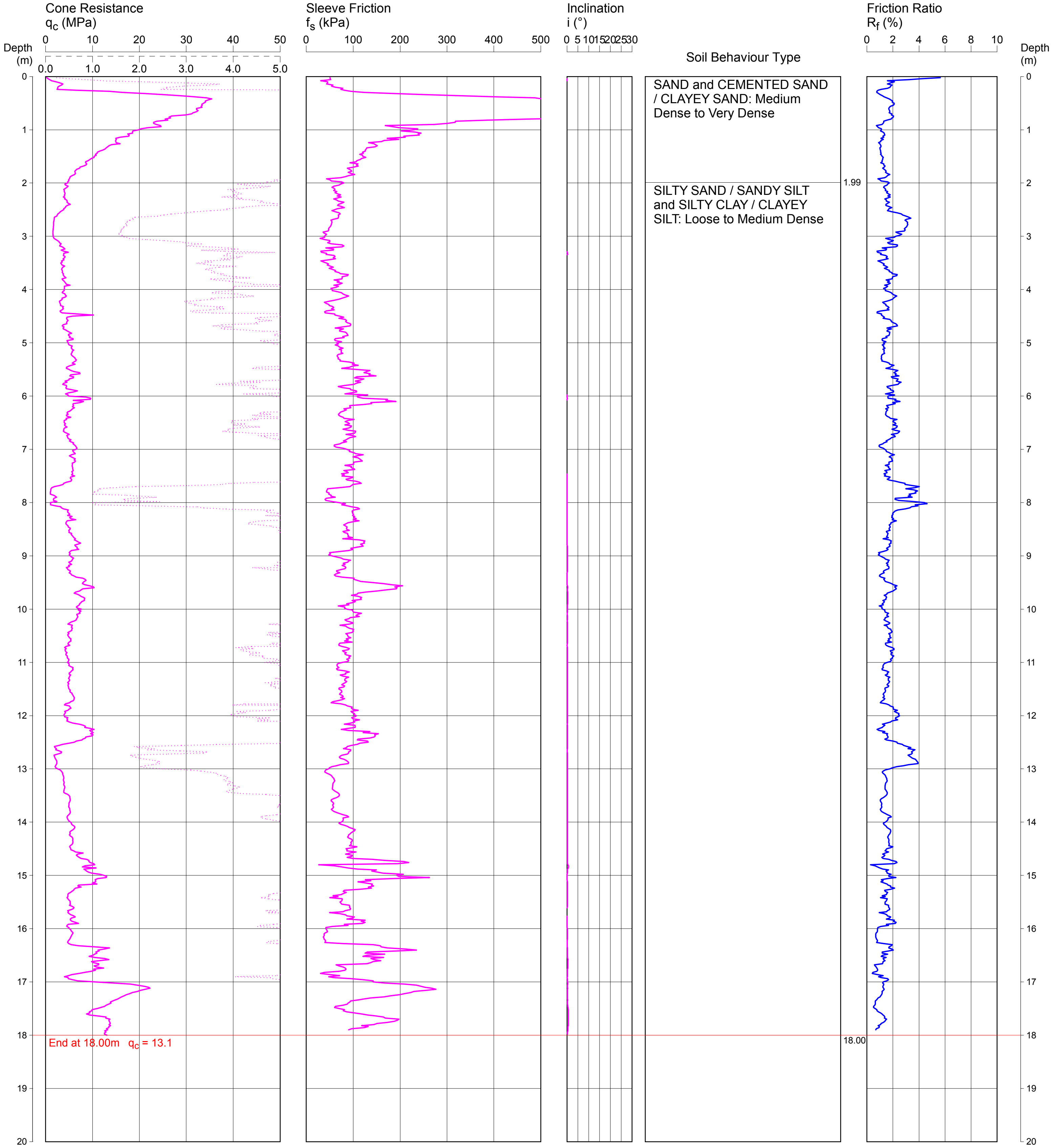
REDUCED LEVEL: 89.25

COORDINATES: 291935.68E 6226307.33N AHD

CPT 302

DATE 2/04/2012

PROJECT No: 40950.06



REMARKS: HOLE DRY TO 10 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\40950.06\Field\CPT 300's\CPT302.CP5
Cone ID: CONE-421 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

REDUCED LEVEL: 89.20

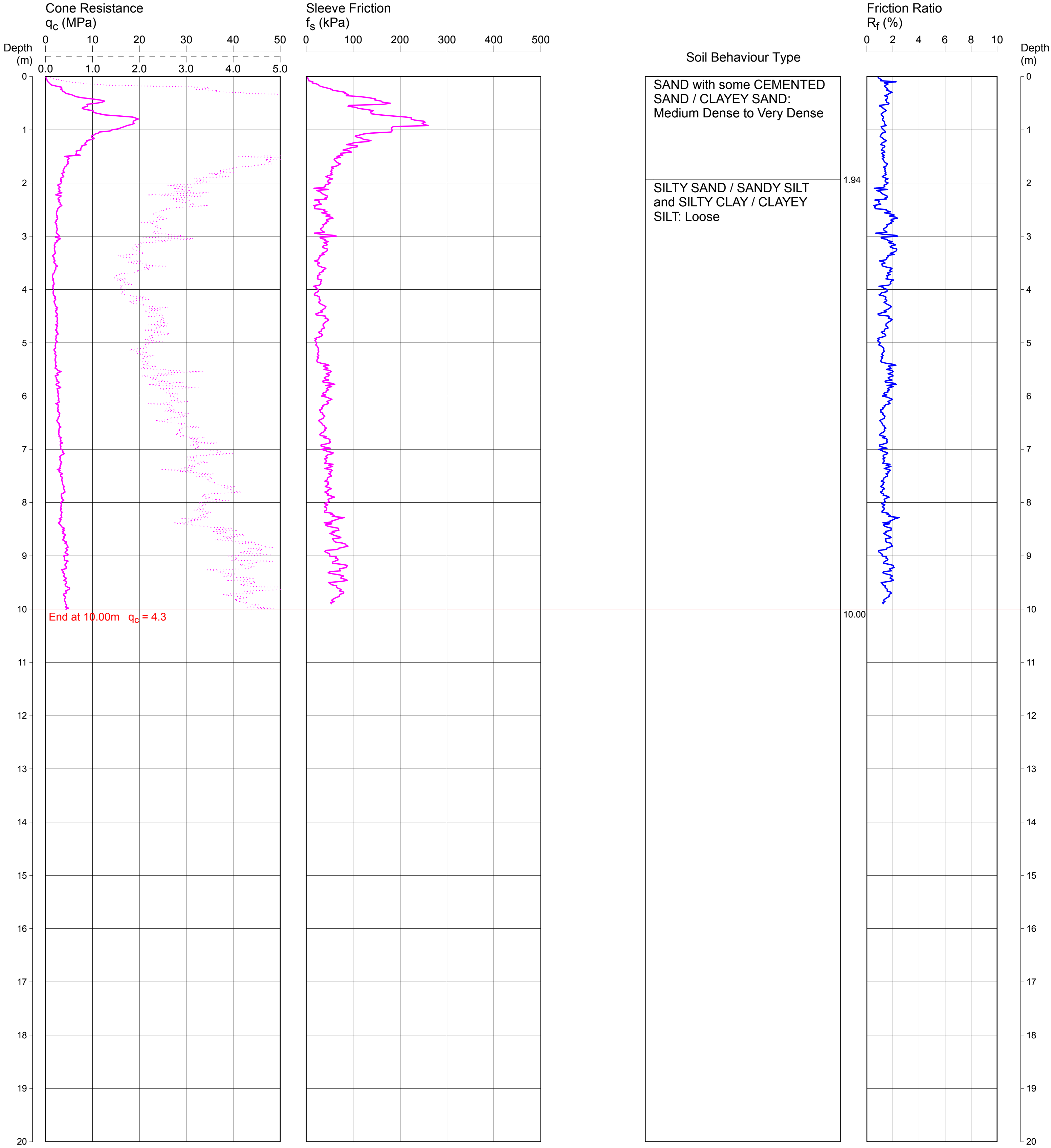
COORDINATES: 291906.44E 6226302.42N AHD

CPT 303

Page 1 of 1

DATE 2/04/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 8.1 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\40950.06\Field\CPT 300's\CPT303.CP5
Cone ID: CONE-421 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

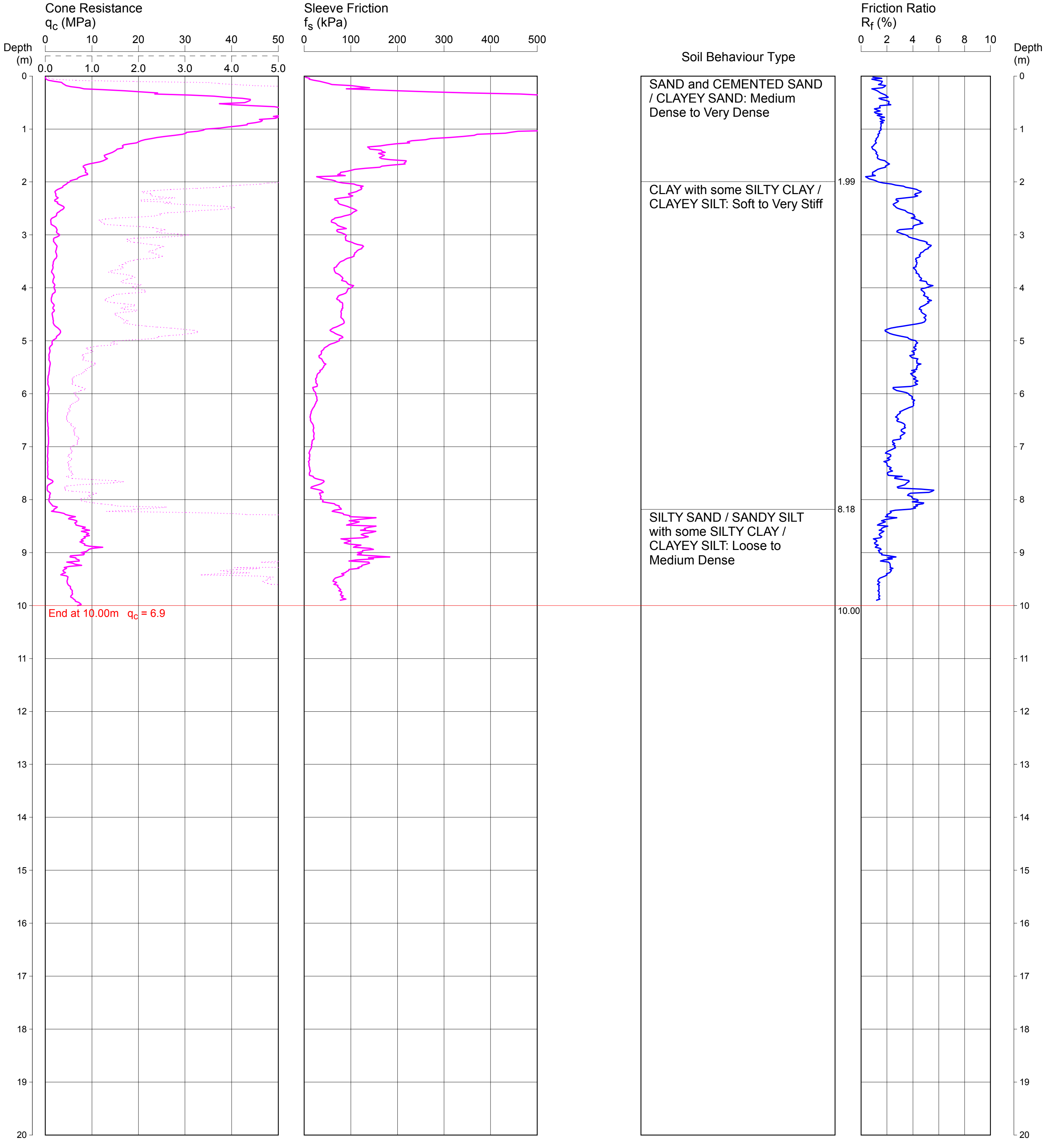
REDUCED LEVEL: 89.46

COORDINATES: 291901.20E 6226330.85N AHD

CPT 304

DATE 2/04/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 9.9 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\40950.06\Field\CPT 300's\CPT304.CP5
Cone ID: CONE-421 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

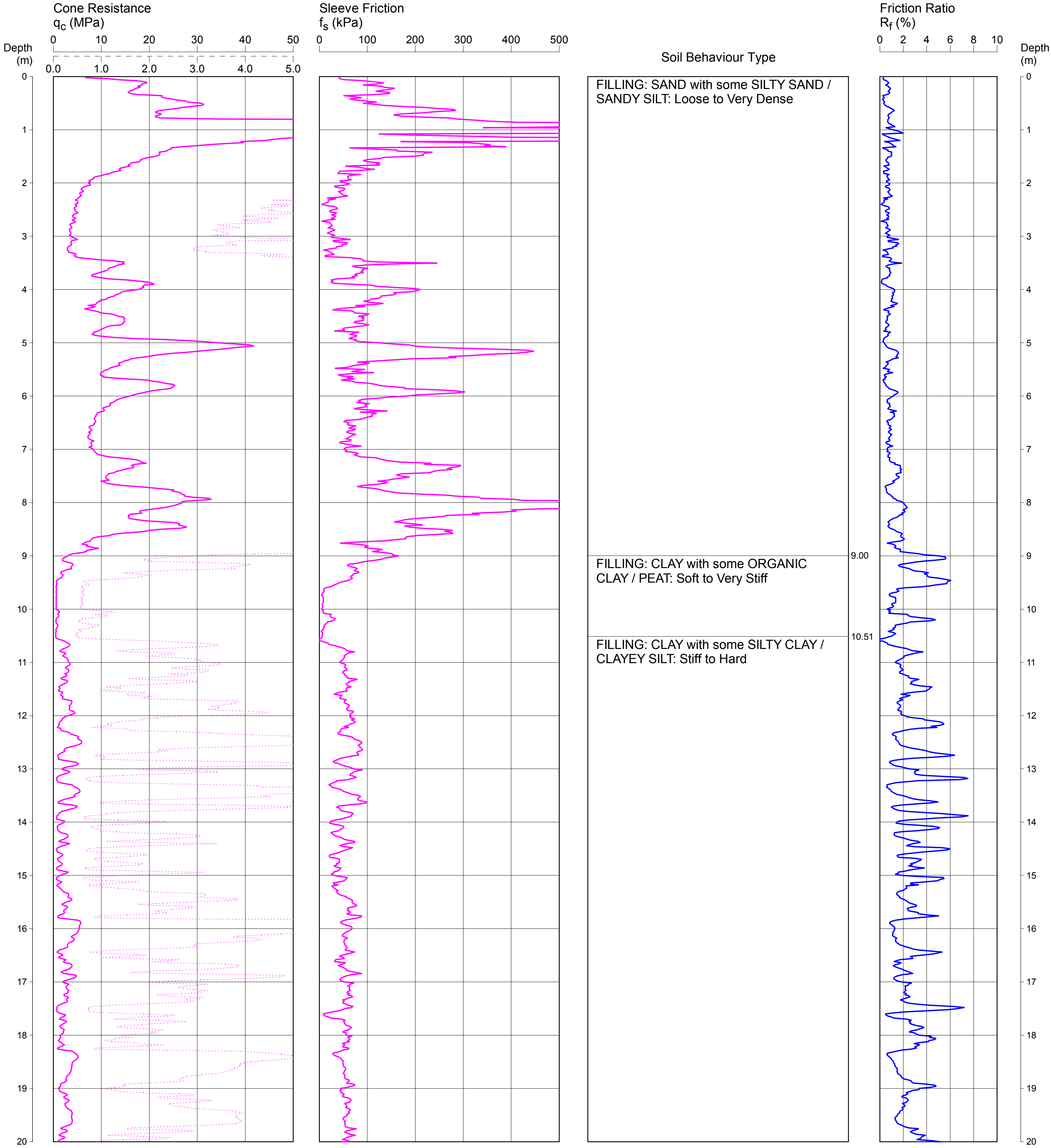
REDUCED LEVEL: 0.0

COORDINATES: 292065E 6226056N

CPT 401

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: WATER NOT OBSERVED ABOVE 8m

File: P:\40950.06\Field\CPT 400's\CPT 401.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

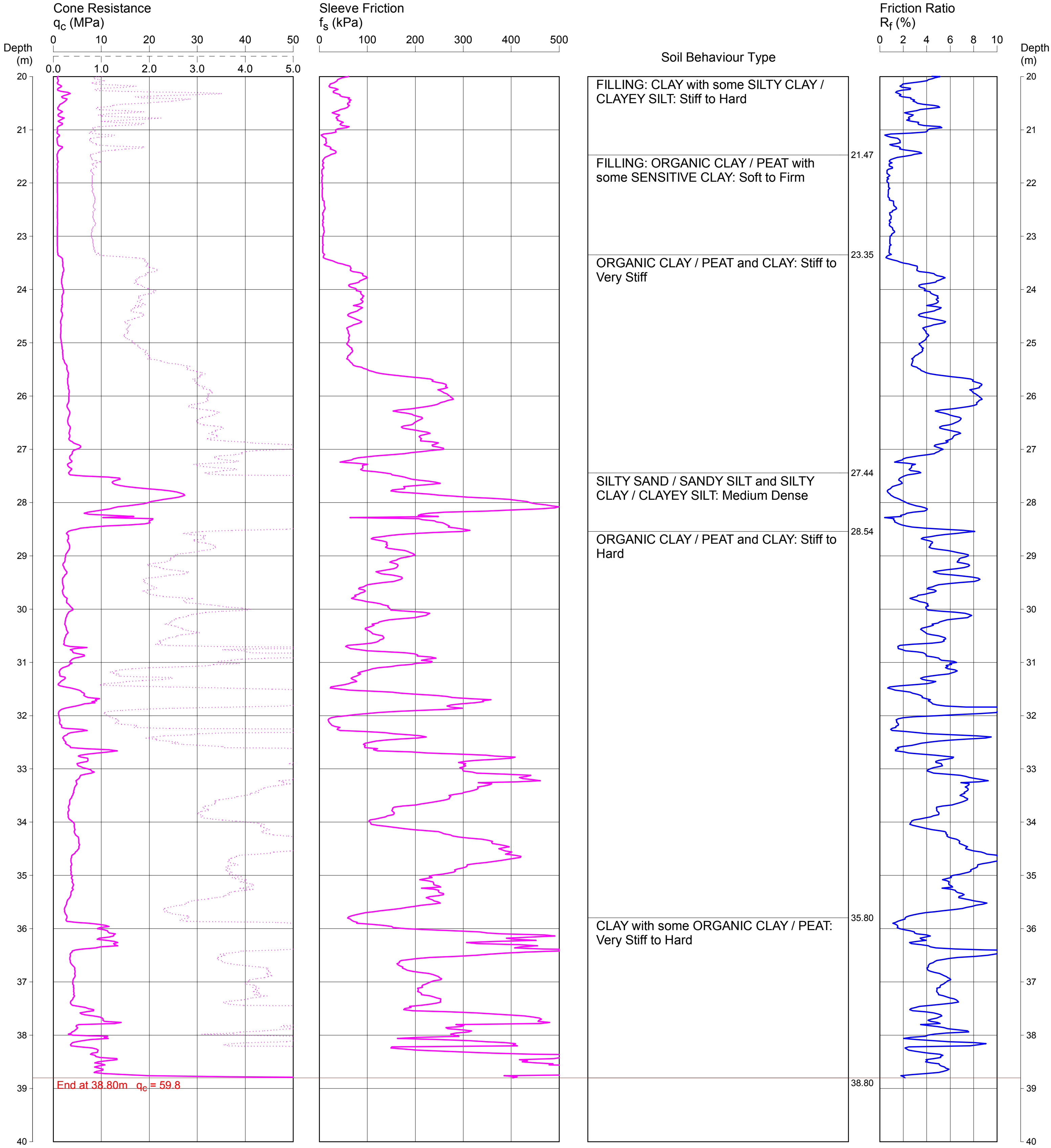
REDUCED LEVEL: 0.0

COORDINATES: 292065E 6226056N

CPT 401

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: WATER NOT OBSERVED ABOVE 8m

File: P:\40950.06\Field\CPT 400's\CPT 401.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

Douglas Partners
Geotechnics / Environment / Groundwater

CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

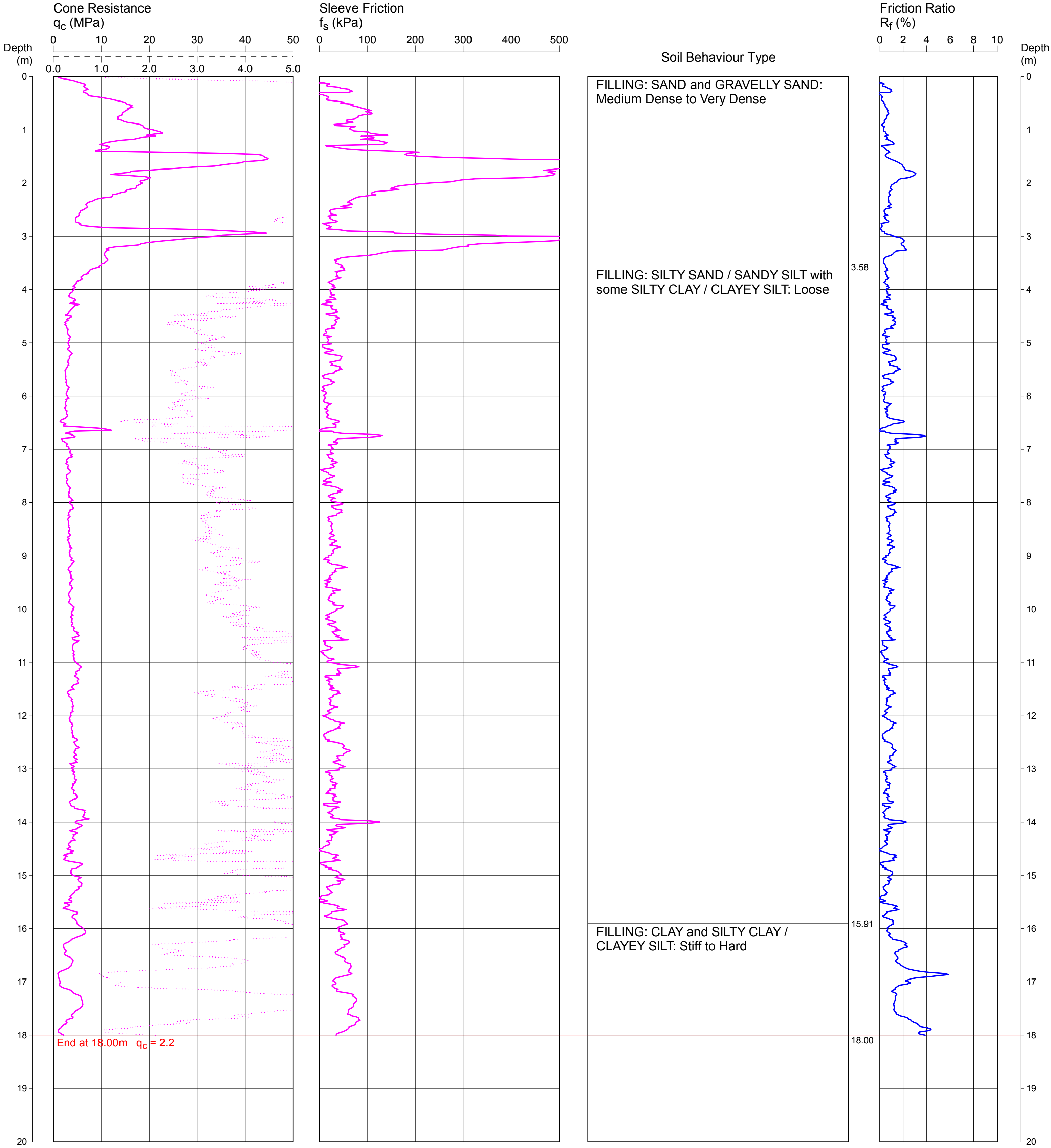
REDUCED LEVEL: 0.0

COORDINATES: 292074E 6226095N

CPT 402

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 0.4m AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 402.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

REDUCED LEVEL: 0.0

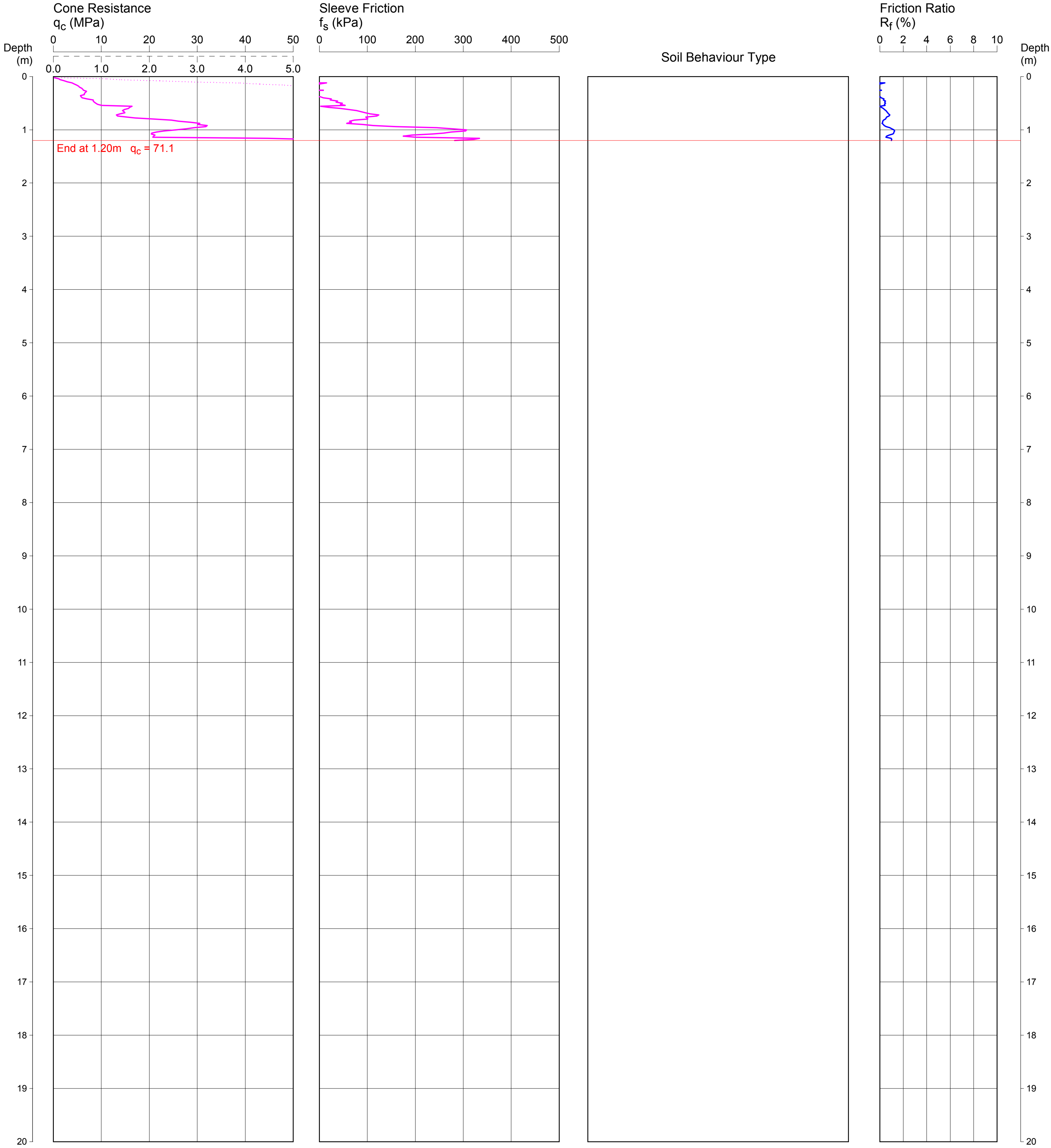
COORDINATES: 292081E 6226128N

CPT 403A

Page 1 of 1

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS:

File: P:\40950.06\Field\CPT 400's\CPT 403A.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

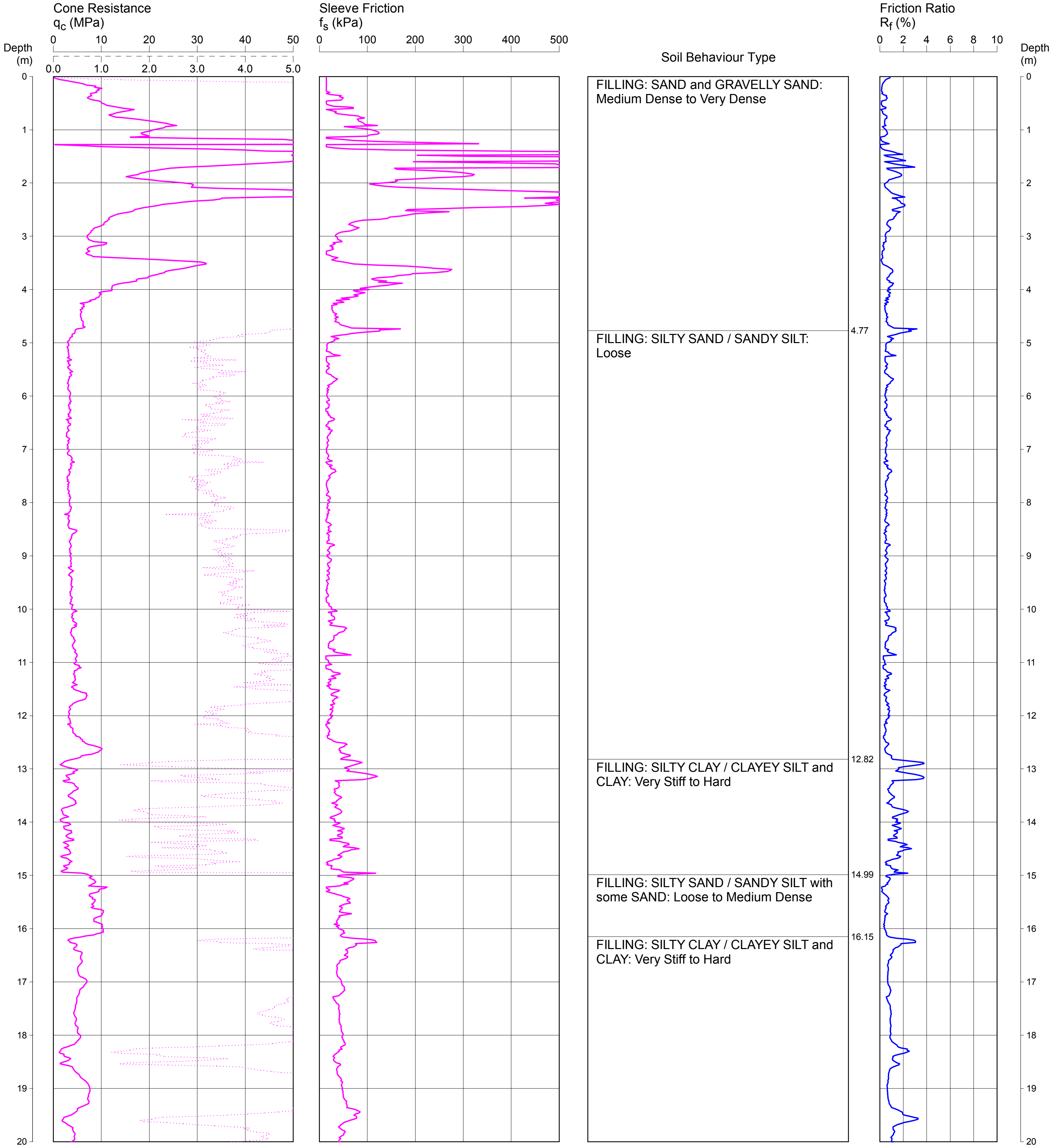
REDUCED LEVEL: 0.0

COORDINATES: 292081E 6226128N

CPT 403B

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT SURFACE AFTER WITHDRAWAL OF RODS
DUMMY CONE USED FROM 1.2 TO 1.7m

File: P:\40950.06\Field\CPT 400's\CPT 403B.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

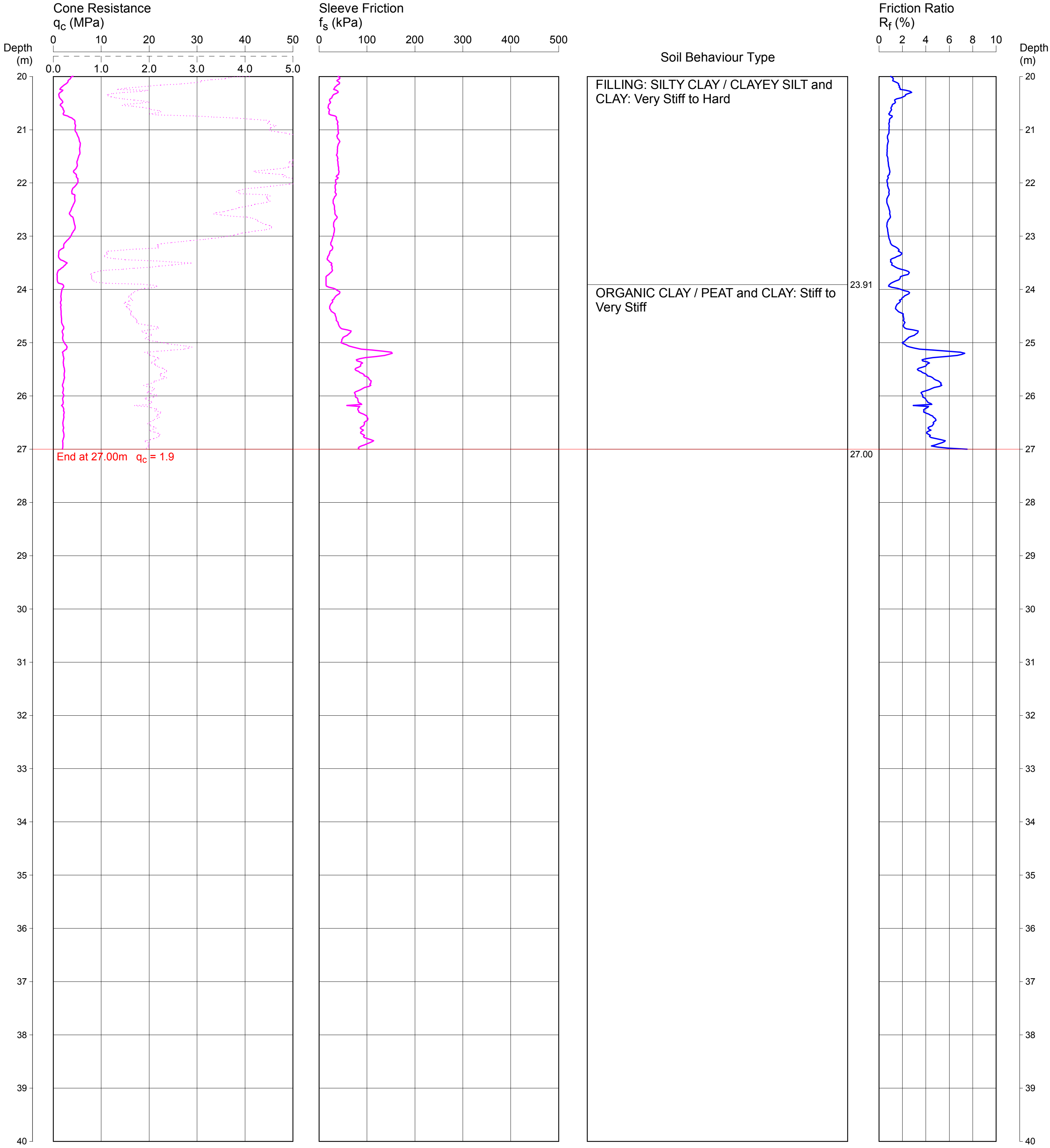
REDUCED LEVEL: 0.0

COORDINATES: 292081E 6226128N

CPT 403B

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT SURFACE AFTER WITHDRAWAL OF RODS
DUMMY CONE USED FROM 1.2 TO 1.7m

File: P:\40950.06\Field\CPT 400's\CPT 403B.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

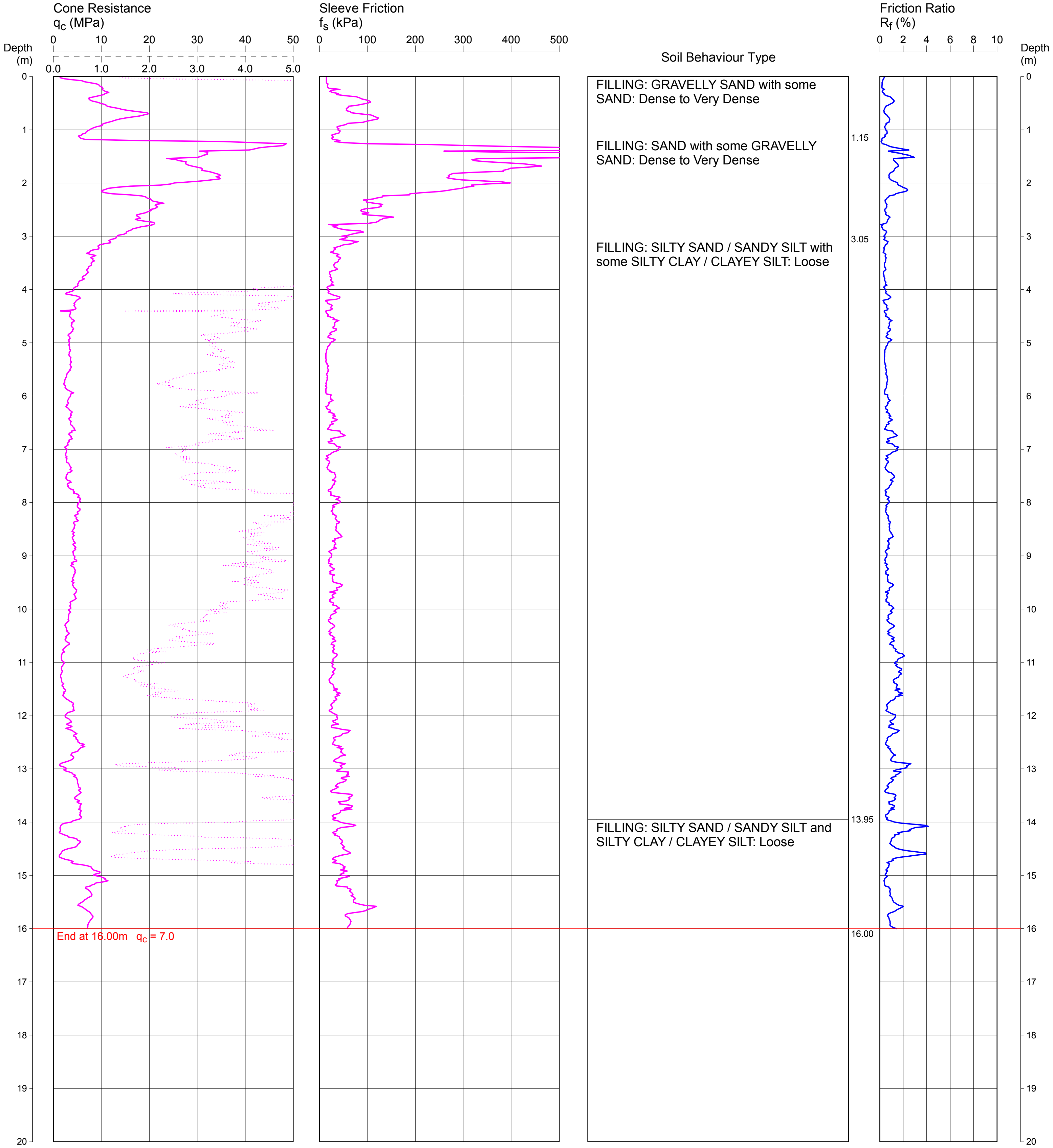
REDUCED LEVEL: 0.0

COORDINATES: 292093E 6226170N

CPT 404

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT SURFACE AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 404.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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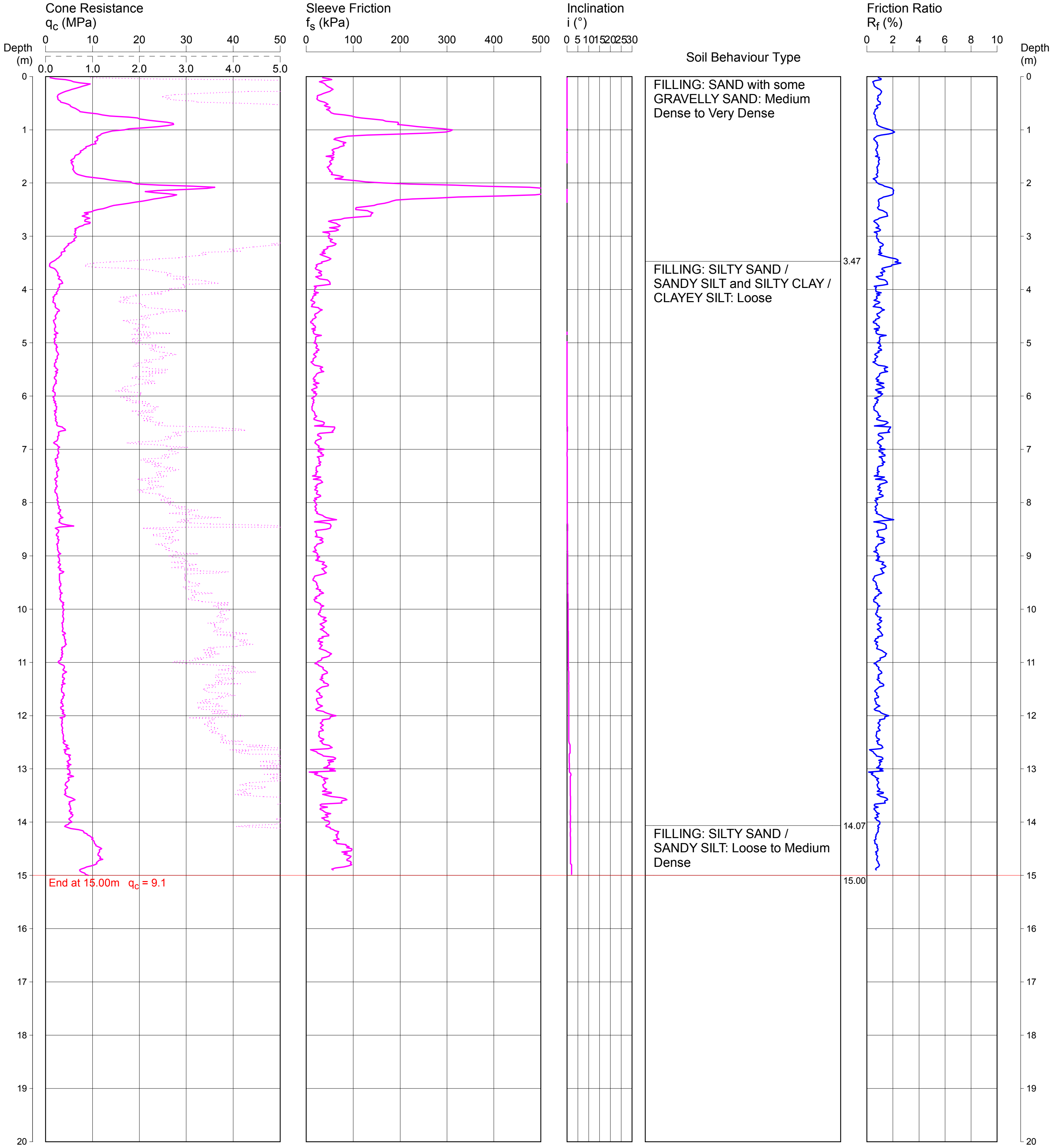
CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD	**LOCATION:** GLENLEE ROAD MENANGLE PARK	**405** Page 1 of 1
PROJECT: PROPOSED SURCHARGE TRIAL	**REDUCED LEVEL:**	**DATE** 1/11/2012
	COORDINATES: 292039E 6226175N	**PROJECT No:** 40950.06



REMARKS: HOLE COLLAPSED AT SURFACE AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 405.CP5
Cone ID: CONE-420 **Type:** 2 Standard

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

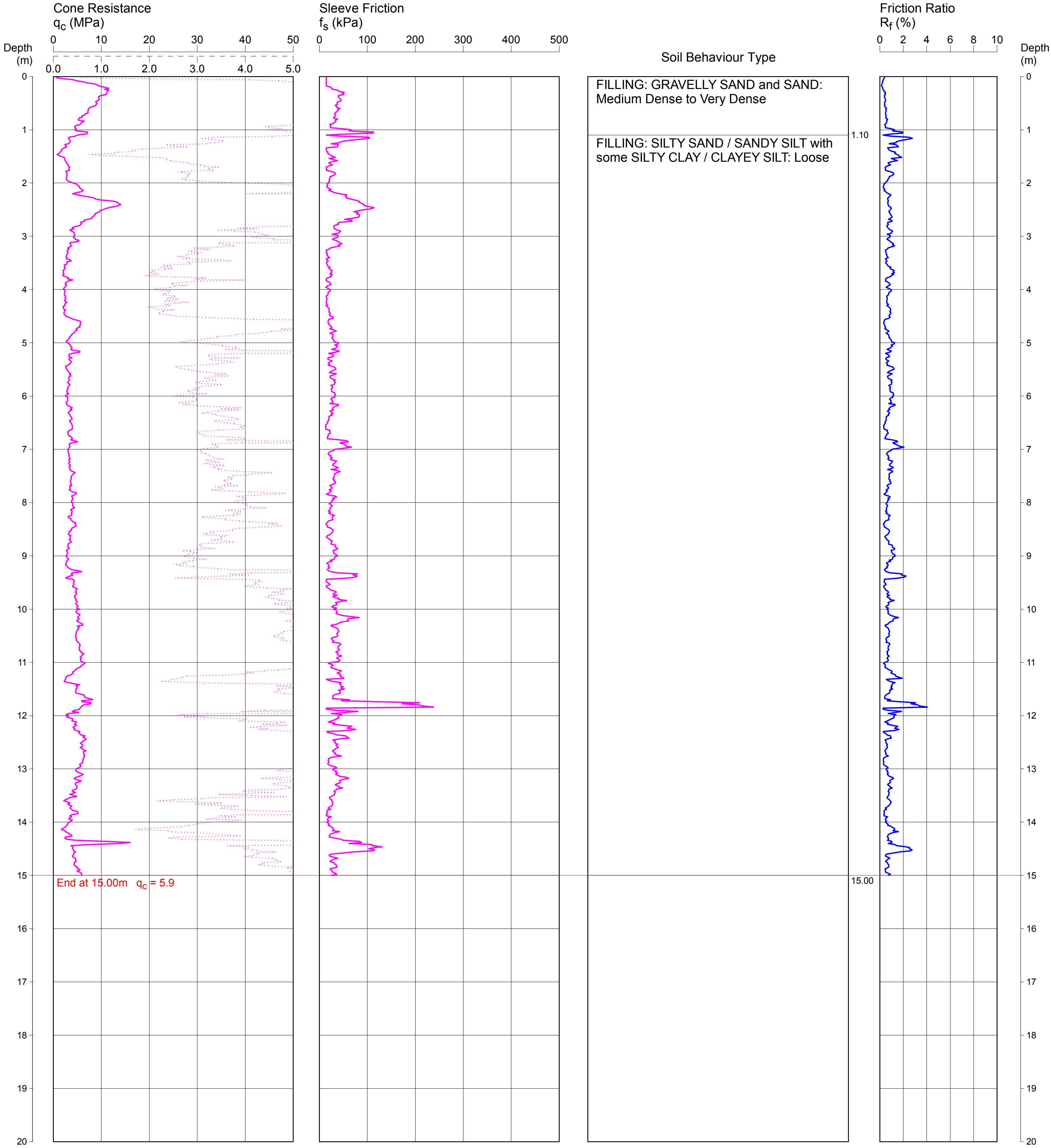
REDUCED LEVEL: 0.0

COORDINATES: 292032E 6226112N

CPT 406

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 2.1m AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 406.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

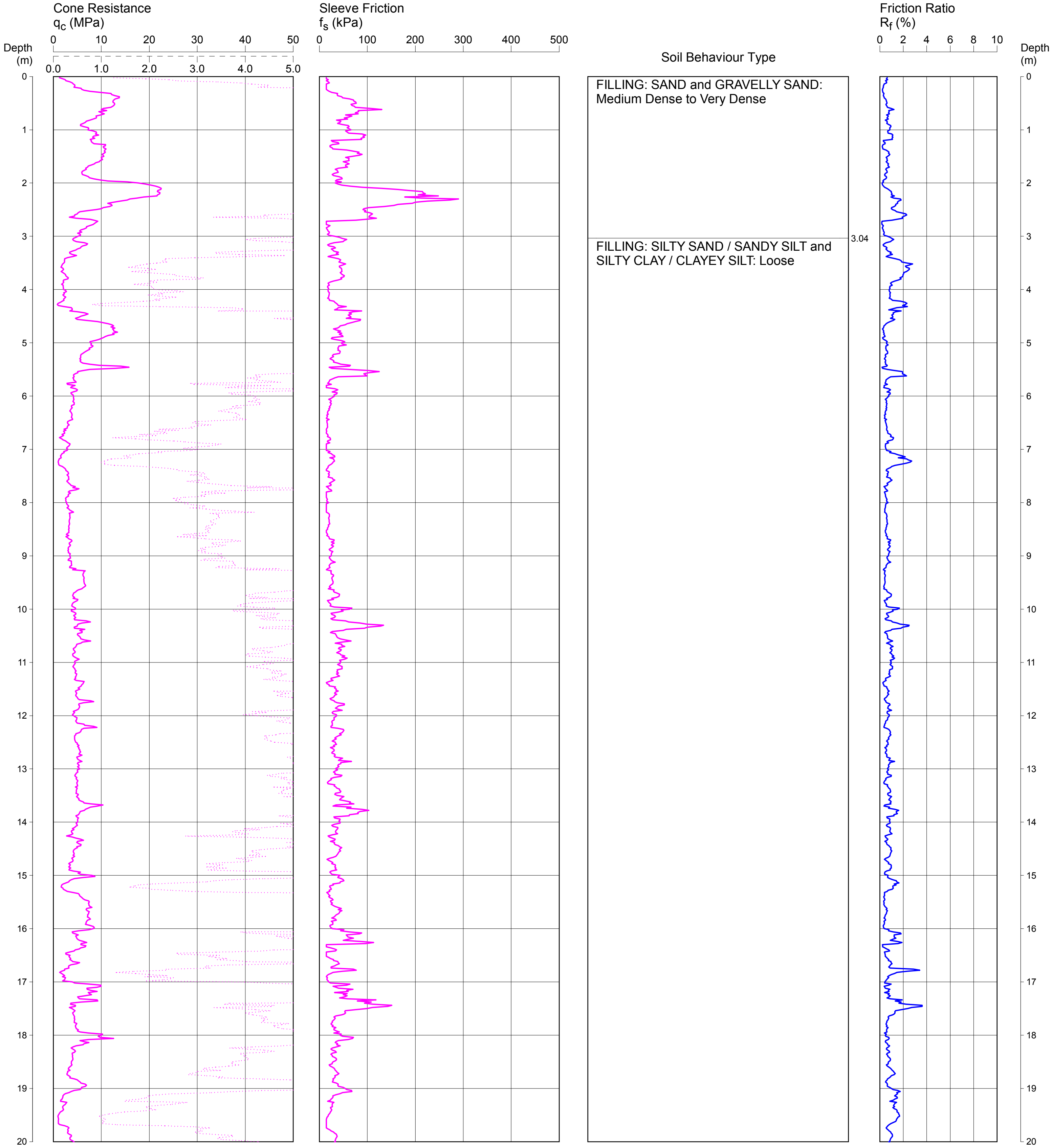
REDUCED LEVEL: 0.0

COORDINATES: 292029E 6226084N

CPT 407

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 2.3m AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 407.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: SADA SERVICES PTY LTD

PROJECT: PROPOSED SURCHARGE TRIAL

LOCATION: GLENLEE ROAD, MENANGLE PARK

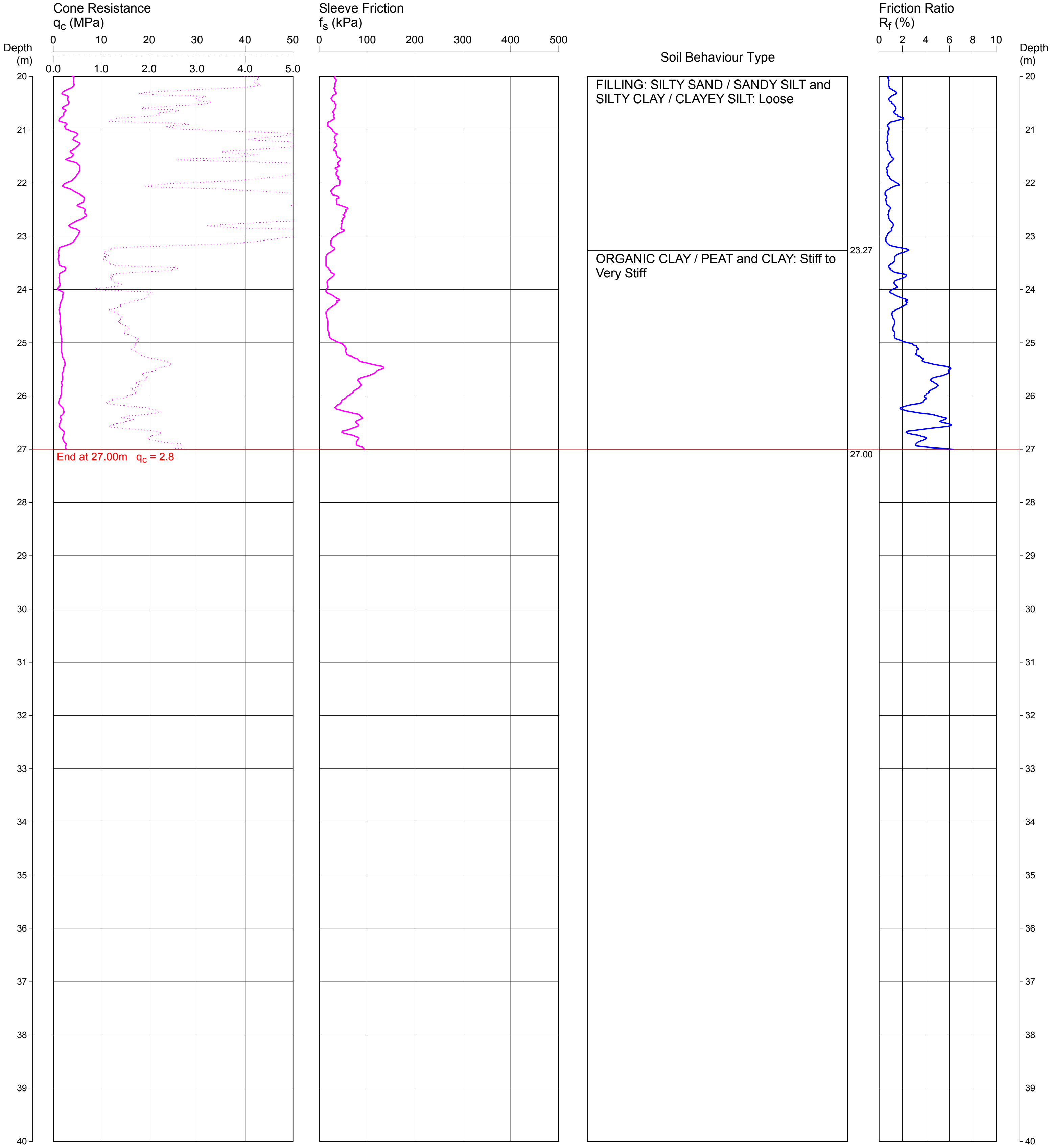
REDUCED LEVEL: 0.0

COORDINATES: 292029E 6226084N

CPT 407

DATE 1/11/2012

PROJECT No: 40950.06



REMARKS: HOLE COLLAPSED AT 2.3m AFTER WITHDRAWAL OF RODS

File: P:\40950.06\Field\CPT 400's\CPT 407.CP5
Cone ID: 120621 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: Sada Pty Ltd

PROJECT: Proposed Weighbridge

LOCATION: Glenlee Road, Mt Annan

REDUCED LEVEL:

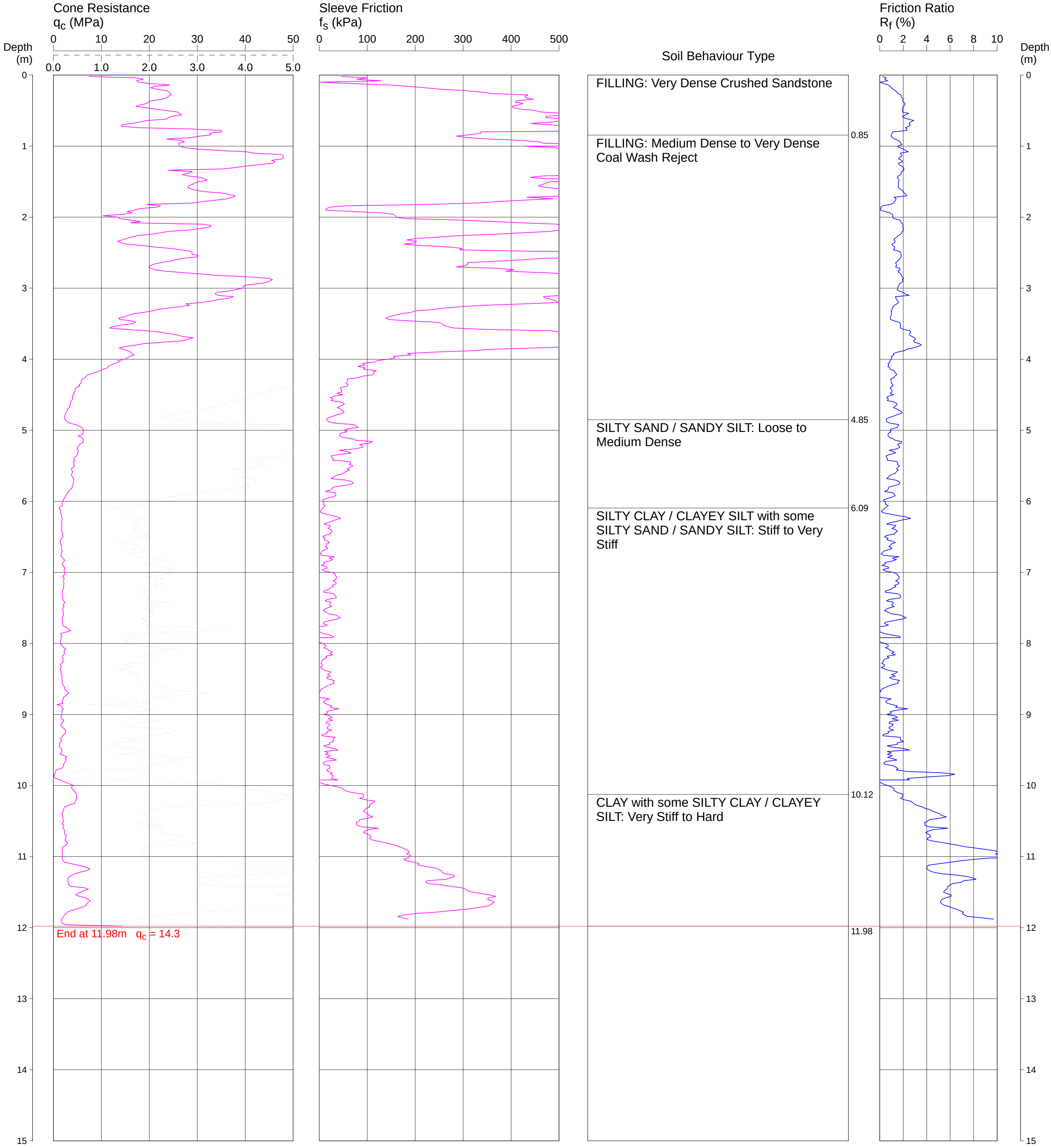
COORDINATES:

CPT501

Page 1 of 1

DATE 24/9/2014

PROJECT No: 40950.06



REMARKS: HOLE DISCONTINUED DUE TO BENDING IN WEATHERED ROCK;
HOLE COLLAPSE AT 7.8 m AFTER WITHDRAWAL OF RODS.

File: P:\40950.06 Glenlee Monitoring\Weigbridge\CPT501.CP5
Cone ID: 120619 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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CONE PENETRATION TEST

CLIENT: Sada Pty Ltd

PROJECT: Proposed Weighbridge

LOCATION: Glenlee Road, Mt Anna

REDUCED LEVEL:

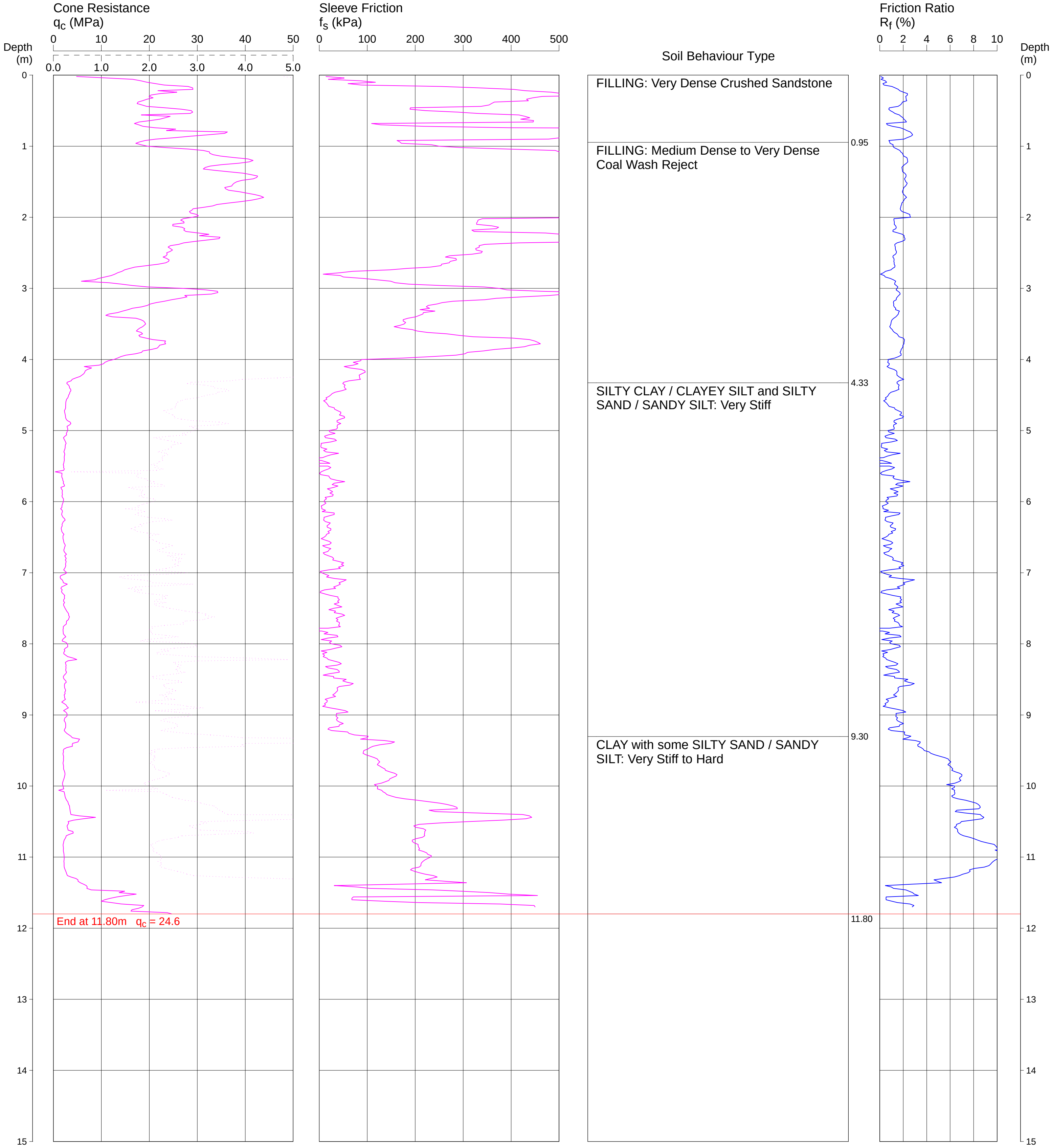
COORDINATES:

CPT502

Page 1 of 1

DATE 24/9/2014

PROJECT No: 40950.06



REMARKS: HOLE DISCONTINUED TO DUE BENDING IN WEATHERED ROCK;
HOLE COLLAPSE AT 9.0 m DEPTH AFTER WITHDRAWAL OF RODS.

File: P:\40950.06 Glenlee Monitoring\Weigbridge\CPT502.CP5
Cone ID: 120619 **Type:** I-CFXY-10

ConePlot Version 5.9.2

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292100
NORTHING: 6226136
DIP/AZIMUTH: 90°/--

PIT No: SP1-1
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace refuse (plastic cans, brick)		D	0.0 – 0.2				
				D	0.5 – 0.7				
				*D	1.2 – 1.4				
				D	1.8 – 2.0				
				D	2.4 – 2.6				
				D	3.4 – 3.8				
	3.8	Pit discontinued at 3.8m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Replicate sample BD2/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292079
NORTHING: 6226165
DIP/AZIMUTH: 90°/--

PIT No: SP1-2
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace refuse (plastic cans, brick)		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1			D	1.0 – 1.2				
				D	1.8 – 2.0				
	2								
				D	2.4 – 2.6				
	3								
				D	3.4 – 3.6				
	4 / 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292070
NORTHING: 6226123
DIP/AZIMUTH: 90°/--

PIT No: SP1-3
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1			*D	1.0 – 1.2				
	2			D	1.8 – 2.0				
				D	2.4 – 2.6				
	3			D	3.4 – 3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Replicate sample BD3/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics | Environment | Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292072
NORTHING: 6226040
DIP/AZIMUTH: 90°/--

PIT No: SP2-1
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.4–0.6				
	1			D	1.0–1.4				
	2			D	2.0–2.2				
	3			D	2.8–3.0				
	3.5	Pit discontinued at 3.5m Pit collapse							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics | Environment | Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292037
NORTHING: 6226070
DIP/AZIMUTH: 90°/--

PIT No: SP2-2
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown sandy clay and compost with trace domestic refuse		D	0.0–0.2				
				D	0.4–0.6				
	1			*D	1.0–1.2				
	2			D	2.0–2.2				
				D	2.4–2.6				
				D	2.6–3.0				
	3.0	Pit discontinued at 3.0m Pit collapse			3.0				

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *Replicate sample BD1/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292070
NORTHING: 6226123
DIP/AZIMUTH: 90°/--

PIT No: SP2-3
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.4–0.6				
	1			D	1.0–1.2				
	2			D	1.8–2.0				
	3 3.0			D	2.8–3.0				
		Pit discontinued at 3.0m Pit collapse							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.8m AHD
EASTING: 292470
NORTHING: 6226340
DIP/AZIMUTH: 90°/--

PIT No: 101
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - mottled orange, brown and green moderately weathered sandstone with same sandy clay, humid		D	0.1–0.3				
				D	0.5–0.7				
	1								
				D	1.3–1.5				
	1.5	Pit discontinued at 1.5m Refusal on filling							
	2								
	3								
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.1m AHD
EASTING: 292257
NORTHING: 6226280
DIP/AZIMUTH: 90°/--

PIT No: 102
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.5–0.7				
				D	1.4–1.8				
				D	2.6–2.8				
				D	4.9–5.1				
	5.1	Pit discontinued at 5.1m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.5m AHD
EASTING: 292359
NORTHING: 6226251
DIP/AZIMUTH: 90°/--

PIT No: 103
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel (coalwash) with trace orange and pink silty clay and brown sandy clay, moist		D	0.0–0.2				
				D	0.4–0.6				
	1								1
				D	1.2–1.4				
	2								2
				D	2.2–2.4				
	3								3
				D	3.4–3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							4
	5								5

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.0m AHD
EASTING: 292422
NORTHING: 6226266
DIP/AZIMUTH: 90°/--

PIT No: 104
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty gravel with sorme black sandy clay, moist		D	0.0–0.2				
				D	0.4–0.6				
	1								
				*D	1.2–1.4				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 78.2m AHD
EASTING: 292204
NORTHING: 6226221
DIP/AZIMUTH: 90°/--

PIT No: 105
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

Depth (m)	Description of Strata	Sampling Type	Sampling Depth	Sample	Results & Comments	Water
0.0	FILLING - black, silty gravel (coalwash) and mottled orange brown and white slightly silty clay, moist	D	0.0–0.2			
		*D	0.4–0.6			
1.2	FILLING - brown sandy clay with some grey shale and trace coalwash, moist	D	1.6–1.8			
	- becoming black, silty gravel (coalwash) with trace brown sandy clay, moist	D	2.4–2.6			
		D	3.8–4.0			
5.2	Pit discontinued at 5.2m Limit of reach					

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD6/100512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 83.6m AHD
EASTING: 292309
NORTHING: 6226200
DIP/AZIMUTH: 90°/--

PIT No: 106
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty gravel (coalwash) with trace brown sand, moist		D	0.0–0.2				
				D	0.4–0.6				
	1								
				D	1.2–1.4				
				D	1.8–2.0				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	3.6	Pit discontinued at 3.6m Limit of reach							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.0m AHD
EASTING: 292416
NORTHING: 6226197
DIP/AZIMUTH: 90°/--

PIT No: 107
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black, silty gravel with some mottled orange, white and brown clay, moist		D	0.0–0.2				
				D	0.3–0.5				
				*D	1.5–1.7				
				D	3.0–3.5				
				D	4.0–4.2				
	5.0	Pit discontinued at 5.0m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD5/100512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 84.5m AHD
EASTING: 292148
NORTHING: 6226168
DIP/AZIMUTH: 90°/--

PIT No: 108
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black, sandy, silty gravel (coalwash) and black silty clay, moist		D	0.0 – 0.2				
				D	0.3 – 0.6				
	1								
				D	1.8 – 2.0				
	2								
	3								
				D	3.4 – 3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 87.5m AHD
EASTING: 292403
NORTHING: 6226149
DIP/AZIMUTH: 90°/--

PIT No: 109
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - black, silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.4–0.6				
				D	1.4–1.6				
				D	2.4–2.6				
				D	3.4–3.6				
	4.8	Pit discontinued at 4.8m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 78.5m AHD
EASTING: 292245
NORTHING: 6226095
DIP/AZIMUTH: 90°/--

PIT No: 110
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - mottled orange and white slightly silty clay with some black silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.4–0.6				
				*D	1.8–2.0				
	2.6	FILLING - brown, sandy clay with some black, silty gravel (coalwash) and trace mottled orange and white, slightly silty clay, grey shale and brick fragments, moist		D	2.8–3.0				
				D	3.8–4.0				
	4.5	Pit discontinued at 4.5m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD3/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 86.8m AHD
EASTING: 292361
NORTHING: 6226087
DIP/AZIMUTH: 90°/--

PIT No: 111
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty clay (coalwash) with trace black silty gravel, moist		D	0.0–0.2				
				D	0.5–0.7				
				*D	1.8–2.0				
				D	3.5–3.8				
				D	4.5–4.7				
	4.7	Pit discontinued at 4.7m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 75.0m AHD
EASTING: 292441
NORTHING: 6226051
DIP/AZIMUTH: 90°/--

PIT No: 112
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel (coalwash) moist		D	0.0–0.2				
				D	0.4–0.6				
	1								
				D	1.4–1.6				
	2								
				D	2.4–2.6				
	3								
				D	3.3–3.5				
	3.9	Pit discontinued at 3.9m Pit collapse							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292089
NORTHING: 6226031
DIP/AZIMUTH: 90°/--

PIT No: 113
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel with trace brown sand, roots and rootlets, one aluminium can observed approximately five scrap pieces of plastic, moist		*D	0.0–0.2				
				D	0.4–0.6				
	1								
				D	1.8–2.0				
	2								
	3								
				D	3.4–3.6				
	3.9	Pit discontinued at 3.9m Limit of reach							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD2/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.0m AHD
EASTING: 292238
NORTHING: 6226016
DIP/AZIMUTH: 90°/--

PIT No: 114
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty clay (coalwash) with trace black silty gravel, moist		D	0.0–0.2				
				D	0.3–0.5				
				D	1.4–1.5				
				D	3.3–3.5				
				D	4.3–4.5				
	4.5	Pit discontinued at 4.5m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 72.0m AHD
EASTING: 292169
NORTHING: 6225954
DIP/AZIMUTH: 90°/--

PIT No: 115
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black, silty gravel, moist		D	0.0–0.2				
				D	0.3–0.5				
	1								
		- some sandy clay inclusions from 1.5m		D	1.5–1.7				
	2								
	3								
		- seepage observed and becoming wet from 3.3m		D	3.3–3.5			▷	
				D	3.8–4.0				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed, seepage observed at 3.3m

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 73.5m AHD
EASTING: 292365
NORTHING: 6225941
DIP/AZIMUTH: 90°/--

PIT No: 116
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black, silty gravel with trace brown sandy clay, roots and rootlets - becoming black silty clay from 0.1m		D	0.0–0.2				
				*D	0.3–0.5				
	1			D	1.3–1.5				
	2			D	2.2–2.4				
	3			D	3.5–3.7				
	3.9	Pit discontinued at 3.9m Limit of reach							
	4								
	5								

Dynamic Penetrometer Test scale: 5, 10, 15, 20

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD1/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292100
NORTHING: 6226136
DIP/AZIMUTH: 90°/--

PIT No: SP1-1
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.5–0.7				
	1								
				*D	1.2–1.4				
				D	1.8–2.0				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.8				
	3.8	Pit discontinued at 3.8m Limit of reach							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94
WATER OBSERVATIONS: No free groundwater observed
REMARKS: *Replicate sample BD2/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.8m AHD
EASTING: 292470
NORTHING: 6226340
DIP/AZIMUTH: 90°/--

PIT No: 101
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - mottled orange, brown and green moderately weathered sandstone with same sandy clay, humid		D	0.1–0.3				
				D	0.5–0.7				
				D	1.3–1.5				
	1.5	Pit discontinued at 1.5m Refusal on filling							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.1m AHD
EASTING: 292257
NORTHING: 6226280
DIP/AZIMUTH: 90°/--

PIT No: 102
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.5–0.7				
	1								1
				D	1.4–1.8				
	2								2
				D	2.6–2.8				
	3								3
	4								4
	5			D	4.9–5.1				5
	5.1	Pit discontinued at 5.1m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.5m AHD
EASTING: 292359
NORTHING: 6226251
DIP/AZIMUTH: 90°/--

PIT No: 103
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel (coalwash) with trace orange and pink silty clay and brown sandy clay, moist		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1								
				D	1.2 – 1.4				
	2								
				D	2.2 – 2.4				
	3								
				D	3.4 – 3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.0m AHD
EASTING: 292422
NORTHING: 6226266
DIP/AZIMUTH: 90°/--

PIT No: 104
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel with sorme black sandy clay, moist		D	0.0–0.2				
				D	0.4–0.6				
	1								
				*D	1.2–1.4				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 78.2m AHD
EASTING: 292204
NORTHING: 6226221
DIP/AZIMUTH: 90°/--

PIT No: 105
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - black, silty gravel (coalwash) and mottled orange brown and white slightly silty clay, moist		D	0.0–0.2				
				*D	0.4–0.6				
	1.2	FILLING - brown sandy clay with some grey shale and trace coalwash, moist		D	1.6–1.8				
		- becoming black, silty gravel (coalwash) with trace brown sandy clay, moist		D	2.4–2.6				
				D	3.8–4.0				
	5.2	Pit discontinued at 5.2m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD6/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 83.6m AHD
EASTING: 292309
NORTHING: 6226200
DIP/AZIMUTH: 90°/--

PIT No: 106
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty gravel (coalwash) with trace brown sand, moist		D	0.0–0.2				
				D	0.4–0.6				
	1								
				D	1.2–1.4				
				D	1.8–2.0				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	3.6	Pit discontinued at 3.6m Limit of reach							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.0m AHD
EASTING: 292416
NORTHING: 6226197
DIP/AZIMUTH: 90°/--

PIT No: 107
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black, silty gravel with some mottled orange, white and brown clay, moist		D	0.0–0.2				
				D	0.3–0.5				
	1								1
				*D	1.5–1.7				
	2								2
	3			D	3.0–3.5				3
	4			D	4.0–4.2				4
	5								5
	5.0	Pit discontinued at 5.0m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD5/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 84.5m AHD
EASTING: 292148
NORTHING: 6226168
DIP/AZIMUTH: 90°/--

PIT No: 108
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black, sandy, silty gravel (coalwash) and black silty clay, moist		D	0.0 – 0.2				
				D	0.3 – 0.6				
	1								1
				D	1.8 – 2.0				
	2								2
	3								3
				D	3.4 – 3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							4
	5								5

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 87.5m AHD
EASTING: 292403
NORTHING: 6226149
DIP/AZIMUTH: 90°/--

PIT No: 109
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - black, silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.4–0.6				
				D	1.4–1.6				
				D	2.4–2.6				
				D	3.4–3.6				
	4.8	Pit discontinued at 4.8m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 78.5m AHD
EASTING: 292245
NORTHING: 6226095
DIP/AZIMUTH: 90°/--

PIT No: 110
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	0.0	FILLING - mottled orange and white slightly silty clay with some black silty gravel (coalwash), moist		D	0.0–0.2				
				D	0.4–0.6				
				*D	1.8–2.0				
	2.6	FILLING - brown, sandy clay with some black, silty gravel (coalwash) and trace mottled orange and white, slightly silty clay, grey shale and brick fragments, moist		D	2.8–3.0				
				D	3.8–4.0				
	4.5	Pit discontinued at 4.5m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD3/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 86.8m AHD
EASTING: 292361
NORTHING: 6226087
DIP/AZIMUTH: 90°/--

PIT No: 111
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty clay (coalwash) with trace black silty gravel, moist		D	0.0 – 0.2				
				D	0.5 – 0.7				
	1								1
				*D	1.8 – 2.0				
	2								2
	3								3
				D	3.5 – 3.8				
	4								4
				D	4.5 – 4.7				
	4.7	Pit discontinued at 4.7m Limit of reach							
	5								5

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/100512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 75.0m AHD
EASTING: 292441
NORTHING: 6226051
DIP/AZIMUTH: 90°/--

PIT No: 112
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty gravel (coalwash) moist		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1								
				D	1.4 – 1.6				
	2								
				D	2.4 – 2.6				
	3								
				D	3.3 – 3.5				
	3.9	Pit discontinued at 3.9m Pit collapse							
	4								
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292089
NORTHING: 6226031
DIP/AZIMUTH: 90°/--

PIT No: 113
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black silty gravel with trace brown sand, roots and rootlets, one aluminium can observed approximately five scrap pieces of plastic, moist		*D	0.0 – 0.2				
				D	0.4 – 0.6				
				D	1.8 – 2.0				
				D	3.4 – 3.6				
	3.9	Pit discontinued at 3.9m Limit of reach							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD2/100512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.0m AHD
EASTING: 292238
NORTHING: 6226016
DIP/AZIMUTH: 90°/--

PIT No: 114
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - black silty clay (coalwash) with trace black silty gravel, moist		D	0.0 – 0.2				
				D	0.3 – 0.5				
	1								
				D	1.4 – 1.5				
	2								
	3								
				D	3.3 – 3.5				
	4								
				D	4.3 – 4.5				
	4.5	Pit discontinued at 4.5m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 72.0m AHD
EASTING: 292169
NORTHING: 6225954
DIP/AZIMUTH: 90°/--

PIT No: 115
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black, silty gravel, moist		D	0.0–0.2				
				D	0.3–0.5				
	1								
		- some sandy clay inclusions from 1.5m		D	1.5–1.7				
	2								
	3								
		- seepage observed and becoming wet from 3.3m		D	3.3–3.5			▷	
				D	3.8–4.0				
	4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed, seepage observed at 3.3m

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 73.5m AHD
EASTING: 292365
NORTHING: 6225941
DIP/AZIMUTH: 90°/--

PIT No: 116
PROJECT No: 78371.01
DATE: 10/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - black, silty gravel with trace brown sandy clay, roots and rootlets - becoming black silty clay from 0.1m		D	0.0–0.2				
				*D	0.3–0.5				
				D	1.3–1.5				
				D	2.2–2.4				
				D	3.5–3.7				
	3.9	Pit discontinued at 3.9m Limit of reach							

Depth scale: 1, 2, 3, 4, 5. Penetrometer scale: 5, 10, 15, 20.

RIG: CAT 320D Excavator with 0.7m bucket **LOGGED:** KGH **SURVEY DATUM:** MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD1/100512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292100
NORTHING: 6226136
DIP/AZIMUTH: 90°/--

PIT No: SP1-1
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown organic waste compost (woodchips, soil) with trace refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.5–0.7				
	1								1
				*D	1.2–1.4				
	2			D	1.8–2.0				2
				D	2.4–2.6				
	3								3
				D	3.4–3.8				
	3.8	Pit discontinued at 3.8m Limit of reach							
	4								4
	5								5

RIG: CAT 320D Excavator with 0.7m bucket

LOGGED: KGH

SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Replicate sample BD2/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292079
NORTHING: 6226165
DIP/AZIMUTH: 90°/--

PIT No: SP1-2
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.4–0.6				
	1			D	1.0–1.2				
				D	1.8–2.0				
	2								
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292070
NORTHING: 6226123
DIP/AZIMUTH: 90°/--

PIT No: SP1-3
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.4–0.6				
	1			*D	1.0–1.2				
	2			D	1.8–2.0				
				D	2.4–2.6				
	3								
				D	3.4–3.6				
	4 4.0	Pit discontinued at 4.0m Limit of reach							
	5								

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Replicate sample BD3/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	⊳	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292072
NORTHING: 6226040
DIP/AZIMUTH: 90°/--

PIT No: SP2-1
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1			D	1.0 – 1.4				1
	2			D	2.0 – 2.2				2
	3			D	2.8 – 3.0				3
	3.5	Pit discontinued at 3.5m Pit collapse							
	4								4
	5								5

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94
WATER OBSERVATIONS: No free groundwater observed
REMARKS:

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292037
NORTHING: 6226070
DIP/AZIMUTH: 90°/--

PIT No: SP2-2
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown sandy clay and compost with trace domestic refuse		D	0.0 – 0.2				
				D	0.4 – 0.6				
	1			*D	1.0 – 1.2				
	2			D	2.0 – 2.2				
				D	2.4 – 2.6				
				D	2.6 – 3.0				
	3.0	Pit discontinued at 3.0m Pit collapse							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

REMARKS: *Replicate sample BD1/110512 taken

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: --
EASTING: 292070
NORTHING: 6226123
DIP/AZIMUTH: 90°/--

PIT No: SP2-3
PROJECT No: 78371.01
DATE: 11/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILLING - brown organic waste compost (woodchips, soil) with trace domestic refuse (plastic cans, brick)		D	0.0–0.2				
				D	0.4–0.6				
				D	1.0–1.2				
				D	1.8–2.0				
				D	2.8–3.0				
	3.0	Pit discontinued at 3.0m Pit collapse							

RIG: CAT 320D Excavator with 0.7m bucket
LOGGED: KGH
SURVEY DATUM: MGA94

WATER OBSERVATIONS: No free groundwater observed

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	≹	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292404
NORTHING: 6226362
DIP/AZIMUTH: 90°/--

BORE No: 117
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel with trace black, silty gravel (coalwash), moist		A	0.0 0.2				
	0.3	FILLING - orange brown, sandy clay with some gravel (coalwash, siltstone), moist		A	0.3 0.5				
	1.0	FILLING - black, silty gravel (coalwash), moist		*A	1.3 1.5				
	2.7	FILLING - orange brown, moderately weathered sandstone with some sandy clay		A	2.7 2.9				
	2.9	Bore discontinued at 2.9m Refusal on sandstone (filling)							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**

TYPE OF BORING: 150mm Solid Flight Auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292370
NORTHING: 6226342
DIP/AZIMUTH: 90°/--

BORE No: 118
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash), moist		A	0.0–0.2				
				A	0.3–0.5				
				A	1.3–1.5				
				A	2.8–3.0				
	3.0	Bore discontinued at 3.0m Target depth reached							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292413
NORTHING: 6226345
DIP/AZIMUTH: 90°/--

BORE No: 119
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - orange brown, sandy clay with some sandstone gravel and cobbles and trace coalwash, humid		A	0.0–0.2				
				A	0.3–0.5				
	1.2	FILLING - black, silty gravel (coalwash), moist		A	1.3–1.5				
	1.8	FILLING - orange brown, sandy clay and sandstone with trace coalwash, humid		A	1.8–2.0				
	2.0	Bore discontinued at 2.0m Refusal on sandstone (filling)							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292388
NORTHING: 6226339
DIP/AZIMUTH: 90°/--

BORE No: 120
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel with some coalwash		A	0.0–0.2				
		- becoming black, silty gravel (coalwash) with some brown, sandy clay and trace siltstone gravel, humid		*A	0.3–0.5				
	1			A	1.0–1.1				1
	1.1	Bore discontinued at 1.1m Refusal on sandstone (filling)							
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**

TYPE OF BORING: 150mm Solid Flight Auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD5/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292393
NORTHING: 6226309
DIP/AZIMUTH: 90°/--

BORE No: 121
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash) with some brown sand, humid		A	0.0–0.2				
				A	0.3–0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292401
NORTHING: 6226306
DIP/AZIMUTH: 90°/--

BORE No: 122
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel (sandstone, coalwash), humid		A	0.0–0.2				
				*A	0.3–0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD7/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292413
NORTHING: 6226310
DIP/AZIMUTH: 90°/--

BORE No: 123
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown and black, sandy gravel (sandstone, coalwash), humid		A	0.0 0.2				
				A	0.3 0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292393
NORTHING: 6226309
DIP/AZIMUTH: 90°/--

BORE No: 124
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash) with some brown sand, humid		A	0.0				
					0.2				
				*A	0.3				
					0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**

TYPE OF BORING: 150mm Solid Flight Auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD6/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m
EASTING: 292340
NORTHING: 6226334
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash), moist		A	0.0–0.2				
				A	0.3–0.5				
				*A	1.3–1.5				
				A	2.8–3.0				
				A	4.3–4.5				
				A	5.8–6.0				
				A	7.3–7.5				
	7.5	Bore discontinued at 7.5m Limit of reach							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**

TYPE OF BORING: 150mm Solid Flight Auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD1/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 84.5m
EASTING: 292329
NORTHING: 6226157
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - brown, sandy gravel with some black, silty gravel (coalwash), moist		A	0.0–0.2				
	0.3	- becoming black, silty gravel (coalwash) from 0.3m		A	0.3–0.5				
				A	1.3–1.5				
				A	2.8–3.0				
				*A	4.3–4.5				
				A	5.8–6.0				
				A	7.3–7.5				
	7.5	Bore discontinued at 7.5m Limit of reach							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD3/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.0m
EASTING: 292126
NORTHING: 6226104
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black silty gravel (coalwash), moist		A	0.0–0.2				
				A	0.3–0.5				
	1								
				A	1.3–1.5				
	2								
				A	2.8–3.0				
	3								
	4								
				A	4.3–4.5				
	5								
				A	5.8–6.0				
	6								
	7								
				A	7.3–7.5				
	7.5	Bore discontinued at 7.5m Limit of reach							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.5m
EASTING: 292309
NORTHING: 6226026
DIP/AZIMUTH: 90°/--

BORE No: 4
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash), moist		A	0.0 – 0.2				
				A	0.3 – 0.5				
				A	1.3 – 1.5				
		- becoming wet from 2.8m		*A	2.8 – 3.0				
				A	4.3 – 4.5				
				A	5.8 – 6.0				
	7.5			A	7.3 – 7.5				
		Bore discontinued at 7.5m Limit of reach							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed, wet from 2.8m
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD2/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292340
NORTHING: 6226334
DIP/AZIMUTH: 90°/--

BORE No: 1A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt and clay, damp							
									2 Backfill
				S	3.0 3.45		8,12,40 N = 52		3 Casing
									5 Bentonite
		- becoming moist below 6.0m		S	6.0 6.45		11,21,19 N = 40		
				S	9.0 9.45		6,8,13 N = 21		
									10 Gravel
									Screen
	12.0	FILLING - dark grey to black, slightly fine to medium gravelly (coalwash) clayey silt with some sand, moist		S	12.0 12.45		4,5,7 N = 12		
	14.1	CLAY - very stiff to hard, brown mottled light grey clay, humid to damp							
				S	15.0 15.45		8,12,18 N = 30		15 End cap
	15.45	Bore discontinued at 15.45m Limit of investigation							

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 5.5m

TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 15.0m

WATER OBSERVATIONS: No free ground water observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.15m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

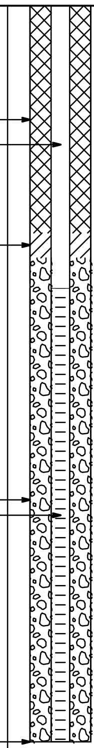
BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 84.5m AHD
EASTING: 292329
NORTHING: 6226157
DIP/AZIMUTH: 90°/--

BORE No: 2A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0	FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt, humid							
	2								Backfill
	3			S	3.0 3.45		9,20,16 N = 36		Casing
	5								Bentonite
	6	- with some clay below 6.0m		S	6.0 6.45		10,35,40 N = 75		
	9	- becoming slightly silty gravelly sand, humid to damp below 9.0m		S	9.0 9.45		10,16,18 N = 34		
	10								Gravel Screen
	12	- becoming gravelly sand with some silt, wet below 12.0m		S	12.0 12.45		8,13,14 N = 27		
	15			S	15.0 15.45		8,5,6 N = 11		End cap
	15.4	CLAY - firm to stiff, grey brown, clay, damp							
	15.45	Bore discontinued at 15.45m Limit of investigation							



RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 5.5m
TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 15.0m
WATER OBSERVATIONS: No free ground water observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 0.9m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.0m AHD
EASTING: 292126
NORTHING: 6226104
DIP/AZIMUTH: 90°/--

BORE No: 3A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - dark grey to black, sandy fine to medium gravel (coalwash) with some silt, damp to moist							1 Bentonite
				S	3.0 3.45		2,1,2 N = 3		3 Casing
		- with some clay below 6.0m		S	6.0 6.45		8,20,27 N = 47		
	9.0	FILLING - dark grey to black, silty sand with trace gravel (coalwash), damp to moist		S	9.0 9.45		3,3,5 N = 8		10 Gravel
				S	12.0 12.45		3,6,7 N = 13		12 Screen
				S	15.0 15.45				
	15.4	CLAY - firm, grey brown, clay, damp to moist							
		- becoming hard, brown and light grey clay with some fine gravel (siltstone) below 18.0m		S	18.0 18.45		9,15,20 N = 35		18 End cap
	18.45	Bore discontinued at 18.45m Limit of investigation							

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to7.5m
TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 18.0m
WATER OBSERVATIONS: No free ground water observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.0m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.5m AHD
EASTING: 292309
NORTHING: 6226026
DIP/AZIMUTH: 90°/--

BORE No: 4A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt, damp to moist							
	2								Backfill
	3			S	3.0 3.45		3,2,3 N = 5		Casing
	5								Bentonite
	6	- becoming wet below 6.0m		S	6.0 6.45		2,3,4 N = 7		
	9			S	9.0 9.45		4,5,5 N = 10		
	12			S	12.0 12.45		4,5,7 N = 12		
	15			S	15.0 15.45		4,6,8 N = 14		Gravel Screen
	18			S	18.0 18.45		13,20,20 N = 40		
	20.7	CLAY - hard, orange light grey and brown, clay, humid to damp		S	21.0 21.45		7,15,25 N = 40		
	25.0	Bore discontinued at 25.0m Limit of investigation							End cap

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 9.7m

TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 21.0m

WATER OBSERVATIONS: No free ground water observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.0m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292404
NORTHING: 6226362
DIP/AZIMUTH: 90°/--

BORE No: 117
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel with trace black, silty gravel (coalwash), moist		A	0.0–0.2				
	0.3	FILLING - orange brown, sandy clay with some gravel (coalwash, siltstone), moist		A	0.3–0.5				
	1.0	FILLING - black, silty gravel (coalwash), moist		*A	1.3–1.5				
	2.7	FILLING - orange brown, moderately weathered sandstone with some sandy clay		A	2.7–2.9				
	2.9	Bore discontinued at 2.9m Refusal on sandstone (filling)							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD4/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292370
NORTHING: 6226342
DIP/AZIMUTH: 90°/--

BORE No: 118
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash), moist		A	0.0–0.2				
				A	0.3–0.5				
	1								
				A	1.3–1.5				
	2								
				A	2.8–3.0				
	3 3.0	Bore discontinued at 3.0m Target depth reached							
	4								
	5								

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292413
NORTHING: 6226345
DIP/AZIMUTH: 90°/--

BORE No: 119
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - orange brown, sandy clay with some sandstone gravel and cobbles and trace coalwash, humid		A	0.0–0.2				
				A	0.3–0.5				
	1.2	FILLING - black, silty gravel (coalwash), moist		A	1.3–1.5				
	1.8	FILLING - orange brown, sandy clay and sandstone with trace coalwash, humid		A	1.8–2.0				
	2.0	Bore discontinued at 2.0m Refusal on sandstone (filling)							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292388
NORTHING: 6226339
DIP/AZIMUTH: 90°/--

BORE No: 120
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel with some coalwash		A	0.0–0.2				
		- becoming black, silty gravel (coalwash) with some brown, sandy clay and trace siltstone gravel, humid		*A	0.3–0.5				
	1.1			A	1.0–1.1				
		Bore discontinued at 1.1m Refusal on sandstone (filling)							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**

TYPE OF BORING: 150mm Solid Flight Auger

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD5/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292393
NORTHING: 6226309
DIP/AZIMUTH: 90°/--

BORE No: 121
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash) with some brown sand, humid		A	0.0–0.2				
				A	0.3–0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292401
NORTHING: 6226306
DIP/AZIMUTH: 90°/--

BORE No: 122
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown, sandy gravel (sandstone, coalwash), humid		A	0.0 0.2				
				*A	0.3 0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD7/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292413
NORTHING: 6226310
DIP/AZIMUTH: 90°/--

BORE No: 123
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - brown and black, sandy gravel (sandstone, coalwash), humid		A	0.0 0.2				
				A	0.3 0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Phase 1 Contamination Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292393
NORTHING: 6226309
DIP/AZIMUTH: 90°/--

BORE No: 124
PROJECT No: 78371.01
DATE: 21/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - black, silty gravel (coalwash) with some brown sand, humid		A	0.0 – 0.2				
				*A	0.3 – 0.5				
	0.5	Bore discontinued at 0.5m Target depth reached							
	1								1
	2								2
	3								3
	4								4
	5								5

RIG: Kubota KX41-3V **DRILLER:** J Boers **LOGGED:** KGH **CASING:**
TYPE OF BORING: 150mm Solid Flight Auger
WATER OBSERVATIONS: No free groundwater observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Proust and Gardner
*Replicate sample BD6/210512 taken

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.5m AHD
EASTING: 292340
NORTHING: 6226334
DIP/AZIMUTH: 90°/--

BORE No: 1A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0.0	FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt and clay, damp							Backfill (to ~2.0m); Casing
				S	3.0 – 3.45		8,12,40 N = 52		
									Bentonite (from ~5.0m)
		- becoming moist below 6.0m		S	6.0 – 6.45		11,21,19 N = 40		
				S	9.0 – 9.45		6,8,13 N = 21		Gravel; Screen
	12.0	FILLING - dark grey to black, slightly fine to medium gravelly (coalwash) clayey silt with some sand, moist		S	12.0 – 12.45		4,5,7 N = 12		
	14.1	CLAY - very stiff to hard, brown mottled light grey clay, humid to damp		S	15.0 – 15.45		8,12,18 N = 30		End cap (15.0m)
	15.45	Bore discontinued at 15.45m Limit of investigation							

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 5.5m
TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 15.0m
WATER OBSERVATIONS: No free ground water observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.15m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

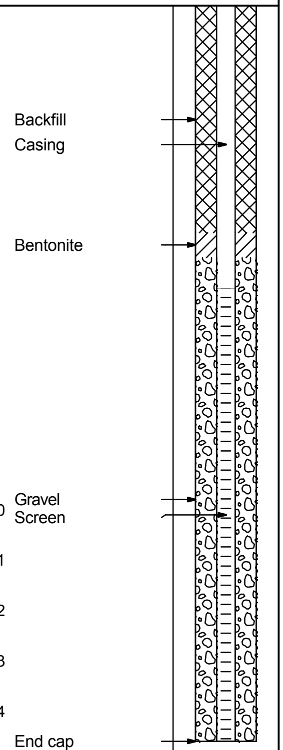
CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 84.5m AHD
EASTING: 292329
NORTHING: 6226157
DIP/AZIMUTH: 90°/--

BORE No: 2A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water
	0.0	FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt, humid						
				S	3.0–3.45		9,20,16 N = 36	
		- with some clay below 6.0m		S	6.0–6.45		10,35,40 N = 75	
		- becoming slightly silty gravelly sand, humid to damp below 9.0m		S	9.0–9.45		10,16,18 N = 34	
		- becoming gravelly sand with some silt, wet below 12.0m		S	12.0–12.45		8,13,14 N = 27	
	15.4			S	15.0–15.45		8,5,6 N = 11	
	15.45	CLAY - firm to stiff, grey brown, clay, damp						
		Bore discontinued at 15.45m Limit of investigation						

Well Construction Details



RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 5.5m

TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 15.0m

WATER OBSERVATIONS: No free ground water observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 0.9m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 89.0m AHD
EASTING: 292126
NORTHING: 6226104
DIP/AZIMUTH: 90°/--

BORE No: 3A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Well Construction Details
	0	FILLING - dark grey to black, sandy fine to medium gravel (coalwash) with some silt, damp to moist							Bentonite (1)
				S	3.0 3.45		2,1,2 N = 3		Casing (3)
		- with some clay below 6.0m		S	6.0 6.45		8,20,27 N = 47		
	9.0	FILLING - dark grey to black, silty sand with trace gravel (coalwash), damp to moist		S	9.0 9.45		3,3,5 N = 8		Gravel (10)
				S	12.0 12.45		3,6,7 N = 13		Screen (12)
				S	15.0 15.45				
	15.4	CLAY - firm, grey brown, clay, damp to moist							
		- becoming hard, brown and light grey clay with some fine gravel (siltstone) below 18.0m		S	18.0 18.45		9,15,20 N = 35		End cap (18)
	18.45	Bore discontinued at 18.45m Limit of investigation							

RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to7.5m
TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 18.0m
WATER OBSERVATIONS: No free ground water observed
REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.0m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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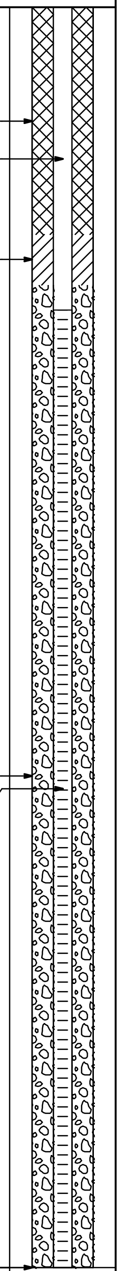
BOREHOLE LOG

CLIENT: J & W Tripodi Holdings Pty Ltd
PROJECT: Geotechnical Assessment
LOCATION: Part Lot 1102 Deposited Plan 883495, Glenlee Road, Menangle Park

SURFACE LEVEL: 88.5m AHD
EASTING: 292309
NORTHING: 6226026
DIP/AZIMUTH: 90°/--

BORE No: 4A
PROJECT No: 78371
DATE: 30/5/2012
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Type	Depth	Sample	Results & Comments	Water	Well Construction Details
		FILLING - dark grey to black, fine to medium gravelly (coalwash) sand with some silt, damp to moist							
	2								Backfill
	3			S	3.0 3.45		3,2,3 N = 5		Casing
	5								Bentonite
	6	- becoming wet below 6.0m		S	6.0 6.45		2,3,4 N = 7		
	9			S	9.0 9.45		4,5,5 N = 10		
	12			S	12.0 12.45		4,5,7 N = 12		
	15			S	15.0 15.45		4,6,8 N = 14		Gravel Screen
	18			S	18.0 18.45		13,20,20 N = 40		
	20.7	CLAY - hard, orange light grey and brown, clay, humid to damp		S	21.0 21.45		7,15,25 N = 40		
	25.0	Bore discontinued at 25.0m Limit of investigation							End cap



RIG: Scout 1 **DRILLER:** Ground Test **LOGGED:** RLG **CASING:** HW to 9.7m

TYPE OF BORING: SFA (TC bit) to 5.5m, Rotary (water) to 21.0m

WATER OBSERVATIONS: No free ground water observed

REMARKS: Surface level interpolated from Drawing dated February 2012 by SJP of Pro-st and Gardner
Monument installed with 1.0m stickup above ground level

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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Depth to Groundwater (m)

Borehole ID	BH 1	BH 2a	BH 3a	BH 5	BH 6	BH 7	BH 8	BH 9
2002?	14.88	-	-	9.96	10.54	10.92	-	-
8/04/2008	Dry			9.20	9.40			
9/05/2008	Dry	12.94	8.91	8.29	8.50	-	15.73	7.69
30/05/2008	Dry	12.82	8.78	8.35	8.17	-	15.81	8.56
25/06/2008	Dry	14.48	9.81	9.31	9.03	-	16.65	9.22
5/11/2008	Dry	16.27	9.92	9.68	10.34	-	16.85	9.33
5/11/2008 (after an hour)	-	-	-	9.71	11.82	-	-	-
12/11/2008	-	-	-	9.66	10.45	-	-	-
25/03/2009	Dry	16.26	9.9	9.15	10.05	-	16.93	9.37
22/04/2009	Dry	15.19	9.06	7.99	8.83	-	15.81	8.67
7/09/2009	15.83	15.36	9.12	8.12	8.68	-	16.21	8.75
17/06/2015	Dry	15.24	9.43	9.25	-	-	Dry	-

Groundwater Levels (mAHD)

Borehole ID	BH 1	BH 2a	BH 3a	BH 5	BH 6	BH 7	BH 8	BH 9
Surface Level RL (m AHD)	89.14	90.28	90.98	89.46	89.76	90.77	90.88	88.87
Surface Level RL from 25/3/2009 (m AHD)	89.14	90.28	90.98	89.46	88.21	90.77	90.88	88.87
2002?	74.26	-	-	79.50	79.22	79.85	-	-
8/04/2008	Dry			80.26	80.36			
9/05/2008	Dry	77.34	82.07	81.17	81.26	-	75.15	81.18
30/05/2008	Dry	77.46	82.20	81.11	81.59	-	75.07	80.31
25/06/2008	Dry	75.80	81.17	80.15	80.73	-	74.23	79.65
5/11/2008	Dry	74.01	81.06	79.78	79.42	-	74.03	79.54
5/11/2008 (after an hour)	-	-	-	79.75	77.94	-	-	-
12/11/2008	-	-	-	79.80	79.31	-	-	-
25/03/2009	Dry	74.02	81.08	80.31	78.16	-	73.95	79.50
22/04/2009	Dry	75.09	81.92	81.47	79.38	-	75.07	80.20
7/09/2009	73.31	74.92	81.86	81.34	79.53	-	74.67	80.12
17/06/2015	Dry	75.04	81.55	80.21	-	-	Dry	-

BH 6 level has been reduced by 1.55m as of 25/3/09. Surface RL should now re

measured by RJH/CMCD - RL at GL

measured by ACC level appears to be at top of Standpipe

measured by ACC level assumed top of standpipe

Appendix C

Typical Chemical and Mechanical Properties of Coal Washery Reject

Attachment A

Typical Chemical and Mechanical Properties of Coalwash

Chemical Properties

Laboratory testing by BHP Billiton – Illawarra Coal (as the producer of coal washery reject primarily through the Dendrobium and West Cliff washeries) and Douglas Partners has been undertaken for some time. Testing has included measurement of the following:

- Combustibles;
- Heavy metals (mercury, cadmium, lead, arsenic, chromium, copper, nickel, selenium, zinc);
- Electrical conductivity;
- pH;
- total sulphur;
- calorific value;
- total ash content.

A summary of test results undertaken over the previous 3 years is given in Table A1. Major element chemical composition is given in Table A2 with a detailed ash analysis given in Table A3.

Table A1: Summary of Chemical Testing

Analysis	Unit	Test results	
		Range	Mean
Combustibles	% dry weight	26.9 – 34.8	27.7
Mercury	mg / kg	0.1 – 0.5	0.2
Cadmium	mg / kg	0.1 – 1.0	0.2
Lead	mg / kg	12 – 76	16.5
Arsenic	mg / kg	<4 – 11.4	4.8
Chromium	mg / kg	<1 – 55	3.6
Copper	mg / kg	10 – 46	14.3
Nickel	mg / kg	3 – 28	2.7
Selenium	mg / kg	<2 – 5	1.1
Zinc	mg / kg	19 – 90	42.0
Electrical Conductivity	ds / m	0.07 – 0.78	0.19
Total Sulphur	%	0.1 – 0.4	0.16
Calorific Value	Kcal / kg	1596 – 2200	1887
pH		7.0 – 10.4	9.7
Total ash content	%	66.1 – 71.9	68.3

Table A2: Major Element Chemical Composition

Ultimate analysis	% (by weight)
Carbon	24.33
Hydrogen	1.90
Sulphur	0.23
Nitrogen	0.55
Phosphorus	0.02

Table A3: Ash analysis

Chemical Composition	Total (%)
SiO_2	65.0
Al_2O_3	24.1
Fe_2O_3	6.5
CaO	0.4
MgO	0.7
Na_2O	0.3
K_2O	1.2
T_2O	0.7
Mn_3O	0.2
P_2O_5	0.1
SO_3	0.2
BaO	0.1
SrO	0.02
ZnO	<0.02
V_2O_5	<0.02

Based on the results and current published data, the trace element composition of coalwash poses no contamination risk to the environment or public health. Crystalline silica, otherwise known as silica dioxide (SiO2) is the basic component of quartz and granite rock. It accounts for 12% of the earths crust by weight. The National Occupational Health and Safety Commission (NOHSC) set standards for airborne crystalline silica. The concentration of crystalline silica in coalwash is substantially less than other forms of VENM (eg: crushed sandstone) and poses a low risk to workers and the community if appropriate dust control and construction methods are used when using coalwash as an engineering fill material.

Current literature indicates ignition temperatures for coalwash is greater than 200°C. Laboratory testing (McIntosh, 1997) indicated ignition temperatures of around 210°C for coalwash compacted to 75% standard (ie: very low compaction with high air voids), and up to 430°C for coalwash compacted to 100% standard (ie: compaction to a standard acceptable for construction sites with low air voids). Ignition temperatures of this magnitude mean that temperatures within the coalwash mass must be (almost unrealistically) high to initiate spontaneous combustion.

Total sulphur concentrations are low which indicates coalwash is not pyritic and has a low potential to produce acidity. The electrical conductivity is also low.

Ash analysis of coalwash confirms that the major constituents are typical sedimentary rock clay minerals composing high proportions of silicon, aluminium and iron.

Mechanical Properties

Testing to determine the mechanical (physical) properties of coalwash has been undertaken with typical results summarised in Table A4 (mechanical properties) and Table A5 (particle size distribution).

Table 4: Mechanical Properties

Parameter	Test Result
Liquid Limit (%)	25 – 35
Plastic Limit (%)	17 – 25
Plasticity Index (%)	17 – 15
Linear shrinkage (%)	4 – 8
CBR (%)	9 – 35
Cohesion (kPa)	20 (1)
Angle of friction (degrees)	36 (1)
Maximum dry density (t/m^3)	1.65 – 1.90
Optimum moisture content (%)	9 – 11

Note (1): as measured in direct shear

Table 5: Particle Size Distribution

Size Fraction (mm)	% retained
+200	0.00
-200 +150	0.3
-150 +75	2.9
-75 +63	1.8
-63 +37.5	10.2
-37.5 +25.0	9.3
-25.0 +19.0	6.7
-19.0 +11.2	13.5
-11.2 +8.0	8.6
-8.0 +6.3	4.3
-6.3 -4.0	7.8
-4.0 +2.8	4.0
-2.8 +2.0	5.3
-2.0 +1.18	6.5
-1.18 +0.6	6.5
-0.6 +0.425	2.6
-0.425 +0.3	1.3
-0.3 +0.15	2.9
-0.15 +0.075	1.2
Less than 0.075	4.5

In summary, the available test results indicate that the particle size distribution for the coalwash is a well graded material and is consistent with material typically classified as "select fill" for most of the grading. The workability of the material can be problematic if the percentage of fines (ie less than 0.075 mm size) increases beyond about 4 – 5%. CBR results in excess of 10% are also considered appropriate for select fill.

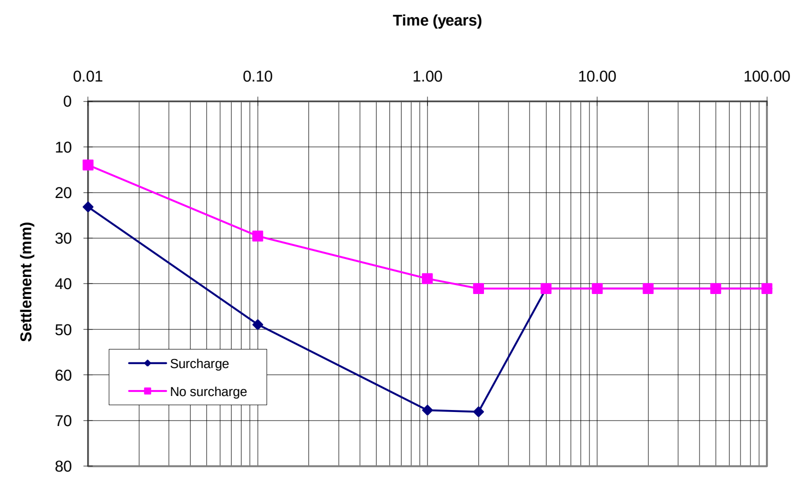
Appendix D

Material Parameters and Settlement Calculations

Project: AREA 1 GLENLEE EMPLACEMENT | **Project No:** 40950.05
Client : SADA SERVICES PTY LTD | **CPT:** 101

Fill Height	5.3	(m)	**Depth of Surcharge (ΔH)**	5	m
Applied Pressure	20	(kPa)	**Time of Surcharge(Δt)**	2	years
			$\gamma_{surcharge}$	16.7	kN/m^3
			γ_{fill}	20	kN/m^3
			Construction Period	2	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	3	3	16.06	0.0077		50	5	0		1	4	5	5	5	5	5	5	5
2	Sand	3.5	0.5	2.57	0.0482		10	5	0		4	5	5	5	5	5	5	5	5
3	Sand	4.4	0.9	11.35	0.0109		50	2	0		2	2	2	2	2	2	2	2	2
4	Sand	6.96	2.56	3.46	0.0358		10	19	1		3	8	19	19	19	19	19	19	19
5	Clay	7.5	0.54	1.36	0.1093		5	12	0		6	12	12	12	12	12	12	12	12
6	Sand	8.36	0.86	8.76	0.0141		20	3	0		1	3	3	3	3	3	3	3	3
7	Sand	8.96	0.6	5.04	0.0246		10	3	0		2	3	3	3	3	3	3	3	3
8	Sand	9.4	0.44	9.27	0.0134		10	1	0		1	1	1	1	1	1	1	1	1
9	Sand	10.5	1.1	7.43	0.0167		20	4	0		2	4	4	4	4	4	4	4	4
10	Sand	12.3	1.8	4.47	0.0277		10	10	0		2	7	10	10	10	10	10	10	10
11	Sand	13	0.7	5.76	0.0215		20	3	0		0	0	3	3	3	3	3	3	3
							Totals	**68**			**23**	**49**	**68**	**68**	**68**	**68**	**68**	**68**	**68**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	23	49	68	68	68	68	68	68	68
Total St without ΔH	14	30	39	41	41	41	41	41	41
Post Construction St with ΔH	0	0	0	0	0	0	0	0	0
Post Construction St without ΔH	0	0	0	0	0	0	0	0	0
Settlement after Surcharge Removal	23	49	68	68	41	41	41	41	41

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

Douglas Partners
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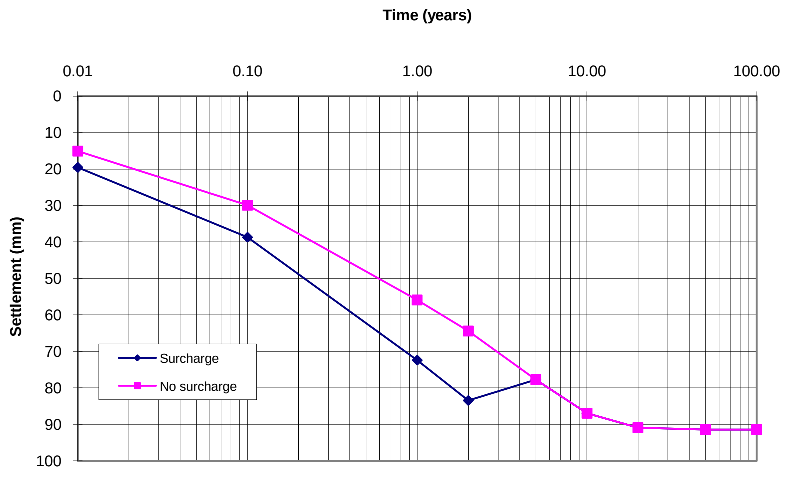
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 102

Fill Height 13.1 (m)
Applied Pressure 20 (kPa)

Depth of Surcharge (ΔH) 5 m
Time of Surcharge(Δt) 2 years
$\gamma_{surcharge}$ 16.7 kN/m^3
γ_{fill} 20 kN/m^3
Construction Period 2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	1.6	1.6	30.71	0.0040		50	2	0		1	2	2	2	2	2	2	2	2
2	Sand	2.44	0.84	8.65	0.0143		100	4	0		4	4	4	4	4	4	4	4	4
3	Sand	2.78	0.34	17.47	0.0071		100	1	0		1	1	1	1	1	1	1	1	1
4	Sand	4.38	1.6	7.93	0.0156		100	9	0		6	9	9	9	9	9	9	9	9
5	Clay	7.7	3.32	2.69	0.0552		1	67	9		2	7	23	32	49	61	66	67	67
6	Clay	8.4	0.7	1.93	0.0770		1	20	0		3	10	20	20	20	20	20	20	20
7	Clay	10	1.6	5.77	0.0258		2	15	1		2	5	13	15	15	15	15	15	15
8																			
9																			
10																			
11																			
							Totals	**118**			**20**	**39**	**72**	**83**	**101**	**113**	**118**	**118**	**118**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	20	39	72	83	101	113	118	118	118
Total St without ΔH	15	30	56	64	78	87	91	91	91
Post Construction St with ΔH	0	0	0	0	17	29	34	35	35
Post Construction St without ΔH	0	0	0	0	13	23	27	27	27
l Settlement after Surcharge Removal	20	39	72	83	78	87	91	91	91

Assumptions
1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

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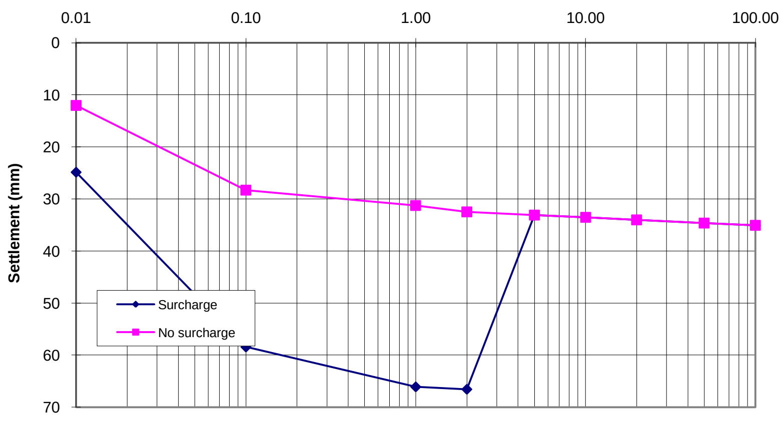
Project: AREA 1 GLENLEE EMPLACEMENT
Project No: 40950.05
Client : SADA SERVICES PTY LTD
CPT: 103

Fill Height	2.9 (m)	**Depth of Surcharge (ΔH)**	5 m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2 years
		$\gamma_{surcharge}$	16.7 kN/m^3
		γ_{fill}	20 kN/m^3
		Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Clay	0.3	0.3	0.31	0.7987	0.0050	1	39	0	2	15	37	39	39	40	40	41	41	42
2	Sand	1.5	1.2	33.8	0.0037		50	1	0		0	1	1	1	1	1	1	1	1
3	Sand	2.68	1.18	4.13	0.0300		20	6	0		2	6	6	6	6	6	6	6	6
4	Sand	3.84	1.16	8.2	0.0151		20	3	0		1	3	3	3	3	3	3	3	3
5	Sand	4.14	0.3	4.44	0.0279		20	1	0		1	1	1	1	1	1	1	1	1
6	Sand	6.1	1.96	9.89	0.0125		20	4	0		1	3	4	4	4	4	4	4	4
7	Sand	6.91	0.81	20.29	0.0061		20	1	0		0	1	1	1	1	1	1	1	1
8	Sand	8	1.09	8.74	0.0142		20	3	0		1	2	3	3	3	3	3	3	3
9	Sand	8.5	0.5	7.3	0.0170		10	1	0		1	1	1	1	1	1	1	1	1
10	Clay	9.16	0.66	2.51	0.0592		1	6	0		1	3	6	6	6	6	6	6	6
11	Clay	10	0.84	12.53	0.0119		3	2	0		0	0	2	2	2	2	2	2	2
							Totals	**66**			**25**	**58**	**66**	**67**	**67**	**68**	**68**	**69**	**69**

Time (years)



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	25	58	66	67	67	68	68	69	69
Total St without ΔH	12	28	31	33	33	34	34	35	35
Post Construction St with ΔH	0	0	0	0	1	1	2	2	3
Post Construction St without ΔH	0	0	0	0	1	1	2	2	3
Settlement after Surcharge Removal	25	58	66	67	33	34	34	35	35

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

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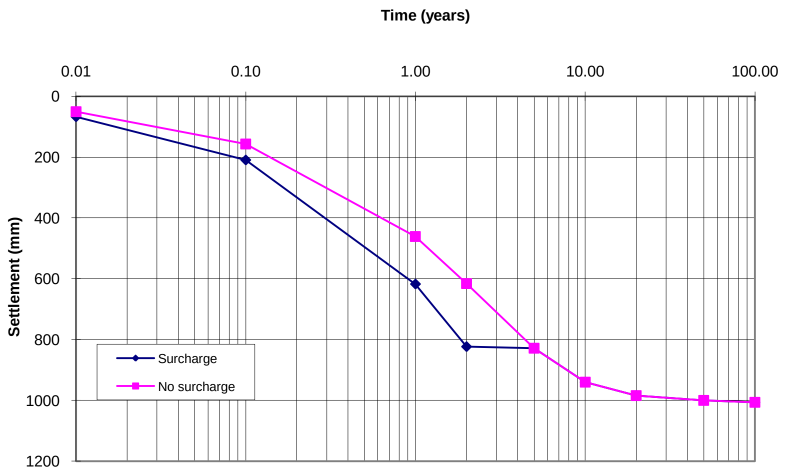
Project: AREA 1 GLENLEE EMPLACEMENT — Project No: 40950.05
Client : SADA SERVICES PTY LTD — CPT: 104

Fill Height	11.3 (m)	Depth of Surcharge (ΔH)	5 m
Applied Pressure	20 (kPa)	Time of Surcharge(Δt)	2 years
		$\gamma_{surcharge}$	16.7 kN/m^3
		γ_{fill}	20 kN/m^3
		Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	1.86	1.86	32.3	0.0038		50	2	0		1	2	2	2	2	2	2	2	2
2	Sand	3.3	1.44	4.6	0.0269		20	13	0		4	12	13	13	13	13	13	13	13
3	Sand	7.6	4.3	18.11	0.0068		20	10	1		1	4	9	10	10	10	10	10	10
4	Clay	10.56	2.96	0.76	0.2443		1	238	7		9	29	91	128	191	226	237	238	238
5	Clay	13.3	2.74	0.36	0.6878	0.0050	1	620	6	14	26	81	255	363	532	615	637	643	647
6	Clay	16.3	3	3.34	0.0445		2	44	4		2	7	23	32	42	44	44	44	44
7	Clay	20.86	4.56	1.77	0.0840		1	126	18		3	10	31	44	70	95	116	126	126
8	Clay	22.18	1.32	0.5	0.3714	0.0050	1	161	1	7	14	44	129	155	166	168	170	172	174
9	Clay	23.34	1.16	1.3	0.1143		1	44	1		4	13	38	43	44	44	44	44	44
10	Clay	25	1.66	2.11	0.0704		1	38	2		3	8	26	33	38	38	38	38	38
11																			
							Totals	1295			67	210	618	824	1106	1254	1311	1329	1336



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	67	210	618	824	1106	1254	1311	1329	1336
Total St without ΔH	50	156	461	616	829	941	985	1001	1007
Post Construction St with ΔH	0	0	0	0	282	430	487	506	512
Post Construction St without ΔH	0	0	0	0	213	325	369	385	391
d Settlement after Surcharge Removal	67	210	618	824	829	941	985	1001	1007

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

Douglas Partners
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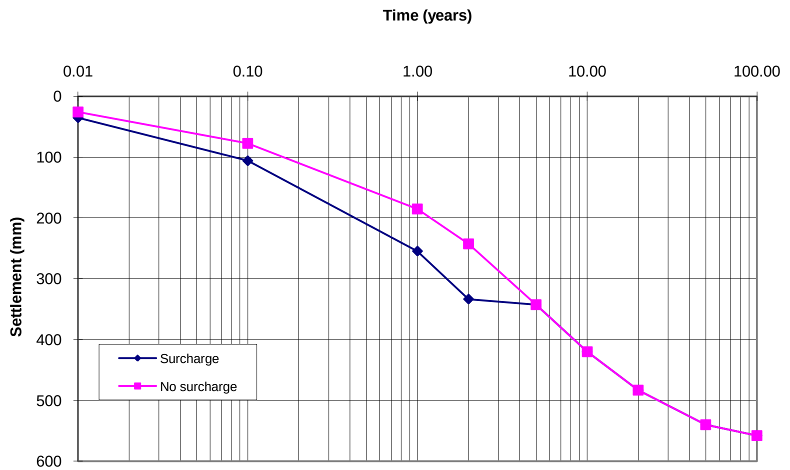
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 105

Fill Height	10.2 (m)	**Depth of Surcharge (ΔH)**	5	m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2	years
		$\gamma_{surcharge}$	16.7	kN/m^3
		γ_{fill}	20	kN/m^3
		Construction Period	2	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.6	0.6	31.53	0.0039		50	1	0		1	1	1	1	1	1	1	1	1
2	Sand	2.86	2.26	5.13	0.0241		20	17	0		4	12	17	17	17	17	17	17	17
3	Clay	3.78	0.92	2.18	0.0682		3	19	0		4	13	19	19	19	19	19	19	19
4	Sand	4.78	1	2.25	0.0550		10	17	0		6	16	17	17	17	17	17	17	17
5	Clay	8.32	3.54	1.76	0.0844		2	92	5		4	13	41	58	81	90	92	92	92
6	Clay	16	7.68	1.25	0.1189		1	280	50		4	13	41	58	92	130	182	252	277
7	Clay	16.7	0.7	3.75	0.0396		1	9	0		1	4	8	9	9	9	9	9	9
8	Clay	20.64	3.94	0.96	0.1934		1	234	13		7	21	67	95	148	195	226	234	234
9	Clay	23.24	2.6	2.6	0.0572		1	46	6		2	6	20	28	40	45	46	46	46
10	Clay	26	2.76	2.2	0.0675		1	57	6		2	7	23	33	48	55	57	57	57
11																			
							Totals	770			35	106	255	334	471	577	664	742	767



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	35	106	255	334	471	577	664	742	767
Total St without ΔH	26	77	185	243	343	420	483	540	558
Post Construction St with ΔH	0	0	0	0	138	244	330	409	433
Post Construction St without ΔH	0	0	0	0	100	178	240	297	315
Settlement after Surcharge Removal	35	106	255	334	343	420	483	540	558

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

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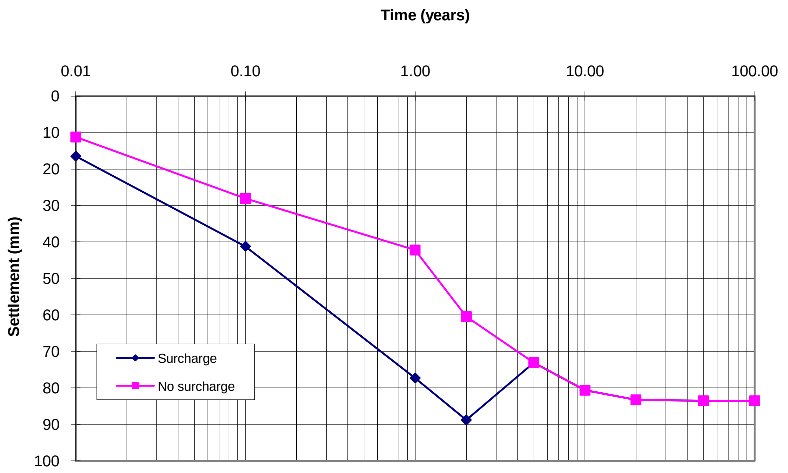
Geotechnics • Environment • Groundwater

Project: AREA 1 GLENLEE EMPLACEMENT
Client : SADA SERVICES PTY LTD

Project No: 40950.05
CPT: 106

Fill Height	7.9 (m)	**Depth of Surcharge (ΔH)**	5 m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2 years
		$\gamma_{surcharge}$	16.7 kN/m^3
		γ_{fill}	20 kN/m^3
		Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	3.66	3.66	8.19	0.0151		20	14	1		2	6	14	14	14	14	14	14	14
2	Clay	4.22	0.56	1.71	0.0869		2	13	0		4	11	13	13	13	13	13	13	13
3	Sand	5.32	1.1	8	0.0155		20	4	0		2	4	4	4	4	4	4	4	4
4	Sand	6.62	1.3	17.79	0.0070		20	2	0		1	2	2	2	2	2	2	2	2
5	Clay	6.92	0.3	3.02	0.0492		2	4	0		2	4	4	4	4	4	4	4	4
6	Sand	7.72	0.8	15.7	0.0079		20	2	0		1	2	2	2	2	2	2	2	2
7	Clay	8.06	0.34	3.55	0.0419		2	4	0		2	4	4	4	4	4	4	4	4
8	Sand	9.2	1.14	12.03	0.0103		20	3	0		1	3	3	3	3	3	3	3	3
9	Clay	10.5	1.3	10.54	0.0141		2	5	1		1	2	5	5	5	5	5	5	5
10	Clay	15.2	4.7	5.36	0.0277		2	34	9		1	4	12	16	25	31	34	34	34
11	Clay	18	2.8	2.88	0.0516		1	38	7		0	0	15	21	31	36	38	38	38
							Totals	**123**			**16**	**41**	**77**	**89**	**107**	**119**	**122**	**123**	**123**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	16	41	77	89	107	119	122	123	123
Total St without ΔH	11	28	42	60	73	81	83	84	84
Post Construction St with ΔH	0	0	0	0	19	30	34	34	34
Post Construction St without ΔH	0	0	0	0	13	20	23	23	23
Settlement after Surcharge Removal	16	41	77	89	73	81	83	84	84

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

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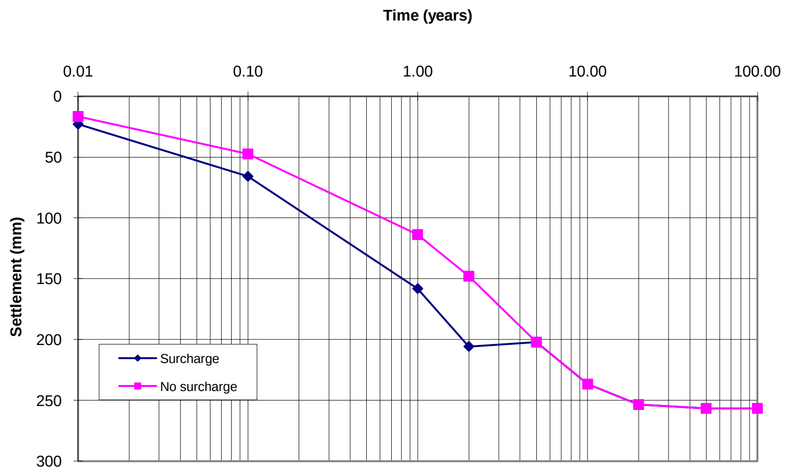
Project: AREA 1 GLENLEE EMPLACEMENT
Client : SADA SERVICES PTY LTD

Project No: 40950.05
CPT: 107

Fill Height	9.7 (m)	**Depth of Surcharge (ΔH)**	5 m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2 years
		$\gamma_{surcharge}$	16.7 kN/m^3
		γ_{fill}	20 kN/m^3
		Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	2.24	2.24	25.38	0.0049		50	3	0		1	3	3	3	3	3	3	3	3
2	Sand	9.26	7.02	3.14	0.0394		10	82	4		4	13	42	58	77	82	82	82	82
3	Clay	12.74	3.48	1.37	0.1085		1	112	10		4	11	36	51	79	100	110	112	112
4	Sand	16.08	3.34	7.06	0.0175		10	17	1		2	6	16	17	17	17	17	17	17
5	Clay	16.28	0.2	1.6	0.0929		1	6	0		3	6	6	6	6	6	6	6	6
6	Sand	17.26	0.98	32.58	0.0038		20	1	0		1	1	1	1	1	1	1	1	1
7	Clay	22.68	5.42	6.46	0.0230		3	37	8		1	4	13	19	28	35	37	37	37
8	Clay	23.1	0.42	1.06	0.1402		1	17	0		5	14	17	17	17	17	17	17	17
9	Clay	27	3.9	2.11	0.0704		1	81	13		2	7	24	33	52	68	79	81	81
10																			
11																			
							Totals	**357**			**23**	**66**	**158**	**206**	**281**	**329**	**353**	**357**	**357**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	23	66	158	206	281	329	353	357	357
Total St without ΔH	16	47	114	148	202	237	254	257	257
Post Construction St with ΔH	0	0	0	0	75	124	147	151	151
Post Construction St without ΔH	0	0	0	0	54	89	106	109	109
Settlement after Surcharge Removal	23	66	158	206	202	237	254	257	257

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

Douglas Partners
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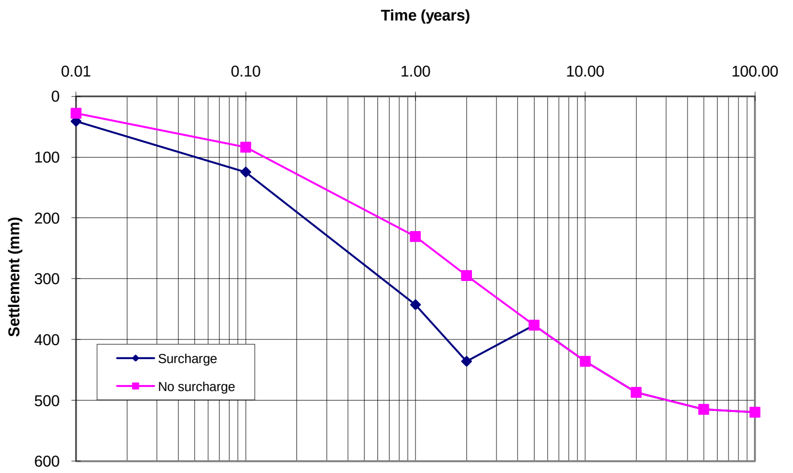
Project: AREA 1 GLENLEE EMPLACEMENT | **Project No:** 40950.05
Client : SADA SERVICES PTY LTD | **CPT:** 108

Fill Height	7.6	(m)
Applied Pressure	20	(kPa)
Depth of Surcharge (ΔH)	5	m
Time of Surcharge(Δt)	2	years
$\gamma_{surcharge}$	16.7	kN/m^3
γ_{fill}	20	kN/m^3
Construction Period	2	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	1	1	11.61	0.0107		100	3	0		3	3	3	3	3	3	3	3	3
2	Clay	2.04	1.04	0.64	0.2902	0.0050	2	77	0	5	12	37	76	79	81	82	84	86	87
3	Clay	8.48	6.44	0.99	0.1876		2	308	18		8	24	76	108	171	232	285	308	308
4	Clay	10.1	1.62	0.64	0.2902	0.0050	1	120	2	8	8	26	82	108	125	128	131	134	136
5	Clay	11.5	1.4	1.07	0.1389		1	50	2		4	13	38	46	50	50	50	50	50
6	Clay	15.3	3.8	3.53	0.0421		3	41	4		2	7	21	29	38	41	41	41	41
7	Clay	22.96	7.66	3.57	0.0416		2	81	25		2	5	17	24	38	53	69	80	81
8	Clay	25	2.04	1.47	0.1011		1	53	4		3	9	29	40	50	53	53	53	53
9																			
10																			
11																			
							Totals	733			41	125	343	436	555	641	715	754	759



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	41	125	343	436	555	641	715	754	759
Total St without ΔH	28	84	231	295	377	436	487	515	520
Post Construction St with ΔH	0	0	0	0	119	205	279	318	323
Post Construction St without ΔH	0	0	0	0	82	141	192	220	225
Settlement after Surcharge Removal	41	125	343	436	377	436	487	515	520

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
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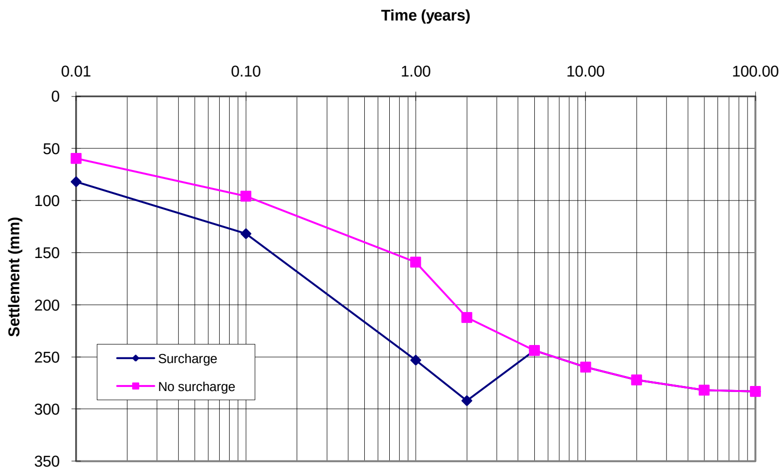
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 109

Fill Height 10.1 (m)
Applied Pressure 20 (kPa)

Depth of Surcharge (ΔH) 5 m
Time of Surcharge(Δt) 2 years
$\gamma_{surcharge}$ 16.67 kN/m³
γ_{fill} 20 kN/m³
Construction Period 2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Primary Consolidation Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.3	0.3	0.2	0.6190		100	57	0		57	57	57	57	57	57	57	57	57
2	Sand	3.86	3.56	30.96	0.0040		100	4	0		1	4	4	4	4	4	4	4	4
3	Sand	7.1	3.24	5.37	0.0231		10	23	1		3	8	21	23	23	23	23	23	23
4	Clay	8.78	1.68	2.98	0.0499		2	26	1		2	8	22	25	26	26	26	26	26
5	Sand	11.58	2.8	4.66	0.0266		10	23	1		3	9	22	23	23	23	23	23	23
6	Clay	13.58	2	1.72	0.0864		1	53	3		3	9	30	40	51	53	53	53	53
7	Sand	15.1	1.52	8.39	0.0148		10	7	0		2	5	7	7	7	7	7	7	7
8	Clay	17.3	2.2	4.29	0.0346		3	23	1		2	7	19	22	23	23	23	23	23
9	Clay	23.2	5.9	3.46	0.0429		1	77	30		1	5	15	21	33	46	62	75	77
10	Clay	23.52	0.32	0.8	0.2321		1	23	0		8	21	23	23	23	23	23	23	23
11	Clay	26	2.48	1.5	0.0991		1	75	5		0	0	34	48	67	74	75	75	75
							Totals	390			82	132	253	292	335	358	374	388	390



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	82	132	253	292	335	358	374	388	390
Total St without ΔH	60	96	159	212	244	260	272	282	283
Post Construction St with ΔH	0	0	0	0	43	66	83	96	98
Post Construction St without ΔH	0	0	0	0	32	48	60	70	71
Settlement after Surcharge Removal	82	132	253	292	244	260	272	282	283

Assumptions
1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
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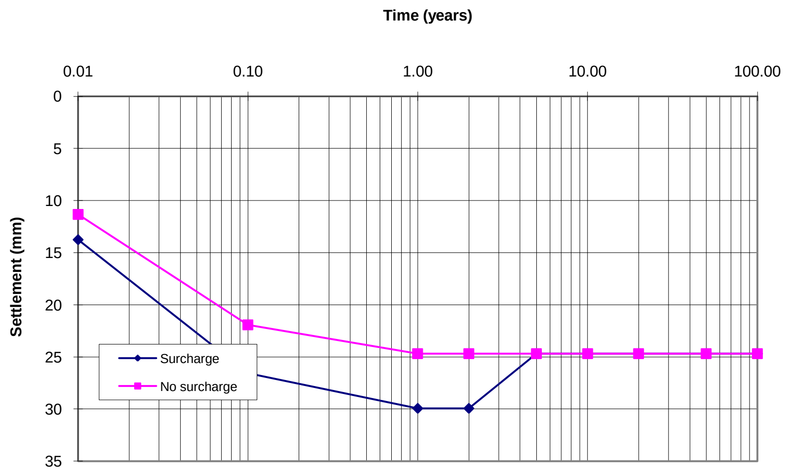
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 110

Fill Height	18.6 (m)	**Depth of Surcharge (ΔH)**	5	m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2	years
		$\gamma_{surcharge}$	16.7	kN/m^3
		γ_{fill}	20	kN/m^3
		Construction Period	2	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	1.3	1.3	16.24	0.0076		50	5	0		3	5	5	5	5	5	5	5	5
2	Sand	2.68	1.38	26.45	0.0047		50	3	0		2	3	3	3	3	3	3	3	3
3	Sand	4.12	1.44	15.7	0.0079		100	5	0		4	5	5	5	5	5	5	5	5
4	Sand	5.34	1.22	30.26	0.0041		20	2	0		1	2	2	2	2	2	2	2	2
5	Sand	6.22	0.88	10.04	0.0123		10	5	0		2	5	5	5	5	5	5	5	5
6	Sand	7.9	1.68	10.77	0.0115		10	9	0		2	6	9	9	9	9	9	9	9
7																			
8																			
9																			
10																			
11																			
							Totals	30			14	27	30	30	30	30	30	30	30



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	14	27	30	30	30	30	30	30	30
Total St without ΔH	11	22	25	25	25	25	25	25	25
Post Construction St with ΔH	0	0	0	0	0	0	0	0	0
Post Construction St without ΔH	0	0	0	0	0	0	0	0	0
Settlement after Surcharge Removal	14	27	30	30	25	25	25	25	25

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
Checked:

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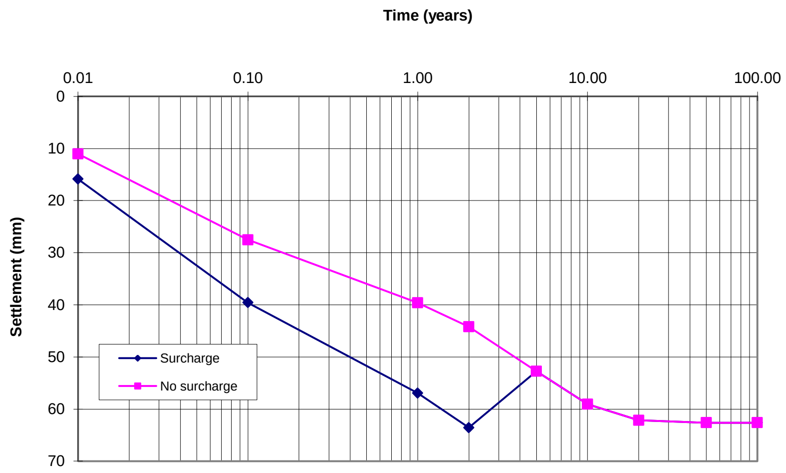
Geotechnics • Environment • Groundwater

Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 216

Fill Height	8.533 (m)		Depth of Surcharge (ΔH)	5 m
Applied Pressure	20 (kPa)		Time of Surcharge(Δt)	2 years
			$\gamma_{surcharge}$	16.7 kN/m^3
			γ_{fill}	20 kN/m^3
			Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Primary Consolidation Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.81	0.81	43.1	0.0029		50	1	0		1	1	1	1	1	1	1	1	1
2	Sand	1.88	1.07	10.33	0.0120		20	4	0		2	3	4	4	4	4	4	4	4
3	Sand	2.7	0.82	4.71	0.0263		20	6	0		4	6	6	6	6	6	6	6	6
4	Clay	3.22	0.52	1.82	0.0816		1	12	0		3	8	12	12	12	12	12	12	12
5	Sand	5.04	1.82	6.77	0.0183		20	9	0		3	7	9	9	9	9	9	9	9
6	Sand	6.54	1.5	5.04	0.0246		20	10	0		3	9	10	10	10	10	10	10	10
7	Clay	10	3.46	2.87	0.0518		1	49	10		2	5	16	23	35	44	48	49	49
							Totals	90			16	40	57	64	76	85	89	90	90



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	16	40	57	64	76	85	89	90	90
Total St without ΔH	11	28	40	44	53	59	62	63	63
Post Construction St with ΔH	0	0	0	0	12	21	26	26	26
Post Construction St without ΔH	0	0	0	0	9	15	18	18	18
Settlement after Surcharge Removal	16	40	57	64	53	59	62	63	63

Assumptions
1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

Date: 28/03/2011
Calculated:
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Douglas Partners
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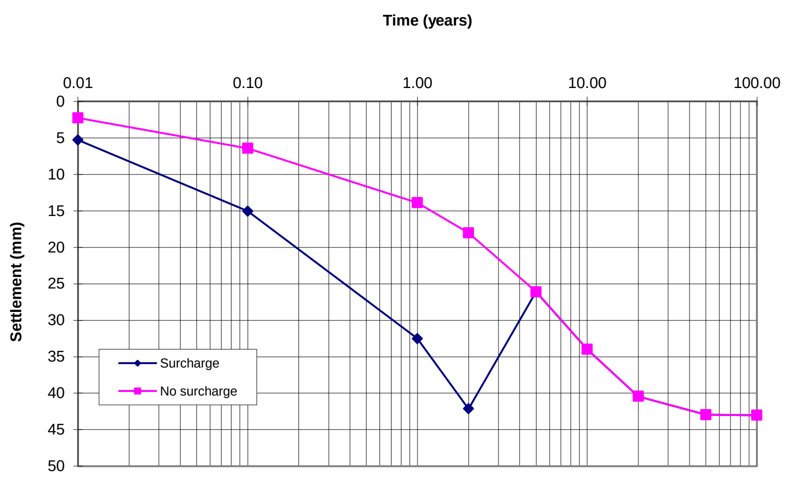
Project: AREA 1 GLENLEE EMPLACEMENT | **Project No:** 40950.05
Client : SADA SERVICES PTY LTD | **CPT:** 217

Fill Height	2.743 (m)	Depth of Surcharge (ΔH)	6	m
Applied Pressure	20 (kPa)	Time of Surcharge(Δt)	2	years
		$\gamma_{surcharge}$	16.7	kN/m^3
		γ_{fill}	20	kN/m^3
		Construction Period	2	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	0.01	0.1	1	2	5	10	20	50	100
1	Sand	1.54	1.54	14.8	0.0084		50	2	0		1	2	2	2	2	2	2	2	2
2	Clay	2.16	0.62	2.29	0.0649		2	7	0		2	5	7	7	7	7	7	7	7
3	Sand	22	19.84	4.71	0.0263		20	91	17		2	7	23	33	52	70	85	91	91
							Totals	101			5	15	33	42	61	79	95	100	101

Settlement under surcharge at t years (mm) applies to columns 0.01–100.



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	5	15	33	42	61	79	95	100	101
Total St without ΔH	2	6	14	18	26	34	40	43	43
Post Construction St with ΔH	0	0	0	0	19	37	52	58	58
Post Construction St without ΔH	0	0	0	0	8	16	22	25	25
d Settlement after Surcharge Removal	5	15	33	42	26	34	40	43	43

Assumptions
1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

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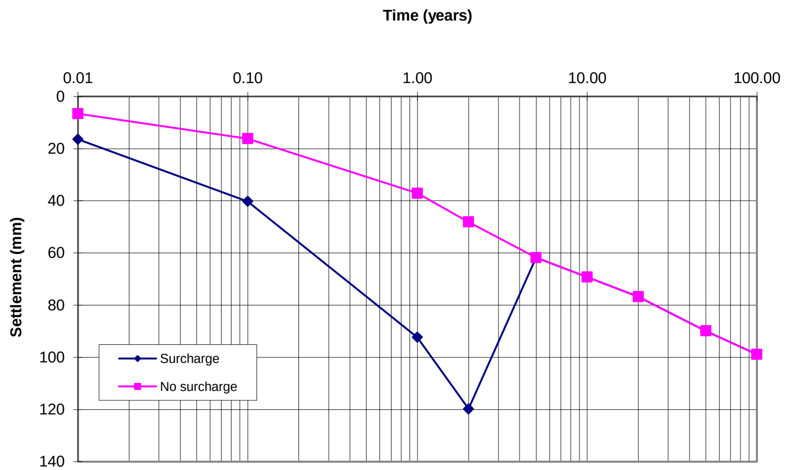
Project: AREA 1 GLENLEE EMPLACEMENT
Client : SADA SERVICES PTY LTD

Project No: 40950.05
CPT: 218

Fill Height	1.803 (m)	**Depth of Surcharge (ΔH)**	5 m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	2 years
		$\gamma_{surcharge}$	16.7 kN/m^3
		γ_{fill}	20 kN/m^3
		Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.84	0.84	12.86	0.0096		50	1	0		1	1	1	1	1	1	1	1	1
2	Clay	3.48	2.64	0.95	0.1955		2	72	3		4	14	43	58	70	72	72	72	72
3	Sand	4.18	0.7	1.71	0.0724		20	7	0		5	7	7	7	7	7	7	7	7
4	Clay	6.71	2.53	1.31	0.1134		1	40	5		2	6	18	25	35	39	40	40	40
5	Sand	8.26	1.55	2.91	0.0425		20	9	0		3	8	9	9	9	9	9	9	9
6	Clay	23	14.74	2.4	0.0619		2	127	92		1	4	14	20	31	44	62	94	117
							Totals	**257**			**16**	**40**	**92**	**120**	**154**	**172**	**191**	**224**	**246**

(Columns 0.01 to 100: Settlement under surcharge at t years (mm))



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	16	40	92	120	154	172	191	224	246
Total St without ΔH	7	16	37	48	62	69	77	90	99
Post Construction St with ΔH	0	0	0	0	34	53	71	104	126
Post Construction St without ΔH	0	0	0	0	14	21	29	42	51
l Settlement after Surcharge Removal	16	40	92	120	62	69	77	90	99

Assumptions
1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

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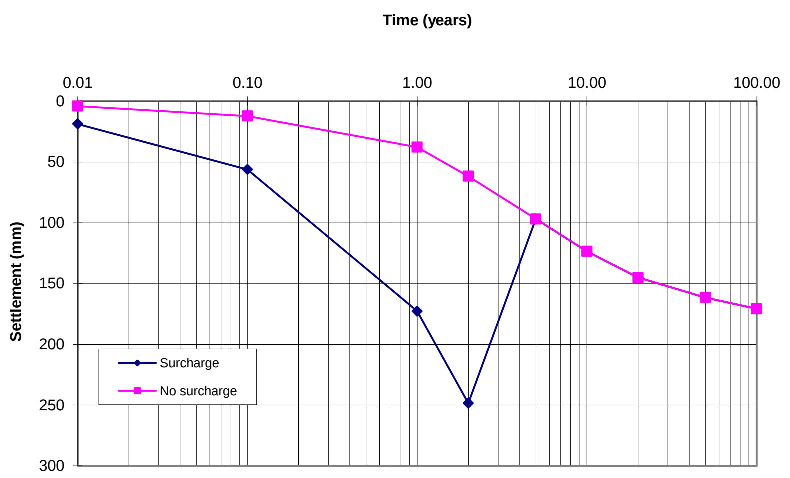
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 219

Fill Height	0.170 (m)		**Depth of Surcharge (ΔH)**	5 m
Applied Pressure	20 (kPa)		**Time of Surcharge(Δt)**	2 years
			$\gamma_{surcharge}$	16.7 kN/m^3
			γ_{fill}	20 kN/m^3
			Construction Period	2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.98	0.98	5.91	0.0209		50	2	0		2	2	2	2	2	2	2	2	2
2	Clay	2.93	1.95	0.43	0.5758	0.0050	1	120	3	10	7	22	69	96	123	130	133	137	140
3	Clay	7.21	4.28	0.35	0.7074	0.0050	1	324	16	21	9	27	85	127	205	277	334	360	366
4	Sand	23	15.79	4.17	0.0297		20	50	11		2	5	16	23	35	44	49	50	50
							Totals	**496**			**19**	**56**	**173**	**248**	**365**	**453**	**518**	**549**	**558**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	19	56	173	248	365	453	518	549	558
Total St without ΔH	4	12	38	62	97	124	145	161	171
Post Construction St with ΔH	0	0	0	0	117	205	270	300	310
Post Construction St without ΔH	0	0	0	0	35	62	83	100	109
l Settlement after Surcharge Removal	19	56	173	248	97	124	145	161	171

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

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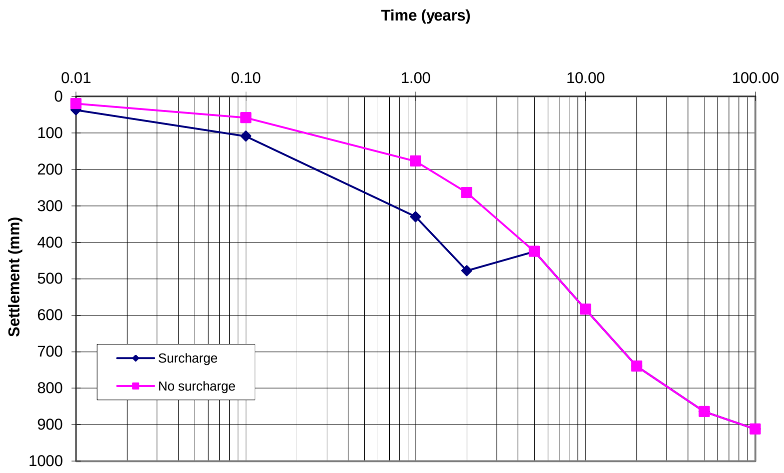
Project: AREA 1 GLENLEE EMPLACEMENT **Project No:** 40950.05
Client : SADA SERVICES PTY LTD **CPT:** 220

Fill Height 3.9 (m)
Applied Pressure 20 (kPa)

Depth of Surcharge (ΔH) 5 m
Time of Surcharge(Δt) 2 years
$\gamma_{surcharge}$ 16.7 kN/m^3
γ_{fill} 20 kN/m^3
Construction Period 2 years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	1.05	1.05	9.98	0.0124		50	2	0		2	2	2	2	2	2	2	2	2
2	Sand	1.76	0.71	3.23	0.0383		20	5	0		3	5	5	5	5	5	5	5	5
3	Clay	5.91	4.15	0.35	0.7074	0.0050	1	531	15	21	14	46	144	210	335	449	533	566	572
4	Clay	11.5	5.59	0.32	0.7738	0.0050	1	782	26	28	16	50	158	232	372	522	687	817	837
	clay	25	13.5	1.47	0.1011		1	247	155		2	7	21	29	46	65	92	145	195
							Totals	1566			37	109	330	478	761	1043	1320	1535	1612



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	37	109	330	478	761	1043	1320	1535	1612
Total St without ΔH	20	59	178	264	425	584	739	864	912
Post Construction St with ΔH	0	0	0	0	282	565	842	1057	1134
Post Construction St without ΔH	0	0	0	0	161	320	475	600	648
Settlement after Surcharge Removal	37	109	330	478	425	584	739	864	912

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

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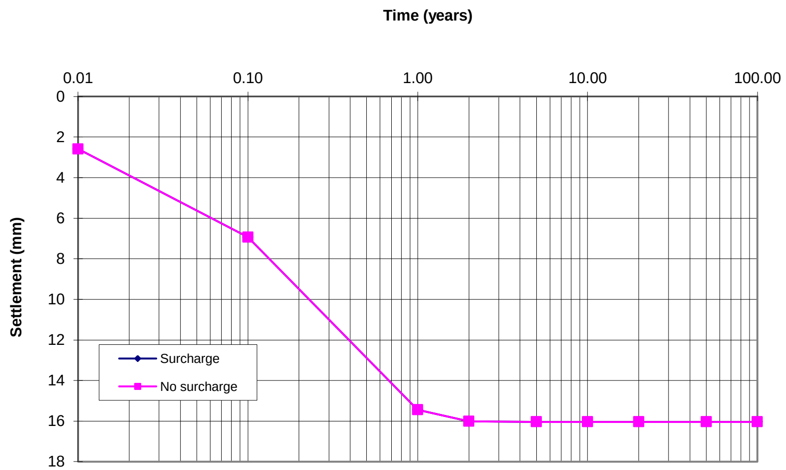
Project: AREA 1 GLENLEE EMPLACEMENT | **Project No:** 40950.05
Client : SADA SERVICES PTY LTD | **CPT:** 222

Fill Height	3.386 (m)	**Depth of Surcharge (ΔH)**	0	m
Applied Pressure	20 (kPa)	**Time of Surcharge(Δt)**	0	years
		$\gamma_{surcharge}$	16.7	kN/m^3
		γ_{fill}	20	kN/m^3
		Construction Period	0	years

Layer	Material	Depth to base (m)	Thickness (m)	CPT q_c (MPa)	Derived parameters m_v (m^2/MN)	c_α	c_v (m2/yr)	Primary Consolidation Settlement (mm)	Time (yrs)	Creep per log cycle (mm)	Settlement under surcharge at t years (mm) 0.01	0.1	1	2	5	10	20	50	100
1	Sand	0.12	0.12	3.46	0.0358		50	0	0		0	0	0	0	0	0	0	0	0
2	Sand	1.13	1.01	17.82	0.0069		20	1	0		0	1	1	1	1	1	1	1	1
3	Sand	5.18	4.05	2.93	0.0423		20	15	1		2	6	14	15	15	15	15	15	15
4	Sand	5.36	0.18	59.18	0.0021		20	0	0		0	0	0	0	0	0	0	0	0
							Totals	**16**			**3**	**7**	**15**	**16**	**16**	**16**	**16**	**16**	**16**



Settlement with Surcharge for t years then removed

Time	0.01	0.1	1	2	5	10	20	50	100
Total St with ΔH	3	7	15	16	16	16	16	16	16
Total St without ΔH	3	7	15	16	16	16	16	16	16
Post Construction St with ΔH	3	7	15	16	16	16	16	16	16
Post Construction St without ΔH	3	7	15	16	16	16	16	16	16
Settlement after Surcharge Removal	3	7	15	16	16	16	16	16	16

Assumptions

1: q_c is average cone value for each layer
2: coefficient of compressibility m_v=0.7429/(α.qc) For sands α=6.
3: for clays α=3 for q_c<0.5, α=4 for q_c<1.0, α=5 for q_c>1.0
4: creep coefficient c_α=0.005 for very soft to firm clays
5: stress at depth = Applied pressure for 1D consolidation
6: settlement = m_v x σ_v x thickness
7: one way drainage for consolidation
8: coefficient of consolidation c_v from oedometer tests

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Appendix E

Spontaneous Combustion Report

SPONTANEOUS COMBUSTION TECHNICAL REPORT

SPONTANEOUS COMBUSTION ASSESSMENT OF BULLI SEAM COAL WASHERY REJECTS

CB3 MINE SERVICES TECHNICAL REPORT – 2015/TR030

PREPARED FOR DOUGLAS PARTNERS PTY LTD

OCTOBER, 2015

Prepared by Dr B Basil Beamish MAusIMM CP(Min) RPEQ No.12621

CB3 Mine Services Pty Ltd
Unit 3/20 Archerfield Road
Darra QLD 4076
Telephone: 07 3375 4100
b.beamish@cb3mineservices.com

ABN 68 161 264 580

EXECUTIVE SUMMARY

This report contains the results and analysis of spontaneous combustion testing of a coal washery rejects sample supplied by Douglas Partners.

SponComSIM™ (incubation) testing shows that under ideal conditions of critical thickness, ample continuous supply of oxygen and minimal heat dissipation, the coal washery rejects show no signs of self-heating and in fact there is a gradual temperature decrease from the initial start temperature due to evaporative cooling effects.

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1.0 INTRODUCTION

1.1 Spontaneous combustion testing

There are a number of spontaneous combustion tests documented in the literature that produce indices for rating the propensity of coal to spontaneously combust (Nelson and Chen, 2007). The more common ones that have gained wider use in the Australian and New Zealand coal industries are R_{70} self-heating rate, crossing point temperature (CPT), relative ignition temperature (RIT) and minimum self-heating temperature (SHT). The first three of these are available from laboratory testing that is offered in Australia. However, SHT is a calculated value from coal quality data using the original equation developed by Smith and Lazzara (1987) based on US coals, as this test is no longer offered by any laboratory.

All of the existing index parameters provide an indication of the intrinsic spontaneous combustion propensity of a particular coal using a classification scheme, but they do not provide any indication of the timeframe taken for coal spontaneous combustion issues to occur (incubation period). They also do not provide a proper risk evaluation of coal self-heating that takes into consideration the effects of extrinsic factors. The moderating influences of extrinsic factors such as in-mine ambient temperature and moisture (both in the coal and the surrounding environment) have been recognised and studied by Hodges and Hinsley (1964), Guney (1971) and Smith and Lazzara (1987) using adiabatic oven testing. From these early studies it is clear that the entire coal self-heating behaviour from low ambient temperature to thermal runaway can only be fully assessed by simulating in-mine conditions. Recent investigations by Beamish and Beamish (2012a,b) have shown how this can be achieved by benchmarking against known coal self-heating experience from operating mines and built stockpiles. Beamish *et al* (2012) and Beamish and Theiler (2015) provide working examples of the success of this new technique.

1.2 Scope of the work

Douglas Partners sought to establish the spontaneous combustion propensity of coal washery rejects from Bulli Seam operations. The following scope of testing was developed and performed using the most appropriate test procedures identified to achieve the spontaneous combustion assessment of the sample:

1. SponComSIM™ (incubation) testing of the coal washery rejects to establish the time to thermal runaway (minimum incubation period) if it occurred and to compare against previous results for benchmark coals.
2. Coal quality analysis (proximate, ultimate and calorific value) of the sample to assist with interpretation of testing results and to calculate values for minimum self-heating temperature (SHT) and crossing point temperature (CPT), where applicable.

2.0 METHODOLOGY

2.1 Samples

The sample reference number and corresponding sample details supplied are contained in Table 1. The sample was supplied in a sealed bag and testing was commenced upon receipt of the sample.

Table 1
Sample supplied by Douglas Partners for spontaneous combustion testing

DP Reference Number	Coal Name	Sample	Coal Analysis Reference Number	Test Reference Number
40950.09	Bulli Seam	Coal Washery Rejects	108/472	DGPCWR1S

S = SponComSIM™ test

2.2 Adiabatic oven SponComSIM™ test procedure

This test is designed to replicate true coal self-heating behaviour from low ambient temperature. As such, the normal in-mine temperature is used as the starting point for the test. The nature of the test also assumes that in the real operational situation there is a critical coal pile thickness present that minimises any heat dissipation (represented by the adiabatic oven testing environment) and there is a sufficient supply of oxygen present to maintain the oxidation reaction. A larger sample mass and lower oxygen flow rate is used, compared to the R_{70} test method, to produce conditions that more closely match reality. The coal sample either reaches thermal runaway, or begins to lose heat due to insufficient coal intrinsic reactivity to overcome heat loss from moisture evaporation and/or heat sink effects from non-reactive mineral matter. As the coal is tested with its as-received moisture content, for some coals this may produce a prolonged temperature shoulder on the way to thermal runaway. This feature of the coal self-heating is not identified by the older R_{70} test, which only measures the coal intrinsic spontaneous combustion propensity on a dry basis.

2.3 Coal rank analysis procedure

Suggate (2000, 1998) demonstrated the applicability of the Suggate rank parameter to both New Zealand and Australian coals. This parameter is determined from either the calorific value and volatile matter of the coal expressed on a dry mineral matter and sulphur free basis (dmmsf), or the atomic O/C and H/C of the coal expressed on a mineral matter free basis. The simpler of these two approaches is to use the calorific value and volatile matter data. This has been done in this report using a purpose-built spreadsheet to generate the Suggate rank plots. In addition, the ASTM rank has been calculated using equations contained in the COALAP computer program developed by Sykes and Suggate (1990).

2.4 Minimum self-heating temperature analysis procedure

In the 1980s the US Bureau of Mines had an active research team working on coal spontaneous combustion issues. A test method was developed that produced an index parameter for spontaneous combustion propensity called Minimum Self-heating Temperature (SHT). This index parameter was found to be related to the coal oxygen content (O, % dry, ash-free basis) according to the following equation (Smith and Lazzara, 1987):

$$\text{SHT } (^{\circ}\text{C}) = 139.74 - 6.57 \times \text{O}$$

To account for the increased (or decreased) reactivity of a coal due to ambient in-mine temperatures, the value for the minimum SHT determined from the equation can be adjusted based on the ambient in-mine temperature of the coal. A value of 12.8 ºC (55 ºF) is used as the baseline in-mine temperature (Smith, Rumancik and Lazzara, 1996):

$$\text{SHT}_{adj} \ (^{\circ}\text{C}) = [\text{SHT} - (\text{T}_{ambient} - 12.8)]$$

According to Smith, Rumancik and Lazzara (1996) coals with adjusted SHT’s <70 ºC are rated as having a high spontaneous combustion propensity, while those with adjusted SHT’s > 100 ºC are rated as having a low spontaneous combustion propensity. Coals with adjusted SHT’s between 70 and 100 ºC are rated as having a medium spontaneous combustion propensity.

Beamish and Beamish (2012a) found that for a range of Australian coals the high intrinsic spontaneous combustion propensity boundary should be increased to 80 ºC using the original Smith and Lazzara equation for SHT. Therefore, the Smith and Lazzara (1987) equation and the modified boundary are applied to the samples in this report.

2.5 Crossing point temperature analysis procedure

The determination of crossing point and relative ignition temperatures (CPT and RIT) follows a similar methodology (Banerjee, 1985). Both tests use an oven heated at a fixed rate (usually 2 ºC/min) to drive the temperature of the coal to a point where the coal crosses over the oven temperature and rapidly progresses towards thermal runaway. This is substantially different to the adiabatic oven testing where the oven tracks the coal temperature as it reacts with oxygen. The lower the CPT or RIT value the higher the spontaneous combustion propensity of the coal.

Barve and Mahadevan (1994) established that CPT values can be calculated from coal quality data based on the moisture content (M, air-dried basis) and the ash content (A, dry basis) of the coal. They proposed a separate equation for bituminous coals in general and a more specific equation for high volatile bituminous coals:

General CPT equation for bituminous coals

$$CPT\ (^{o}C) = 168.8 - 10.3 \times M + 0.12 \times A + 0.69 \times M^2 - 0.06 \times M \times A + 0.01 \times A^2$$

CPT equation for high volatile bituminous coals

$$CPT\ (^{o}C) = 170 - 5.16 \times M - 2.8 \times A - 0.005 \times M^2 + 0.28 \times M \times A + 0.02 \times A^2$$

Banerjee *et al* (1972) determined that coals with CPT values less than 140 ºC are generally considered to have a high intrinsic spontaneous combustion propensity, those within the range of 140 ºC to 160 ºC have a medium intrinsic spontaneous combustion propensity, and coals with CPT values greater than 160 ºC have a low intrinsic spontaneous combustion propensity. However, more recent checks of each of the CPT equations for a range of Australian coals suggests that the boundaries should be set at 130 ºC for high propensity and 150 ºC for low propensity.

2.6 Thermal runaway analysis procedure

The self-heating behaviour of the coal recorded by the SponComSIM™ test is compared against the documented self-heating performance of a range of coals with known spontaneous combustion histories (incubation periods). Due to the nature of the moisture evolution that occurs during the coal self-heating, the time taken for the coal temperature to reach 100ºC is used as the key indicator of the coal to reach thermal runaway (t_{TR}). This value is obtained in laboratory hours and is converted to site days using the comparison with coals of known behaviour. The site days are expressed as a range rather than an exact value as it is impossible to project the outcome of a real event in exact terms. It should be noted that this analysis is for loosely piled coal such as that found in mine goaf areas, mine roof falls or temporary stockpiles that have not been compacted.

3.0 ANALYSIS OF RESULTS AND INTERPRETATION

3.1 Coal quality analysis and rank

Proximate analysis, ultimate analysis and calorific value determination was performed on the coal washery reject sample. A summary of the results obtained for the sample are contained in Table 2. The high ash content of the sample precludes any realistic rank determination and the high oxygen content is attributable to the presence of carbonate mineral matter. The low sulphur content of the sample provides assurance of the absence of any reactive pyrite.

Table 2
Analytical and calculated spontaneous combustion index data for coal washery rejects sample

	40950.09 108/472 DGPCWR1S
PROXIMATE ANALYSIS (air-dried basis)	
Moisture (%)	1.3
Ash (%)	64.5
Volatile Matter (%)	12.1
Fixed Carbon (%)	22.1
Calorific Value (MJ/kg)	9.16
ULTIMATE ANALYSIS (dry ash-free basis)	
Carbon (%)	76.3
Hydrogen (%)	5.40
Nitrogen (%)	1.30
Sulphur (%)	0.35
Oxygen (%)	16.6
CALCULATED SPONTANEOUS COMBUSTION INDEX PARAMETERS	
SHT (°C)	na
CPT (°C)[1]	202
CPT (°C)[2]	na

[1]General equation for bituminous coals; [2]Specific equation for high volatile bituminous coals

3.2 Minimum self-heating temperature and crossing point temperature analysis

The calculated minimum self-heating temperature value is not valid for this sample as it has an elevated oxygen content from the presence of carbonate mineral matter. The calculated crossing point temperature value of 202 ºC indicates the sample has a low spontaneous combustion propensity, which is consistent with the high ash content of the sample.

3.3 Thermal runaway analysis

Beamish and Beamish (2010, 2011 and 2012a,b) showed that the time taken for coal to reach thermal runaway (incubation period) under loosely piled conditions can be determined using a laboratory adiabatic testing technique that is benchmarked against known coal performance on site. This analysis has been applied to the coal washery rejects sample. The initial conditions for the test are contained in Table 3 and the self-heating curves are shown in Figure 1 compared with other benchmark coals. It should be noted that the moisture content of the test was a partially air-dried result and the as-received moisture of the sample was considerably higher at 9.2%. The sample had to be partially air-dried to enable it to be processed to the size fraction used for testing.

Table 3 SponComSIM™ test conditions

Sample	Initial temperature (°C)	Moisture content (%)	Ash content (%)
40950.09	24.6	4.2	62.9

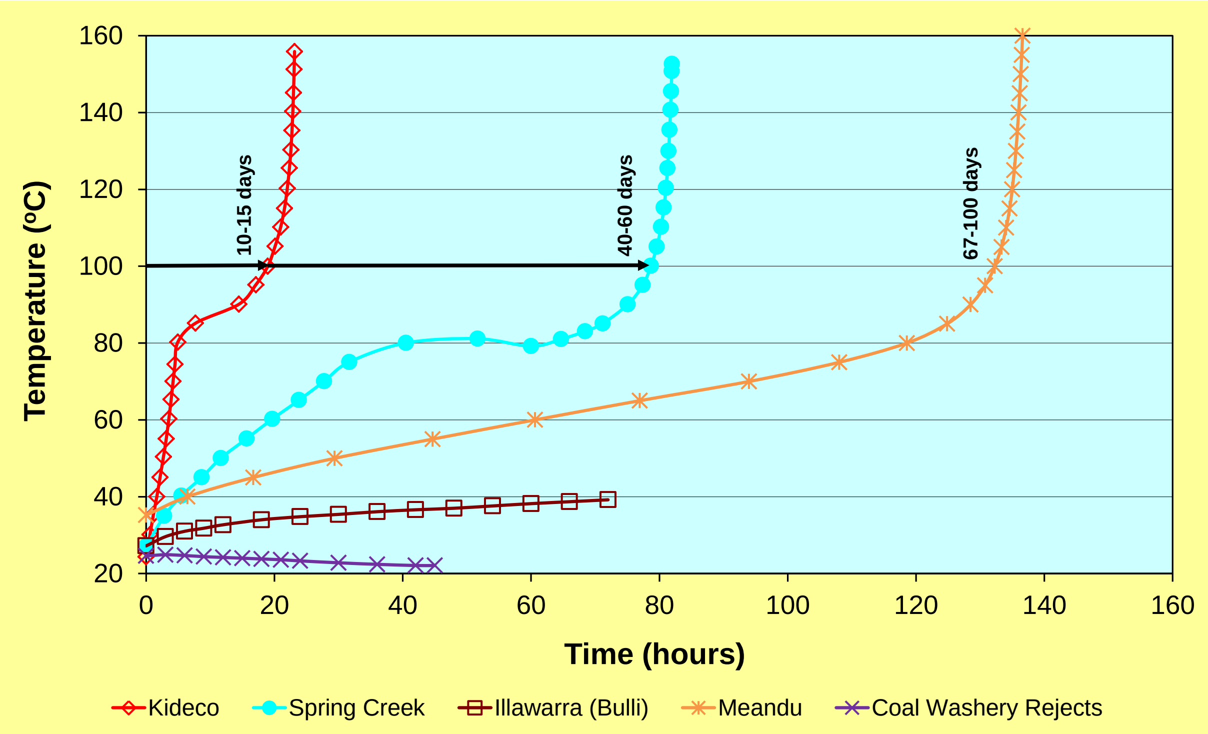

Figure 1. SponComSIM™ test results for coal washery rejects sample compared against coals with known self-heating behaviours. Note the relative timescale comparing projected minimum days to thermal runaway (minimum incubation period) for loosely piled coal found in coal roof falls and uncompacted stockpiles is also shown for the benchmark coals.

The sample shows no signs of self-heating from the initial starting temperature, with a steady decrease in temperature as the test progressed due to a moderate evaporative cooling effect from the moisture present in the sample. In the as-received moisture state it would be expected that the temperature decrease from evaporative cooling could be even greater, until a new equilibrium is reached in-situ.

4.0 EVALUATION OF SPONTANEOUS COMBUSTION RISK FACTORS

4.1 Introduction

A comparison against spontaneous combustion propensities of coals from various mines has been presented in section 3.3 of this report. However, to establish an overall site specific risk of spontaneous combustion it is necessary to take into consideration the physical properties of the coal rejects as well as the site factors related to handling and storage. This is emphasised by way of stockpile examples in Figures 2 and 3 that show loosely formed coal piles with steep sides and coarse coal near the base, which is a poor combination in terms of spontaneous combustion management where the surrounding environmental conditions favour heat gain over heat dissipation.

Figure 2. Enclosed stockpile storage of Kideco coal showing no compaction except from the weight of the stockpile and steep sides at angle of repose with coarse coal fraction accumulated at the base of the stockpile allowing pathways for air to enter the stockpile and create a chimney effect. Note the moisture condensation lines within the rectangular zone arising from hot spot development inside the pile. Thermal runaway reached in 10-15 days.

Figure 3. Coal heating developed in uncompacted stockpile with steep sides (angle of repose) and coarse coal fraction accumulated at the base of the stockpile allowing pathways for air to enter the stockpile and create a chimney effect. The hotspot has migrated from inside the stockpile to daylight on the surface and reach ignition.

4.2 Coal physical properties and site factors

Production of coal fines will enhance the reactivity of the coal through greater access of air to oxidation sites as a result of the increased surface area available for reaction to take place. The ease of fines production is a property of the coal, which is best measured by the Hardgrove Grindability Index (HGI) value.

Moisture effects on coal self-heating in a pile of broken coal (whether naturally formed underground by roof falls, or as part of goaf formation or surface built stockpiles) are two-fold. In the case of low-moisture content coals, the maximum temperature increases steadily with time. In the case of high-moisture coals, temperature increases rapidly initially before evaporation dominates and the temperature reaches a plateau value (generally around 80-90 °C). Once the coal becomes dry locally the temperature will increase rapidly towards thermal runaway. However, if the coal pile has been in a prolonged drying phase that is interrupted by a wetting or rain event and the water penetrates into the coal pile then additional heat can be generated from the "heat of wetting" effect as the coal re-adsorbs the moisture available to it. A similar effect is created by an increase in humidity, which can also lead to premature thermal runaway in the coal pile.

The coal ambient temperature also plays a major role in determining the initial coal self-heating rate. The R_{70} test is performed at 40 °C to compare all coals on a standard basis. This temperature is more closely aligned with Queensland coals for which the test was originally developed (Humphreys, Rowlands and Cudmore, 1981) and is indicative of underground or summer temperatures in the Bowen Basin. For coal ambient temperatures at least 10 °C lower than this, the initial self-heating rate of the coal will be greatly diminished (approximately halved). This increases the timeframe for any hot spot to develop assuming ideal conditions exist to allow heat to accumulate in broken coal. The converse is also true.

Arisoy and Akgun (2000) showed that for different coal reactivities there was a critical pile thickness necessary for coal self-heating to develop to a stage where spontaneous combustion was inevitable after three months. This thickness varied between 0.85 and 1.8m for coals with high reactivities and medium reactivities respectively. More recent work by Akgun and Essenhigh (2001) also showed that where coal pile heights exceeded 2 m, given sufficient time and other favourable conditions, coal self-heating leading to thermal runaway was inevitable.

There are two very important parameters that determine the rate at which a hot spot will develop in a broken coal pile. These are pile porosity and slope angle of the pile sides. Compaction decreases the pile porosity and thus increases the resistance to the airflow into the pile, which results in suppressing the oxidation reaction due to air starvation (Akgun and Essenhigh, 2001). As the slope of the coal pile sides decreases, the time to thermal runaway increases. Akgun and Essenhigh (2001) found that reducing the coal pile slope from 63° to 34° increased the time to thermal runaway by 100%. Hence, steep-sided coal piles create the biggest problem for coal self-heating, which normally initiates about 2 m in from the sides.

Air supply to broken coal is also a pre-requisite for self-heating to generate. In a closed environment, exclusion of air removes the issue. However, often some air leakage will occur. As a standard risk mitigation strategy, gas monitoring of the enclosed environment will normally provide confirmation of this, with any hot spot development showing as a change in the gas composition of the environment (for example abnormal increases in carbon monoxide or other spontaneous combustion gas indicators above the background trends).

Winmill (1915) performed a definitive study of the effect of varying the percentage of oxygen in air on the rate of oxygen absorption by crushed coal (<250 µm) at 30 °C and hence the rate at which reaction can take place. The results of this study (Figure 4) showed that the rate of oxygen absorption was proportional to the square-root of the oxygen percentage in the air. As such the rate of oxygen absorption dropped to just over half when the oxygen concentration decreased from 100% to 20.9% (normal air concentration) and when the oxygen concentration decreased to 5% the rate of oxygen absorption halved again. These findings emphasise the importance of keeping goaf areas airtight. Winmill (1915) also stated that “So long as the oxygen is below 2 per cent, it would seem that no coal has a sufficiently high rate of oxidation to cause any serious rise in temperature”.

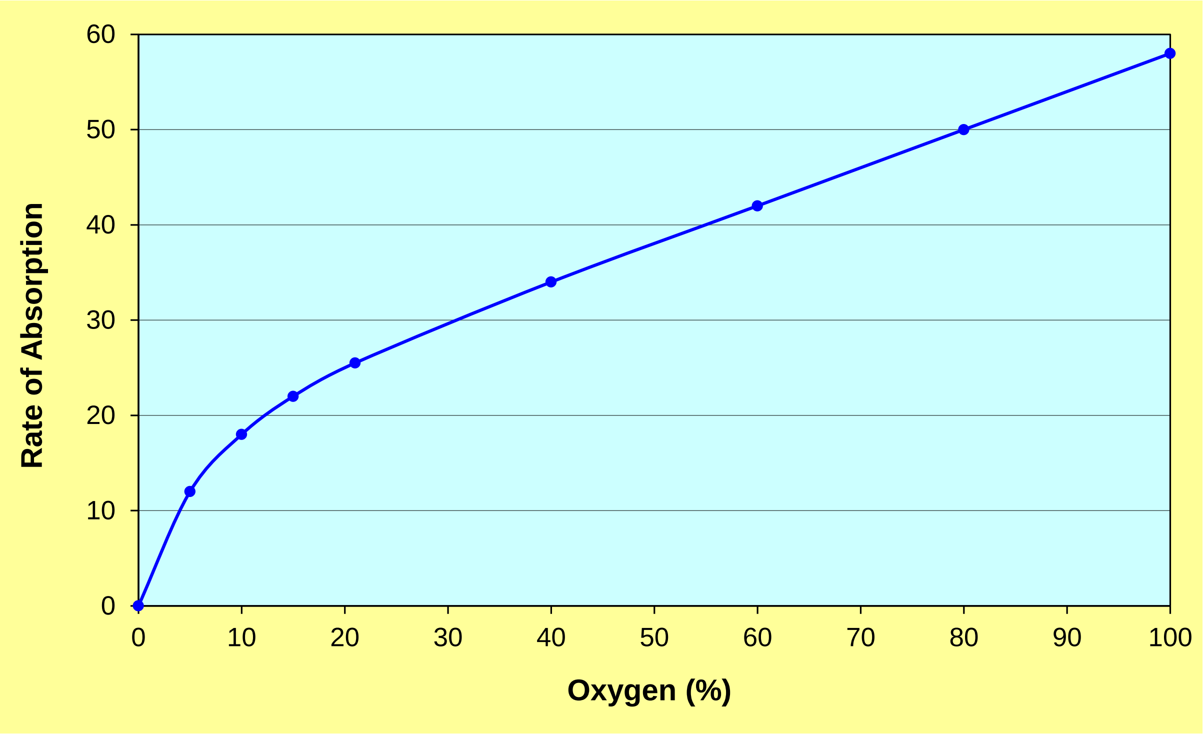

Figure 4. Relationship between oxygen concentration in air and oxygen absorption rate (note the rates of absorption are expressed in arbitrary units, since comparative figures only are required).

4.3 Preliminary risk assessment of site specific factors

4.3.1 General risk assessment methodology

Risk assessment is routinely used in the coal industry to develop plans that are appropriate to the management of hazards. Leading practice at all coal mines requires the implementation of a Principal Mining Hazard Management Plan for Spontaneous Combustion. The initial step in developing this plan should be to identify the root causes of an unwanted spontaneous combustion event. This can be achieved using the Fault Tree Analysis (FTA) risk assessment method. A generic example of the initial branches of a spontaneous combustion fault tree is shown in Figure 5. All of the factors discussed in this report can be incorporated into this fault tree to expand on each of the branches so that it represents the possible situation for operations in handling and storage of the coal washery rejects.

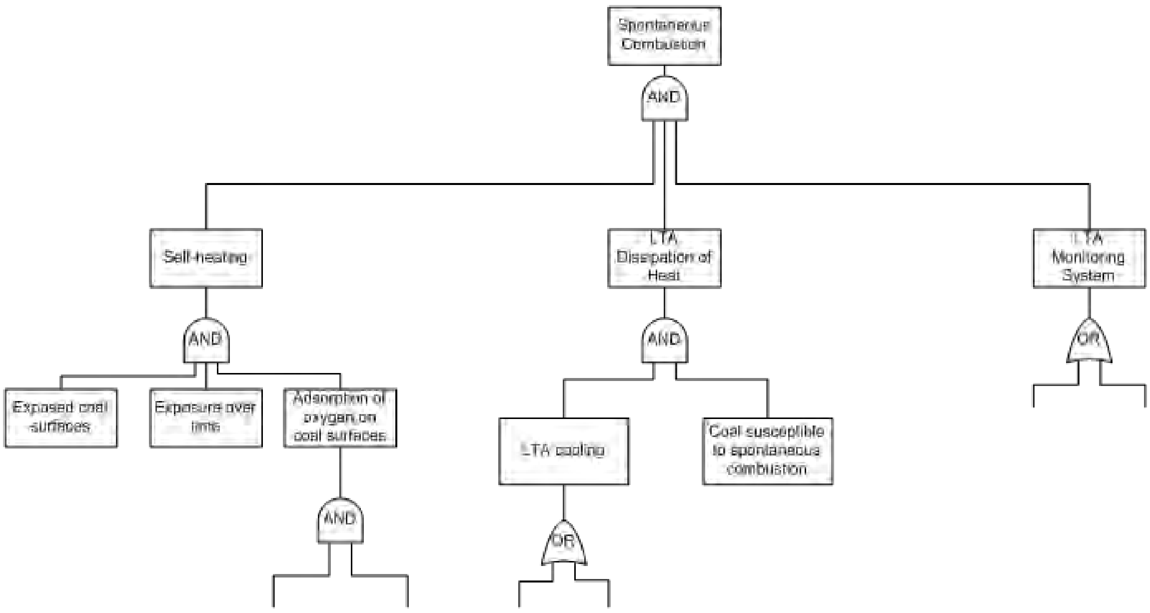

Figure 5. Partial spontaneous combustion fault tree showing possible causes leading to an unwanted event (modified from Beamish *et al*, 2010). Note: LTA = Less Than Adequate

4.3.2 Risk assessment of coal washery rejects emplacement heatings

Ambient and seasonal conditions combined with appropriate stockpile building management procedures (compaction) control stockpile performance behaviour. In winter the ambient conditions provide significant heat dissipation to the external atmosphere. In summer this cooling effect will be less and also humidity of the surrounding air can promote self-heating in a stockpile that has previously dried out.

Several stockpile geometrical features and properties can affect the propensity for spontaneous combustion. These are:

- Stockpile height – high uncompacted stockpiles help to create chimney effects, particularly if coarse particles segregate near the base of the pile;
- Stockpile porosity and permeability – sequential compaction helps to create resistance to airflow in the pile and reduce oxygen concentration;
- Stockpile slope angle – low slope angles reduce propensity due to a reduction in pressure gradient along the flow path of air into the pile; and
- Stockpile orientation – stockpiles oriented with their long-axis perpendicular to the prevailing wind direction increase propensity due to the greater surface area exposed to the higher air velocity enabling a continuous fresh air supply to penetrate the pile.

The geometrical factors can be controlled by an appropriate emplacement management plan. From a monitoring perspective, based on the test results obtained for the coal washery rejects, thermal imaging of the stockpile surface should show an initial temperature decrease from evaporative cooling until a new equilibrium is reached with the surroundings.

5.0 CONCLUSIONS

SponComSIM™ (incubation) testing has been applied to a coal washery rejects sample. The self-heating performance of the sample has been benchmarked against coals with known spontaneous combustion histories. Due to the low intrinsic reactivity of the sample (primarily related to the high mineral matter content) and the moisture content the coal washery rejects do not self-heat even under ideal adiabatic conditions.

6.0 RECOMMENDATIONS

Data on site performance of the coal washery rejects will be important in matching the laboratory results obtained. This should be incorporated as part of a review of successful emplacement.

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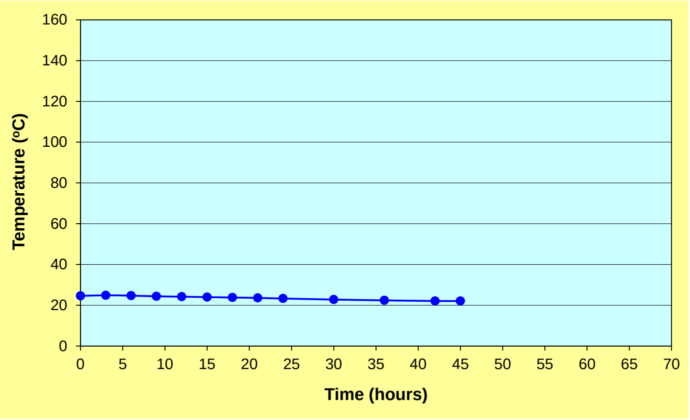
APPENDIX 1

ADIABATIC TESTING RESULTS FOR COAL WASHERY REJECTS SAMPLE

Douglas Partners

DGPCWR1S	40950.09	
Date prepared	1/10/2015	
Date on test	1/10/2015	
Moisture content	4.2	%
Time to thermal runaway (t_{TR})	nd	h
Loose coal pile lower t_{TR}	nd	days
Loose coal pile upper t_{TR}	nd	days

Coal Temp (°C)	Time (min)	Time (h)
24.6	0	0.00
24.9	180.00	3.00
24.7	360.00	6.00
24.4	540.00	9.00
24.2	720.00	12.00
24.0	900.00	15.00
23.8	1080.00	18.00
23.6	1260.00	21.00
23.3	1440.00	24.00
22.8	1800.00	30.00
22.4	2160.00	36.00
22.1	2520.00	42.00
22.1	2700.00	45.00



Appendix F

Results of Acid Producing Potential Testing

MINERAL RESOURCES

Environmental Geochemistry Services,
Environment Unit
New South Wales Department Of Mineral Resources
Cnr Joseph Street & Weeroona Road
(P.O. Box 76) Lidcombe, NSW 2141 Australia
Phone (+061 2) 9646 1344 Fax (+061 2) 9749 1405

FACSIMILE MESSAGE

DATE	~~[illegible]~~ 9/4/02	
TO:	R. Byrnes IEC	**PHONE:** **FAX:** 95990338

FROM: PAUL FREDRICKSON	**PHONE: 9646 1344**
ENVIRONMENTAL GEOCHEMISTRY SERVICES, LIDCOMBE	**FAX: 9749 1405**

RE: Testing on Coal Rejects

Number of pages including this page: 2

Final report on Solid Sample Characterisation

looks like (1) material has low saline leachate problem
(2) " negative NAPP
(3) low some trace metals contents in solid
(4) MEP shows increasing iron in leachate

MINERAL RESOURCES NEW SOUTH WALES

NSW DEPARTMENT OF MINERAL RESOURCES
Cnr Joseph Street & Weeroona Road
(P.O. Box 76), Lidcombe, NSW 2141 Australia
Environmental Geochemistry Services
Phone (02) 9646 1344 · Fax (02) 9749 1405

ENVIRONMENTAL GEOCHEMISTRY SERVICES

Client:	**International Environmental Consultants Pty Ltd**	Number of Samples:	**1**
Attention:	**Mr Robert Byrnes**	Sample Medium:	**Waste**
EGS Job Number:	**E02/0027**	Collected By:	**R Byrnes**
EGS Report Number:	**R022703E**	Date Received:	**11/02/02**
Your Reference:	**letter 7/1/2002**		

Certificate of Analysis

Sample Analysed As Received

Location: **_UNSPECIFIED**

EGS Sample No: 350 - 352

Sample Designation: **Coal Reject (-9.5mm, -2mm and pulv)**

Test	Result	Units	Method
Solid - pH, EC, Paste pH			
EC	185	uS/cm @ 25°C	LEACH-9512
pH	7.30	pH units	LEACH-9512
Solid - Anions			
Cl^-	<1	mg/L	CAT-IC-9804
NO_3^-	<1	mg/L	CAT-IC-9804
SO_4^-	5	mg/L	CAT-IC-9804
Solid - Characterisation			
Carbonate Carbon	0.21*	% C in CO_3	CO2-9605
Total Carbon*	19.7; 19.5	% C	/LECO
Sulphate Sulphur	<0.01	% S	AS-SO4-9811
Total Sulphur*	0.061; 0.055	%	/LECO
Acid Neutralizing Capacity	-5	kg H_2SO_4 / tonne	ANC-9812
Net Acid Producing Potential	-15 (-3)	kg H_2SO_4/ tonne	NAPP-9506

NOTES: Testing for pH, EC and anions were conducted on a 1:5 w/w solid:water leach solution of a - 2mm whole solid
Soil characterisation tests carried out on finely pulverised subsample of -2mm whole solid.
Net Acid Producing Potential (NAPP) = 30.6*(total S - sulphate S) - 81.6* carbonate C (or = 30.6*(total S - sulphate S) + ANC)

* Test by subcontract to ACIRL Ltd; Lab Report No. NML02-8828.
\# Tests by subcontract to Genalysis Services; Lab Report No. 595.0/0200806

See separate Genalysis Report 595.0/0200806 for test results for metals contents.
See separate EGS report R022703F for TCLP and MEP test results of -9.5mm sample.

K. A. Brooks
Principal Environmental Officer
Manager, Environmental Geochemistry Services
Enviromental Unit

Approved: 9/04/02

EGS Job Reference: E02/0027
EGS Report Number: R022703E

Mr Robert Byrnes
IEC
Suite 5002, 5th Floor
376 Bay St
Brighton-Le-Sands NSW 2216

MINERAL RESOURCES NEW SOUTH WALES

NSW DEPARTMENT OF MINERAL RESOURCES
Cnr Joseph Street & Weeroona Road
(P.O. Box 76), Lidcombe, NSW 2141 Australia
Environmental Geochemistry Services
Phone (02) 9646 1344 · Fax (02) 9749 1405

ENVIRONMENTAL GEOCHEMISTRY SERVICES

Client:	**International Environmental Consultants Pty Ltd**	Number of Samples:	**10**
EGS Job Reference:	**E02/0044**	Sample Medium:	**Water**
EGS Report Number:	**R022703F**	Collected By:	**D.M**
Your Reference:	**letter 7/1/2002**	Date Received:	**19/02/02**

Certificate of Analysis

Samples Analysed as Received

Report on Multiple Extraction Procedure (US EPA Method 1320)

COPY
Page 1 only

Sample Description EGS Sample No.	-- Method Code	--- Units	TCLP 489	MEP DAY 1 490	MEP DAY 2 491	MEP DAY 3 492	MEP DAY 4 493	MEP DAY 5 494
pH	PH-0001	pH Units	4.95	5.50	5.30	5.30	5.35	5.50
Iron (F/A)	WAT-AAS9801	mg/L	8.40	10	1.10	1.95	2.60	4.60
Manganese (F/A)	WAT-AAS9801	mg/L	0.35	<0.20	<0.20	<0.20	<0.20	<0.20
Lead (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Zinc (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	0.200	<0.100	0.150	0.100	0.450	0.100

Sample Description EGS Sample No.	-- Method Code	--- Units	MEP DAY 6 495	MEP DAY 7 496	MEP DAY 8 497	MEP DAY 9 498
pH	PH-0001	pH Units	5.60	5.05	5.35	5.40
Iron (F/A)	WAT-AAS9801	mg/L	6.60	9.00	9.60	11
Manganese (F/A)	WAT-AAS9801	mg/L	<0.20	<0.20	<0.20	0.20
Lead (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	<0.100	<0.100	<0.100	<0.100
Zinc (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	0.350	0.250	0.250	0.550

MINERAL RESOURCES NEW SOUTH WALES

NSW DEPARTMENT OF MINERAL RESOURCES
Cnr Joseph Street & Weeroona Road
(P.O. Box 76), Lidcombe, NSW 2141 Australia
Environmental Geochemistry Services
Phone (02) 9646 1344 · Fax (02) 9749 1405

ENVIRONMENTAL GEOCHEMISTRY SERVICES

Client:	**International Environmental Consultants Pty Ltd**	Number of Samples:	**1**
Attention:	**Mr Robert Byrnes**	Sample Medium:	**Waste**
EGS Job Number:	**E02/0027**	Collected By:	**R Byrnes**
EGS Report Number:	**R022703E**	Date Received:	**11/02/02**
Your Reference:	**letter 7/1/2002**		

Certificate of Analysis

Sample Analysed As Received

Location: **_UNSPECIFIED**

EGS Sample No: **350 - 352**

Sample Designation: **Coal Reject (-9.5mm, -2mm and pulv)**

Test	Result	Units	Method
Solid - pH, EC, Paste pH			
EC	185	uS/cm @ 25°C	LEACH-9512
pH	7.30	pH units	LEACH-9512
Solid - Anions			
Cl^-	<1	mg/L	CAT-IC-9804
NO_3^-	<1	mg/L	CAT-IC-9804
SO_4^-	5	mg/L	CAT-IC-9804
Solid - Characterisation			
Carbonate Carbon		% C in CO_3	CO2-9605
Total Carbon#	19.7, 19.5	% C	/LECO
Sulphate Sulphur	<0.01	% S	AS-SO4-9811
Total Sulphur#	0.061; 0.055	%	/LECO
Acid Neutralizing Capacity	-5	kg H_2SO_4 / tonne	ANC-9812
Net Acid Producing Potential		kg H_2SO_4/ tonne	NAPP-9506

NOTES: [NA] - Not Applicable; [NT] - Not Tested; [IS] - Insufficient Sample; [X] - Below detectable limit; [F/A] - Filtered Acidified

Testing for pH, EC and anions were conducted on a 1:5 w/w solid:water leach solution of the sample reduced to minus 2mm. Soil characterisation tests carried out on finely pulverised subsample.

Tests by subcontract to Genalysis Services.. Lab Report No. 595.0/0200806

See separate Genalysis Report 595.0/0200806 for test results for metals contents.

See separate EGS report R022703F for TCLP and MEP test results of -9.5mm sample.

K. A. Brooks
Principal Environmental Officer
Manager, Environmental Geochemistry Services
Enviromental Unit

Approved: 26/03/02 (Interim Report Date)

EGS Job Reference: E02/0027
EGS Report Number: R022703E

Mr Robert Byrnes
IEC
Suite 5002, 5th Floor
376 Bay St
Brighton-Le-Sands NSW 2216

MINERAL RESOURCES NEW SOUTH WALES

NSW DEPARTMENT OF MINERAL RESOURCES
Cnr Joseph Street & Weeroona Road
(P.O. Box 76), Lidcombe, NSW 2141 Australia
Environmental Geochemistry Services
Phone (02) 9646 1344 Fax (02) 9749 1405

ENVIRONMENTAL GEOCHEMISTRY SERVICES

Client:	**International Environmental Consultants Pty Ltd**	Number of Samples:	**10**
EGS Job Reference:	**E02/0044**	Sample Medium:	**Water**
EGS Report Number:	**R022703F**	Collected By:	**D.M**
Your Reference:	**letter 7/1/2002**	Date Received:	**19/02/02**

Certificate of Analysis

Samples Analysed as Received

Report on Multiple Extraction Procedure (US EPA Method 1320)

Sample Description EGS Sample No.	-- Method Code	--- Units	TCLP 489	MEP DAY 1 490	MEP DAY 2 491	MEP DAY 3 492	MEP DAY 4 493	MEP DAY 5 494
pH	PH-0001	pH Units	4.95	5.50	5.30	5.30	5.35	5.50
Iron (F/A)	WAT-AAS9801	mg/L	8.40	10	1.10	1.95	2.60	4.60
Manganese (F/A)	WAT-AAS9801	mg/L	0.35	<0.20	<0.20	<0.20	<0.20	<0.20
Lead (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100
Zinc (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	0.200	<0.100	0.150	0.100	0.450	0.100

Sample Description EGS Sample No.	-- Method Code	--- Units	MEP DAY 6 495	MEP DAY 7 496	MEP DAY 8 497	MEP DAY 9 498
pH	PH-0001	pH Units	5.60	5.05	5.35	5.40
Iron (F/A)	WAT-AAS9801	mg/L	6.60	9.00	9.60	11
Manganese (F/A)	WAT-AAS9801	mg/L	<0.20	<0.20	<0.20	0.20
Lead (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	<0.100	<0.100	<0.100	<0.100
Zinc (F/A)	WAT-AAS9801 #WAT-ASV97 12	mg/L	0.350	0.250	0.250	0.550

NOTES: [NA] - Not Applicable; [NT] - Not Tested; [IS] - Insufficient Sample; [X] - Below detectable limit; [F/A] - Filtered Acidified

Coal reject sample reduced to minus 9.5mm and leached using US EPA Method 1320 Multiple Extraction Procedure
First leachate used dilute acetic acid, next 9 leachates used water buffered to pH 3.0 with dilute sulphuric/nitric acids.
Extraction at 1:10 w/w= solid : liquid , Sample leached by tumbled end over end for 24hours then the pH was recorded.
Trace analysis was carried out on the filtrate.

for

K. A. Brooks
Principal Environmental Officer
Manager, Environmental Geochemistry Services
Enviromental Unit

Approved: 28/03/02

EGS Job Reference: E02/0044
EGS Report Number: R022703F

16-18 Hayden Court, Myaree, Western Australia 6154
PO Box 4023 Myaree BC, Western Australia 6950
tel: +61 8 9317 2505
email: lab@mpl.com.au
envirolab.com.au
Envirolab Services (WA) Pty Ltd trading as
MPL Laboratories | ABN 53 140 099 207

CERTIFICATE OF ANALYSIS 172237

Client:
Envirolab Services - Sydney
12 Ashley St
Chatswood
NSW 2067

Attention: Aileen Hie

Sample log in details:

Your Reference:	**135851-1**
No. of samples:	1 soil
Date samples received:	15/10/2015
Date completed instructions received:	15/10/2015
Location:	

Analysis Details:
Please refer to the following pages for results, methodology summary and quality control data.
Samples were analysed as received from the client. Results relate specifically to the samples as received.
Results are reported on a dry weight basis for solids and on an as received basis for other matrices.
Please refer to the last pages of this report for any comments relating to the results.

Report Details:

Date results requested by:	22/10/15
Date of Preliminary Report:	N/A
Issue Date:	22/10/15

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Tests not covered by NATA are denoted with *.
Total sulfur analysis performed by Sydney Analytical Laboratories.

Results Approved By:

Stacey Hawkins
Acid Soils/Acid Mine Drainage Supervisor

Net Acid Production Potential		
Our Reference:	UNITS	172237-1
Your Reference	-------------	135851-1
Sample ID	------------	601-606
Depth		3.8-5.0m
Date Sampled		23/09/2015
Type of sample		Soil
Date Prepared		14/10/2015
Date Analysed		22/10/2015
NAPP*	kg H2SO4/tonne	-20
APP (acid production pot.)	kg H2SO4/tonne	6.7
Sulphur - Total*	%	0.22
ANC	kg H2SO4/tonne	26

Method ID	Methodology Summary
AMD-001	Acid Mine Drainage determined by AMIRA International - Acid Rock Drainage Test Handbook.
Ext-053	Analysed by Genalysis, accreditation number 3244

Report Comments:

Asbestos Signatories:

Asbestos was analysed by Approved Identifier: Not applicable for this job
Airborne fibres were analysed by Approved Counter: Not applicable for this job

Definitions:

NT: Not tested NA: Test not required INS: Insufficient sample for this test PQL: Practical Quantitation Limit
<: Less than >: Greater than RPD: Relative Percent Difference LCS: Laboratory Control Sample
NS: Not Specified NEPM: National Environmental Protection Measure NR: Not Reported

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011

Quality Control Definitions

Blank: This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.

Duplicate: This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.

Matrix Spike : A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.

LCS (Laboratory Control Sample) : This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.

Surrogate Spike: Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.
Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.
Spikes for Physical and Aggregate Tests are not applicable.
For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.
Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Appendix G

Typical Results of Liquefaction Testing

DP Townsville

Paper to

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Attn: Steve Som
DP Newcastle
XLS

Liquefaction performance of soils at the site of a partially completed ground improvement project during the 1999 Chi-Chi earthquake in Taiwan

Der-Her Lee, C. Hsein Juang, and Chi-Sheng Ku

Abstract: This paper examines the liquefaction performance of soils at the site of a partially completed ground improvement project at the Chang-Hwa Coastal Industrial Park during the 1999 Chi-Chi earthquake in Taiwan. The site is on land reclaimed by hydraulic filling. To meet the need of a planned construction, site characterization was carried out with standard penetration tests (SPTs) and cone penetration tests (CPTs) at 13 locations. Dynamic compaction was later performed to mitigate the potential liquefaction hazards at this site. Before completion of the ground improvement work, the site experienced a major earthquake, the Chi-Chi earthquake (magnitude M_w = 7.6). Evidence of liquefaction was observed in this earthquake in the unimproved area but not in the improved area. After the earthquake, additional site exploration was carried out using SPTs and CPTs. The data from these in situ tests carried out before and after the earthquake and in areas with and without ground improvement are analyzed and the results are reported.

Key words: ground improvement, in situ tests, liquefaction, earthquake.

Résumé : Cet article examine la performance en liquéfaction d'un site partiellement traité dans le Chang-Hwa Coastal Industrial Park durant le séisme de Chi-Chi à Taiwan en 1999. Le site est sur un terrain qui a été préparé par remblayage hydraulique. Pour rencontrer les exigences de la construction prévue, la qualité du site a été évaluée par des essais SPT et CPT à 13 différents endroits. Par la suite, du compactage dynamique a été exécuté pour réduire les risques de liquéfaction potentielle sur ce site. Avant l'achèvement des travaux d'amélioration du terrain, le site a subi un séisme majeur, le séisme de Chi-Chi (M_w = 7,6). Au cours de ce séisme, on a observé des signes de liquéfaction dans la superficie non traitée, mais non dans la partie traitée. Après le séisme, des investigations additionnelles ont été réalisées sur le site au moyen du SPT et du CPT. On a analysé ces données des essais in situ réalisés avant et après le séisme, et sur les superficies traitées et non traitées, et on présente les résultats.

Mots clés : amélioration du terrain, essais in situ, liquéfaction, séisme.

[Traduit par la Rédaction]

Introduction

This paper examines the liquefaction performance of soils at a site in the Chang-Hwa Coastal Industrial Park during the 21 September 1999 Chi-Chi earthquake (magnitude M_w = 7.6) in Taiwan. The industrial park is located in Chang-Hwa on the west coast of central Taiwan and the site is on land reclaimed by hydraulic filling. During iuvestigation of the site for a proposed construction project, it was determined that there was a very high chance that the fill sand could liquefy when subjected to the design earthquake. Dynamic compaction was selected as a method of ground improvement at this site. Before completion of the ground improvement work, the site experienced a major ground shaking from the Chi-Chi earthquake. A sand boil was observed at the site during the earthquake. After the earthquake, additional site exploration was conducted using standard penetration tests (SPTs) and cone penetration tests (CPTs). Comparison of the liquefaction potential before and after the earthquake and between areas with and without grouud improvement yields valuable lessons that should be of interest to the geotechnical engineer.

Simplified methods based on the SPT and CPT, such as those by Seed et al. (1985), Robertson and Campanella (1985), and Olsen (1997), are widely used by the engineer to evaluate liquefaction potential of soils. A recent update of these simplified methods has been documented in Youd and Idriss (2001) and Robertson and Wride (1998). Because of their simple nature and decades of experience, these methods, referred to herein as the deterministic methods, remain the methods of choice for most practicing engineers conducting liquefaction analysis. In some recent studies (Liao et al. 1988; Youd and Noble 1997; Toprak et al. 1999; Chen and Juang 2000; Juang and Jiang 2000), however, the limit state or boundary curves in these methods were characterized with a wide range of probabilities. This raises a critical question as to how the factor of safety (F_S) against initiation of liquefaction obtained from these deterministic methods may be interpreted. If the same magnitude of F_S obtained from different deterministic methods represents different liq-

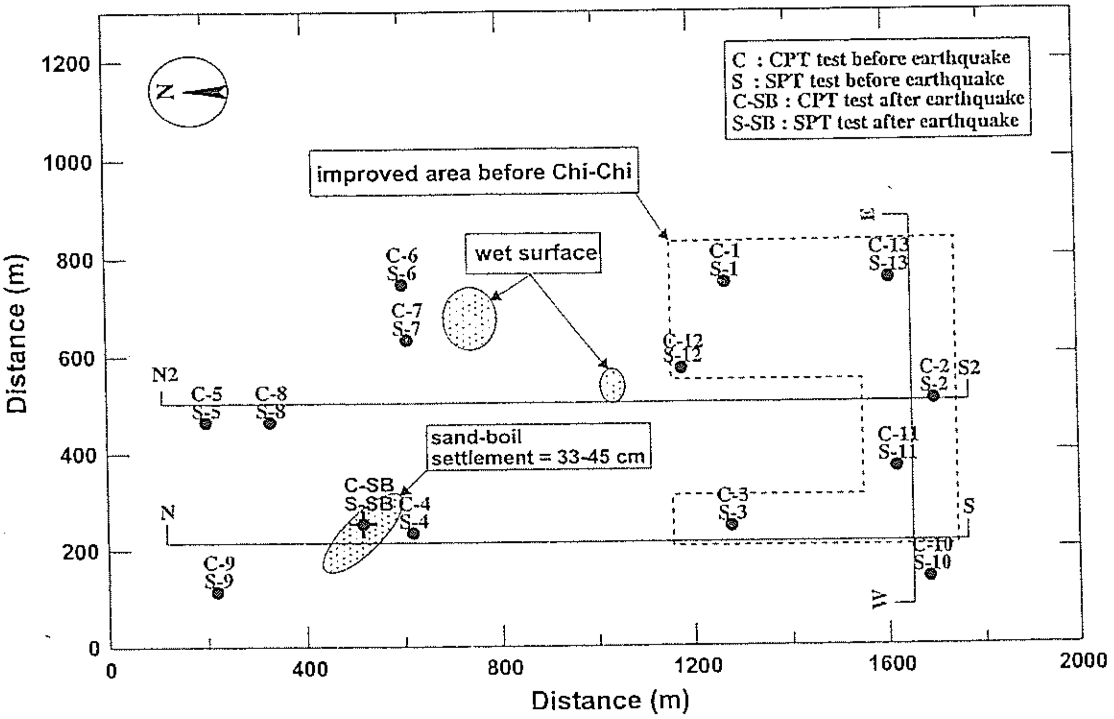
Received December 7, 2000. Accepted July 5, 2001. Published on the NRC Research Press Web site at http://cgj.nrc.ca on December 21, 2001.

D.-H. Lee and C.-S. Ku. Department of Civil Engineering, National Cheng Kung University, Tainan, Taiwan.
C.H. Juang.[1] Department of Civil Engineering, College of Engineering and Science, Clemson University, Lowry Hall, Box 340911, Clemson, SC 29634-0911, U.S.A.

[1]Corresponding author (e-mail: hsein@clemson.edu).

 DOI: 10.1139/cgj-38-6-1241

Fig. 1. Layout of the site investigation.



uefaction potential, then a meaningful cross-checking and comparison of the results obtained from these methods cannot be assured (Juang et al. 2000*b*).

In a post-earthquake characterization of liquefaction potential at a site, it is considered more advantageous to adopt probabilistic methods than deterministic methods, as the liquefaction potential is more directly related to the probability of liquefaction than the factor of safety. This is because the relation between liquefaction potential and probability of liquefaction is linear, whereas the relation between liquefaction potential and factor of safety is nonlinear. For example, the liquefaction potential will double if the probability of liquefaction is doubled. On the other hand, if the factor of safety is reduced to a half, the liquefaction potential will not necessarily double (it could be much higher or lower). In addition, different degrees of conservatism are often built in in the existing deterministic methods, making it more difficult to interpret the calculated factor of safety for post-earthquake liquefaction assessment. This is not an issue when the probability of liquefaction is used to "measure" the liquefaction potential. In the present study, the liquefaction potential of the site investigated is analyzed using probabilistic methods.

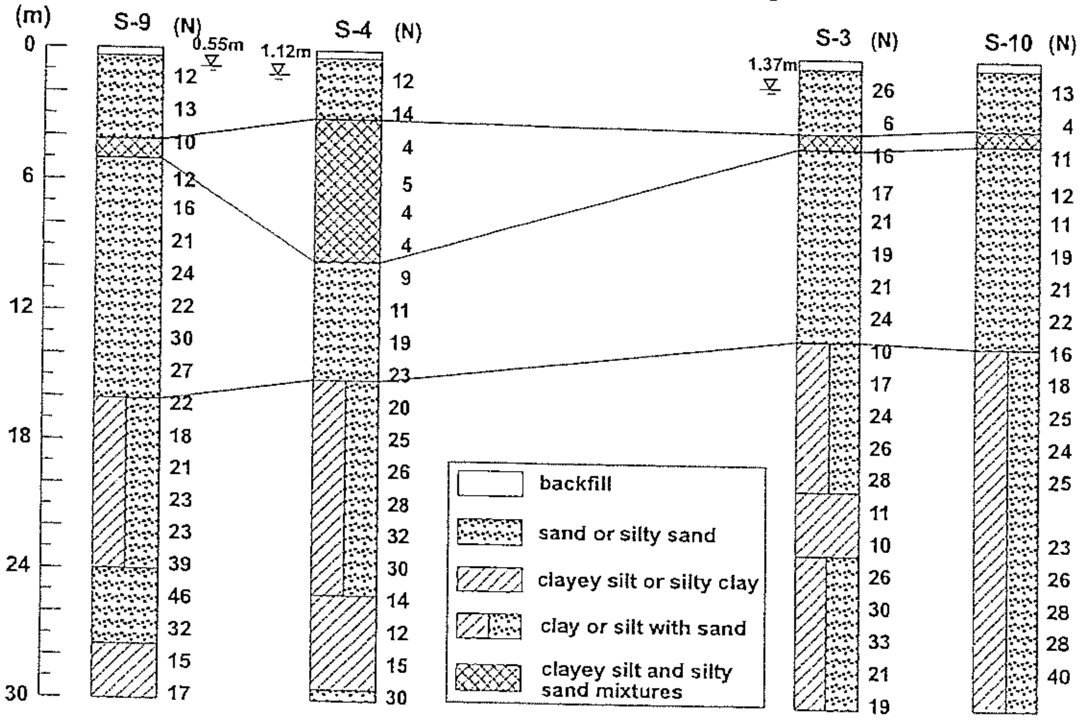
Site conditions

The site investigated is located in the West 2nd District of Lukung, which is in the Chang-Hwa Coastal Industrial Park (CHCIP). This site, which is roughly 800 m in width and 2000 m in length, is on land reclaimed by hydraulic filling. The elevation of the ground surface at the site is about 4.2 m based on a bench mark installed at a depth of 150 m. Thirteen boreholes were drilled and samples were taken and tested for index properties. In addition, 13 CPTs were conducted side by side (about 3 m apart) at the locations of the boreholes. Figure 1 shows the layout of these in situ tests.

The SPT was conducted using an automatic hammer, generally according to the test procedure specified by the American Society for Testing and Materials (ASTM D1586) However, no energy measurement was made. The energy rati was estimated to be in the range 50–80% according to th field engineer. The CPT was conducted using the procedur specified in ASTM D3441. During the test, the penetratio rate was 2 cm/s, and data were recorded every 5 cm. Th electronic cone and associated devices used, located inside th 20 t truck, were manufactured by Hogentogler. The projecte area of the seismic cone is 10 cm^2, the apex angle of the cor is 60°, and the surface area of the sleeve is 150 cm^2.

Figures 2 and 3 show the soil profiles in north–south ar east–west directions, respectively, based on the boreholes wi SPTs. Figures 4 and 5 show the profiles in north–south ar east–west directions, respectively, based on the CPT soundi records. The perceived layers in the profiles in Figs. 4 and are indicated as broken lines. Figures 6 and 7 show the s profiles along the north–south and east–west cross sectio respectively, with the CPT and SPT results shown side side. Note that in deriving these approximate profiles, juc ment is exercised, considering both the SPT and CPT data multaneously. In particular, a layer of very sensitive soil (*ve weak* sandy silt and clayey silt mixture) was identified at lo tion S-4, based mostly on the CPT data. The groundwater ble is generally within 2.0 m of the current ground surfa The soil profiles show that, within the top 20 m, the mainly consists of silty sands (SM or SP–SM according to Unified Soil Classification System) with thin layers of s (ML) or silty clays (CL). Note that the backfill material at top 0.2 m is a gravel, below which is about 4–5 m of hyd lic fill. Figure 8 shows typical particle-size distributions

Fig. 2. Soil profile along cross section N–S. *N*, number of blows in the penetration testing.



samples taken from the hydraulic fill at various depths and from the sand boil observed at the site.

The site is located in seismic zone II according to the *Seismic design specifications for highway bridges* (Ministry of Communication 1996), which specifies a maximum horizontal acceleration of 0.23g and a magnitude M_w of 7.5 based on a return period of 475 years. The loose sand in the upper layer was considered to have high liquefaction potential when subjected to the design earthquake. Thus, a ground modification project involving dynamic compaction was undertaken to improve the liquefaction resistance of the soils at this site. Figure 9 shows the site undergoing dynamic compaction. In each subzone, dynamic compaction was carried out with a main *pounder* and subsequently with a smaller pounder, arranged in a grid pattern with a outer width of about 10 m. The main pounder used in the dynamic compaction weighed 25 t, had a base area of 3 m^2, and was dropped from a height of 20 m at each location in the grid pattern. The smaller pounder weighed 12 t, had a base area of 6 m^2, and was dropped from a height of 10 m. The maximum effective depth of this dynamic compaction operation, estimated by the specialty contractor, was about 10 m.

Before the 1999 Chi-Chi earthquake, part of the dynamic compaction work had been completed (see Fig. 1). Evidence of liquefaction, in terms of a sand boil and an unusually wet ground surface, was observed at this site in the unimproved area but not in the improved area during the earthquake. The epicentre of the earthquake was about 50 km from the site, and the closest distance from the site to the rupture plane is about 33 km. The maximum horizontal ground acceleration at this site estimated from a nearby seismic station (TUC117) was 0.12g. After the earthquake, additional CPTs and SPTs were conducted at the location where the sand boil was observed.

Liquefaction potential of soils at the site investigated

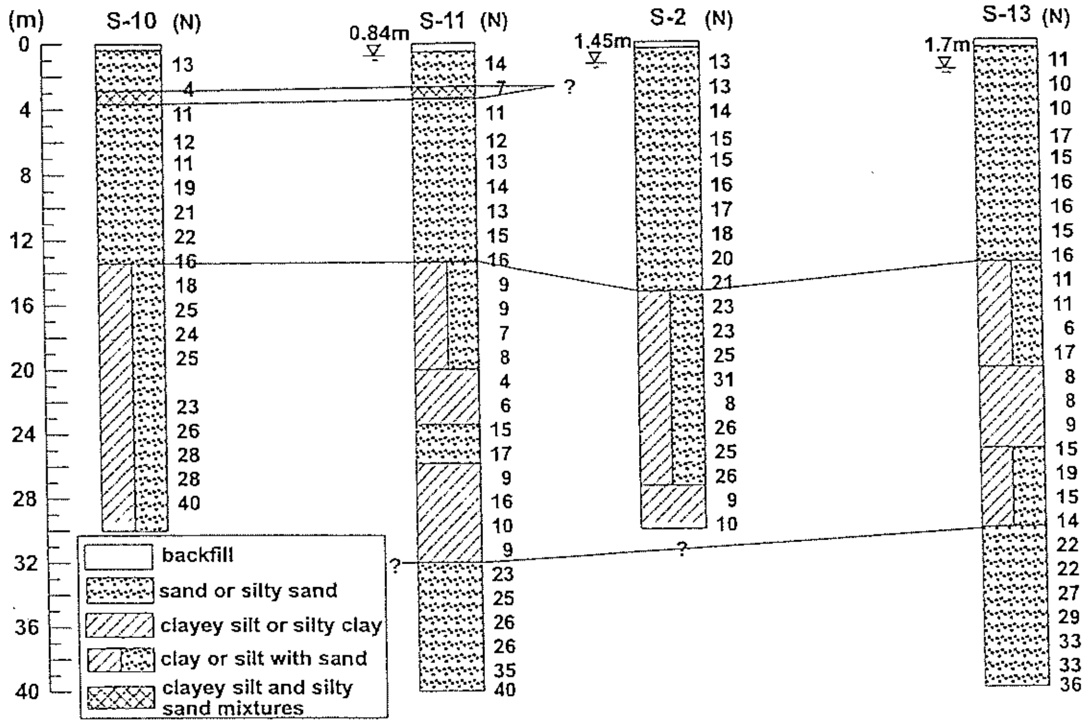
Probabilistic method for liquefaction analysis

In the present study, characterization of the site for its liquefaction potential is carried out based only on CPT data, as it is believed that the CPTs conducted at this site are more reliable than the SPTs. According to the field engineer, the SPTs conducted at this site were not calibrated. The energy ratio could rauge from 50 to 80% according to the field engineer. This makes it less desirable to perform a liquefaction analysis using the SPT-based methods.

In a recent liquefaction workshop (Youd and Idriss 1997), the method developed by Robertson and Wride (1998) was recommended for liquefaction evaluation using the CPT partly because of its ease of application (Youd and Idriss 2001). The method of Robertson and Wride is deterministic, in which liquefaction is said to occur if $F_S \leq 1$ and no liquefaction is said to occur if $F_S > 1$. As argued previously, however, it is preferable to assess the chance of liquefaction in terms of probability, rather than factor of safety, in a post-earthquake assessment. In the present study, the CPT-based probabilistic method developed by Juang et al. (2000*a*) is employed. This method is an empirical method established based on a large database of field liquefaction performance records. The conditional probability of liquefaction, P_L, given the site-specific information so that F_S can be determined, is calculated as (Juang et al. 2000*a*)

$$[1] \qquad P_L = \frac{1}{1 + \left(\dfrac{F_S}{1.0}\right)^{4.65}}$$

Fig. 3. Soil profile along cross section E–W.



where the factor of safety F_S is defined as the ratio of the cyclic resistance ratio (CRR) to the cyclic stress ratio (CSR). In the present study, CSR is calculated as (modified from Seed et al. 1985)

$$[2] \qquad \mathrm{CSR}_{7.5} = \frac{0.65\left(\frac{\sigma_v}{\sigma_v'}\right)\left(\frac{a_{\max}}{g}\right)r_d}{\mathrm{MSF}}$$

where σ_v and σ_v' are the total and effective vertical stresses, respectively, at the depth in question; $a_{\max}$ is the peak horizontal ground surface acceleration; g is the acceleration due to gravity; MSF is the magnitude scaling factor; and r_d is the stress reduction factor. The term MSF is used to adjust the calculated CSR to the reference earthquake magnitude of 7.5.

The CRR is calculated as (Juang et al. 2000*a*)

$$[3] \qquad \mathrm{CRR}_{7.5} = f_T\left\{B_o + \sum_{k=1}^{n}\left[W_k f_T\left(B_{Hk} + \sum_{i=1}^{m} W_{ik} P_i\right)\right]\right\}$$

In eq. [3] the input variables P_i are $P_1 = q_{cN1}$, $P_2 = R_f$, $P_3 = \sigma_v'$, and $P_4 = R_p$, where R_p is the ratio of total stress σ_v to effective stress σ_v', R_f is the friction ratio defined as the ratio of sleeve friction (f_s) to cone tip resistance (q_c), and q_{cN1} is the normalized cone tip resistance (after Robertson and Wride 1998):

$$[4] \qquad q_{cN1} = \frac{q_c}{\sqrt{\sigma_v'}}$$

where both q_c and σ_v' must be in atmospheres (1 atm = 100 kPa). The terms B_o, B_{Hk}, W_k, and W_{ik} are coefficients obtained from the analysis of a large database of field liquefaction performance records (Juang et al. 2000*a*), and f_T repre sents a transfer function defined as

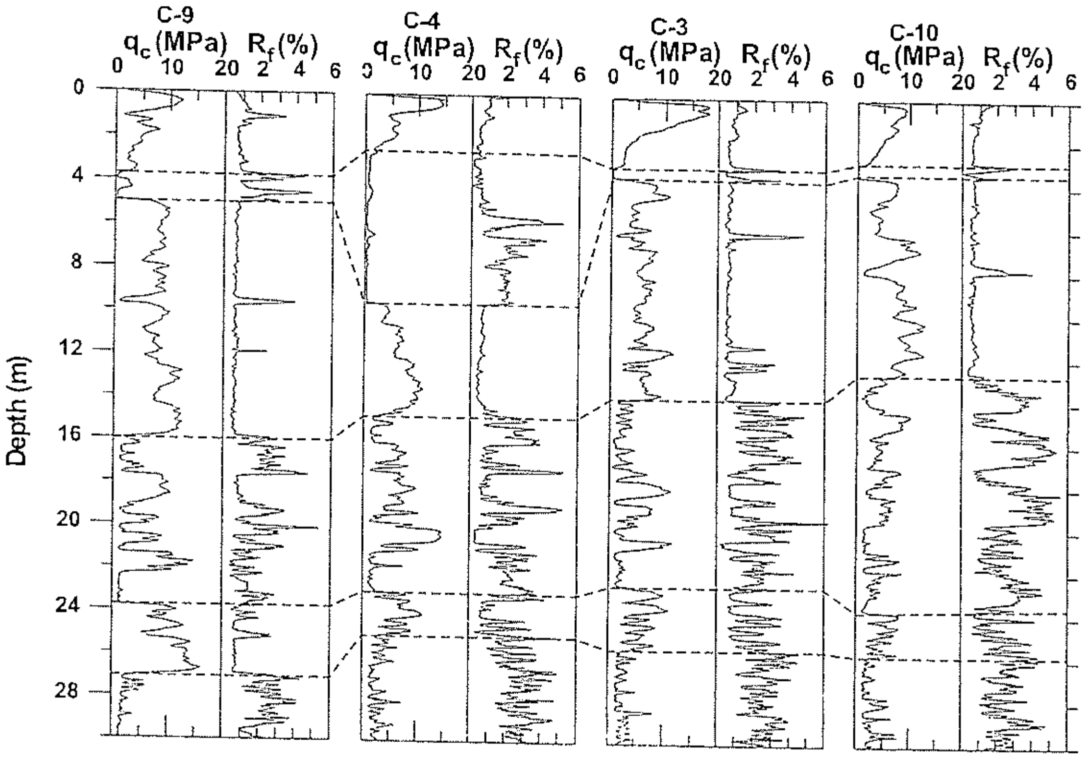
$$[5] \qquad f_T(\theta) = \frac{1}{1 + e^{-\theta}}$$

where θ is a dummy variable. The calculation of CRR usi eq. [3], along with the associated eqs. [4] and [5], is tedio but straightforward. A spreadsheet module, CPT.xls, h been prepared for this calculation and is available free fro the second author.

Equation [1] is a mapping functiou that relates F_S to P Figure 10 shows a plot of this mapping function, which re resents a calibration of the entire set of equations used to d termine CSR, CRR, and F_S. The calibration was carried c by Juang et al. (2000*a*) using a relatively large database field performance cases. It is cautioned, however, that eq. [is intended to be used for cases where CSR, CRR, and are calculated using the entire set of equations presented this paper. It may not be applicable if CSR, CRR, and F_S determined from a different simplified method such as th of Robertson and Wride (1998) and Olsen (1997). To c rectly interpret the probability of liquefaction based on a c culated F_S, the method used calculate F_S must be *calibrat* just as calibration must be performed on every new piece in situ test equipment. Thus, a new $P_L - F_S$ mapping fu tion that calibrates a particnlar simplified method must developed for that method. This issue is worth further cussions but is beyond the scope of this paper, which cuses on assessing liqnefaction performance of reclai land in a recent earthquake.

As a final note, it is worth discussing some issues rel to the probabilistic method described previously. First, probability calculated from eq. [1] is a conditional prob ity for a given set of site-specific conditions, includir

Fig. 4. CPT profile along cross section N–S.



given value of a_{max} that is typically specified in a design. This analysis is different from the general, regional seismic risk analysis in which the coefficient of variation in a_{max}, originated from different sources of uncertainty, conld reach as high as about 60%. The conditional probability is suitable for assessing liquefaction in a seismic design and in the post-earthquake investigation, as the value of a_{max} is either specified or measured.

Second, the probabilistic method described previously is based on CPT data, and thus has the same limitations as with any other CPT-based method such as that of Robertson and Wride (1988). For example, no samples are retrieved for examination and testing. Without the knowledge of clay content, liquid limit, and natural water content, the Chinese criteria (Seed and Idriss 1982), which are appropriate for screening nonliquefiable soils when the soils are considered too clay rich, cannot be applied. In general, if the soil is judged too clay rich (Robertson and Wride 1998; Youd and Idriss 2001), soil samples should be retrieved and tested to confirm the soil type and liquefaction resistance.

Third, the basic input parameters in eq. [3] are q_c, f_s, σ_v, and σ_v'. This is a neural network based equation that does not require the intermediate parameters snch as fine contents (FC) and soil behavior type index (I_c). Eqnation [3] represents a trained network that relies only on the case histories that are described with the four basic parameters, seismic data, and liquefaction observations. It avoids the uncertainty induced by the use of FC and (or) I_c obtained based on some empirical equations.

Performance of the site during the Chi-Chi earthquake

Evidence of soil liquefaction was observed at a site visit immediately after the 21 September 1999 Chi-Chi earthquake. Figure 11 shows a photograph of a sand boil in the vicinity of C-4 and the hole created by sand boiling (the hole is about 90 cm in diameter and 60 cm in depth). The location of the sand boil is marked in Fig. 1. In the vicinity of C-7, the surface was very wet, which is also a sign of liquefaction (albeit weaker).

The site was relatively flat, with an elevation of about 4.2 m. No lateral displacement was observed during the Chi-Chi earthquake. A survey at some locations at the site after the earthquake did show various degrees of vertical settlement. In the vicinity of C-12 where dynamic compaction had been carried out, the ground settlement was about 3 cm. In the vicinity of C-4 where dynamic compaction had not been carried out and a sand boil was observed, the ground settlement was in the range of 33–45 cm. Thus, evidence of liquefaction was found in the unimproved area, whereas no evidence of liquefaction was observed in the improved area at this site during the 1999 Chi-Chi event.

Liquefaction potential of the site before ground improvement

Liquefaction potential of the site was first analyzed using the CPTs carried out during the period 4–6 May 1998, before the ground improvement work. The analysis was carried out using the 1999 Chi-Chi earthquake parameters. In this case, the following seismic parameters were used: M_w = 7.6, and a_{max} = 0.12g. The maximum horizontal ground acceleration a_{max} was obtained from a seismic station (TCU117) about 3 km from the site. No variation in a_{max} was assumed, since this is a measured value. Figures 12–14 show the liquefaction potential of the site along cross sections N–S, N2–S2, and W–E (see Fig. 1 for the location of these cross sections).

Without the ground improvement work, the site would have liquefied at several locations and at various depths during the Chi-Chi earthquake. As shown in Fig. 12, a thick

Fig. 5. CPT profile along cross section E–W.

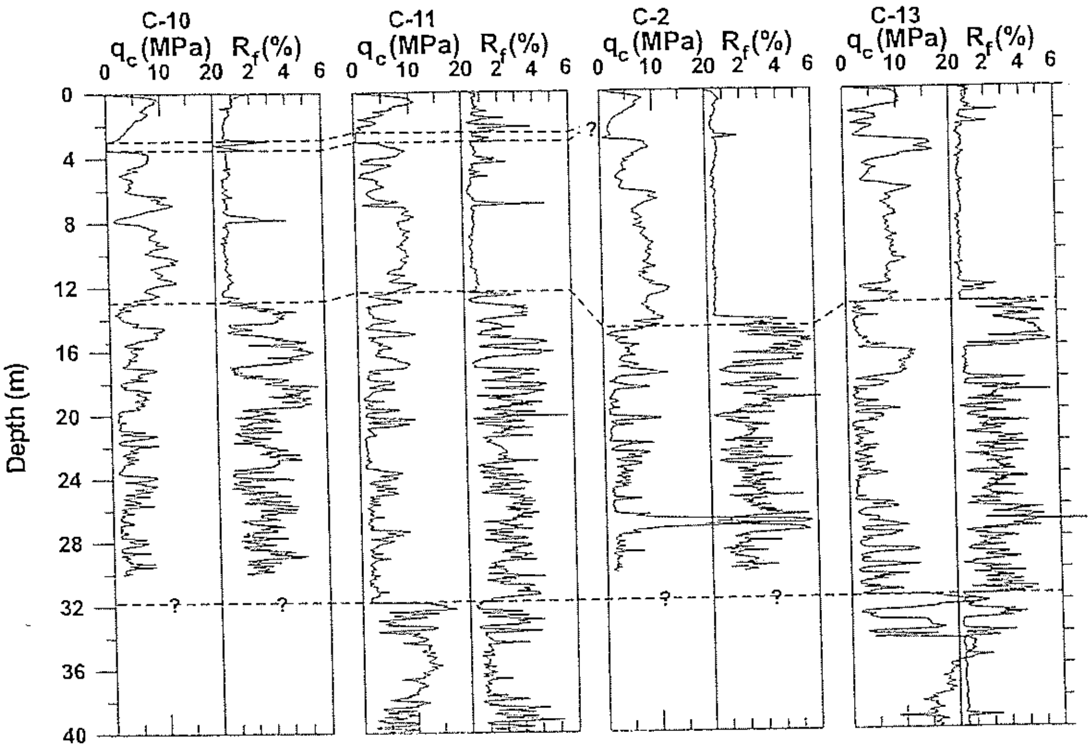


Fig. 6. Soil profile along cross section N–S.

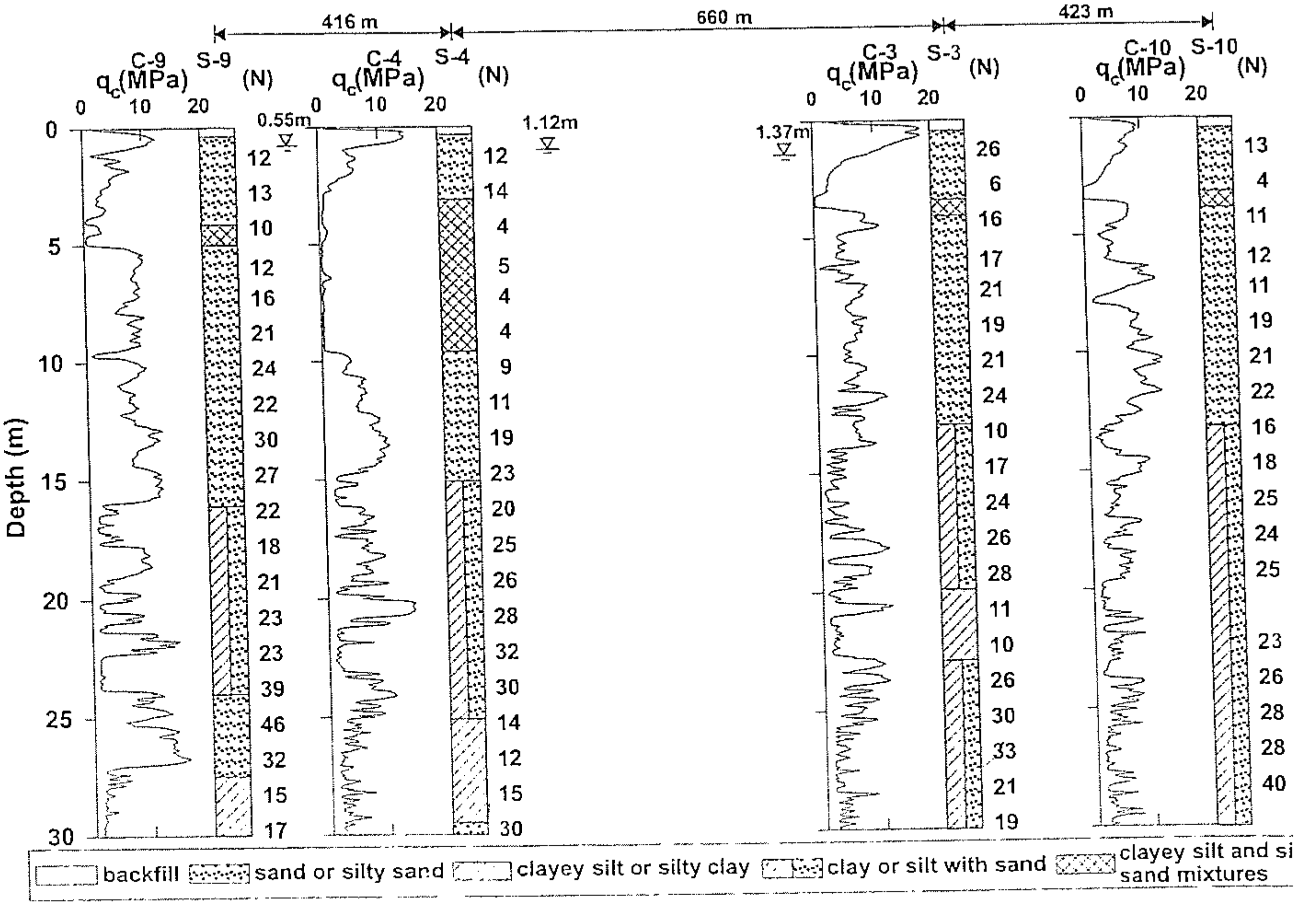


Fig. 7. Soil profile along cross section E–W.

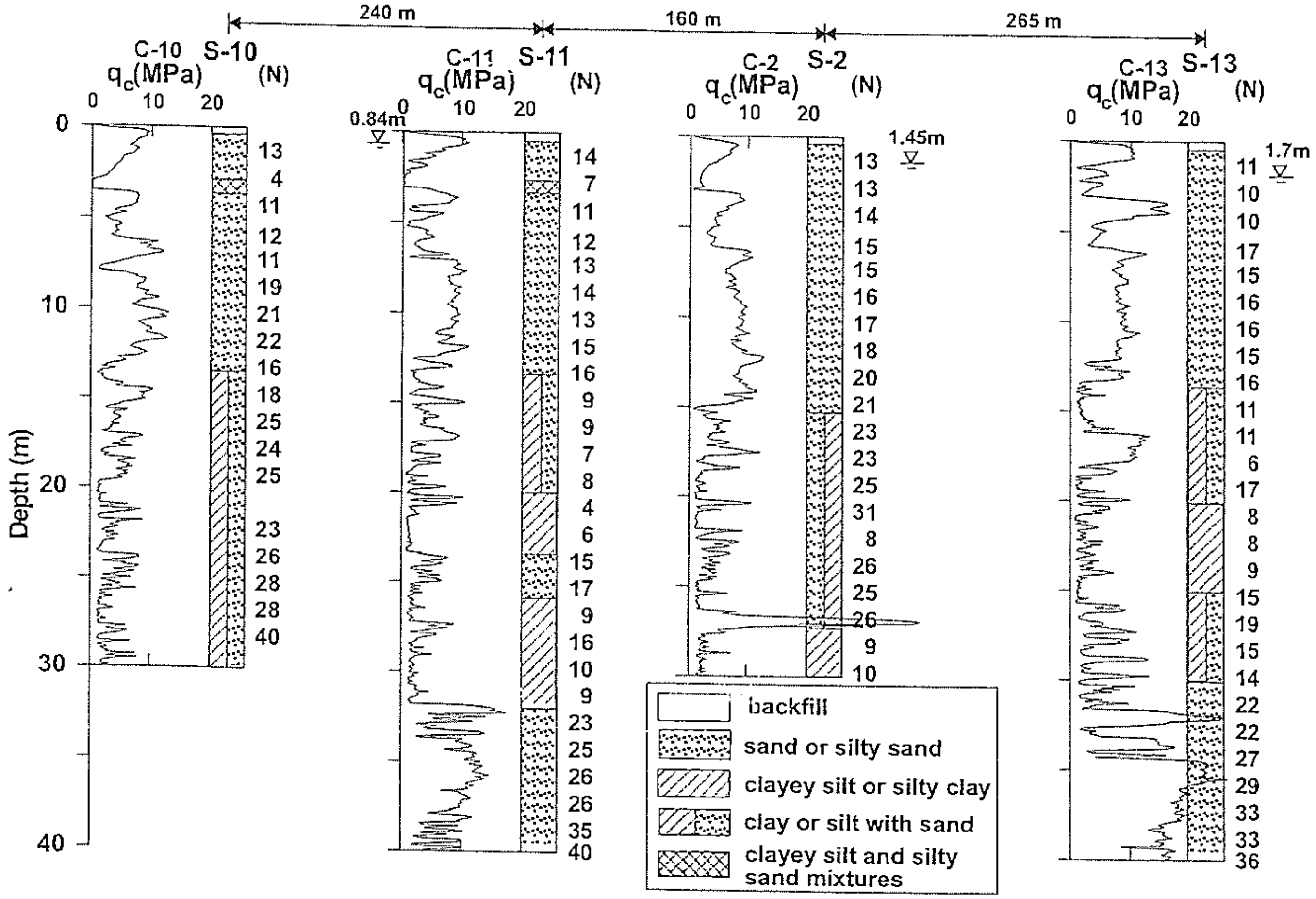


Fig. 8. Particle-size distributions.

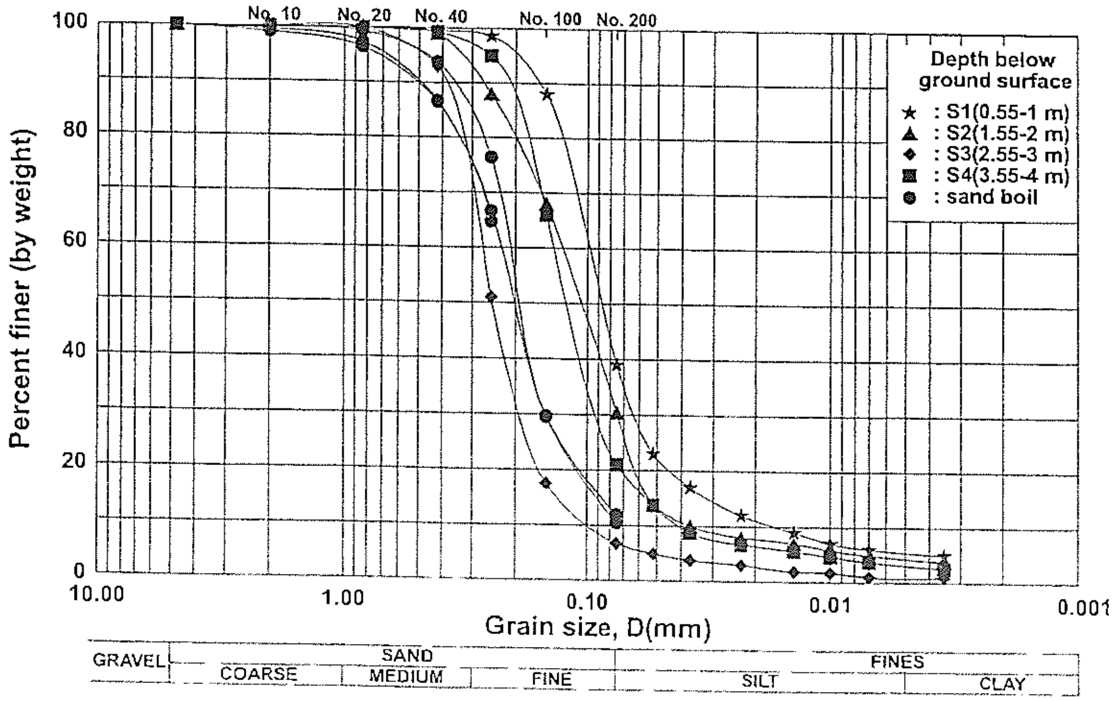


Fig. 9. Impact craters at the site during dynamic compaction.

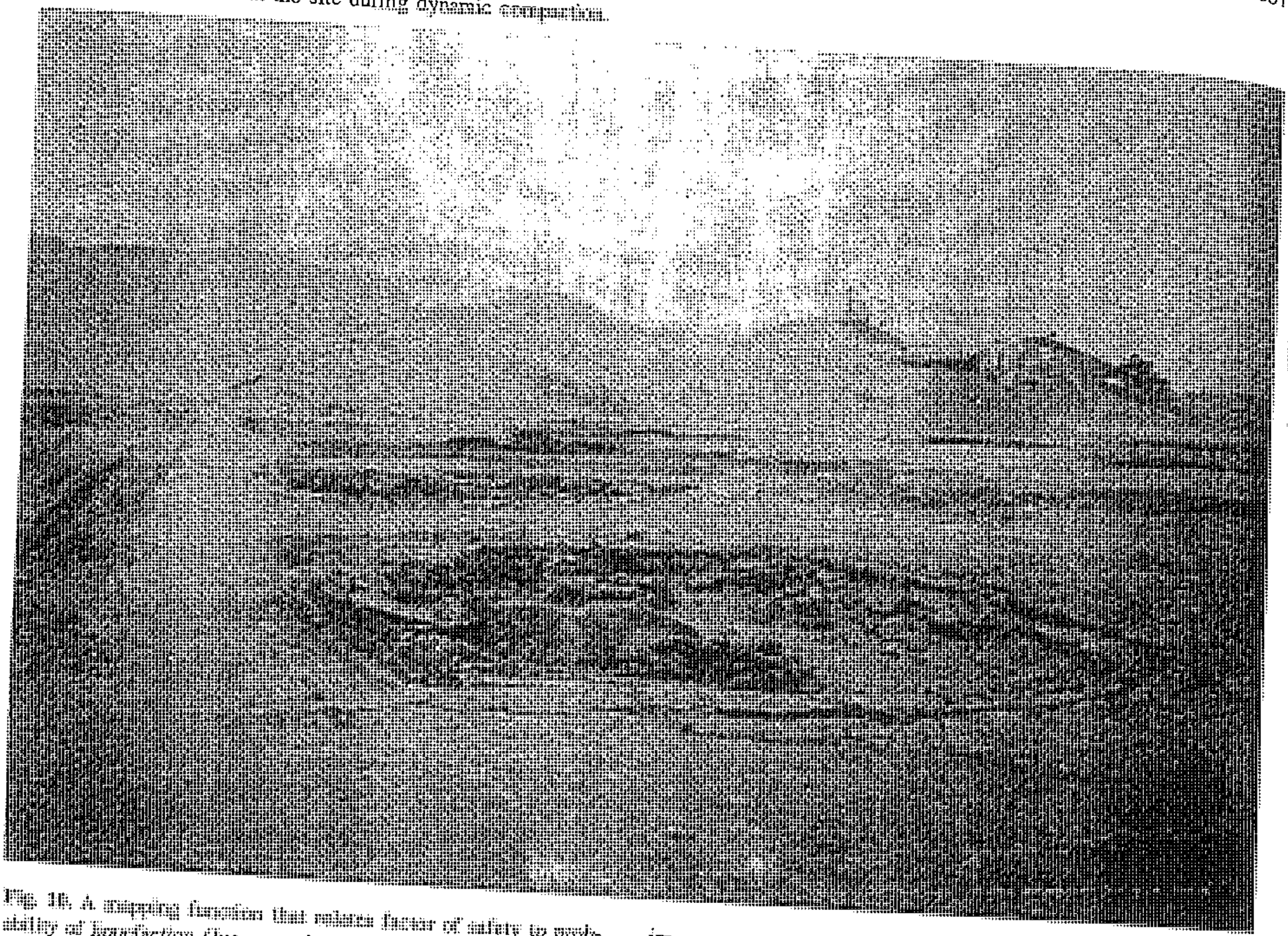
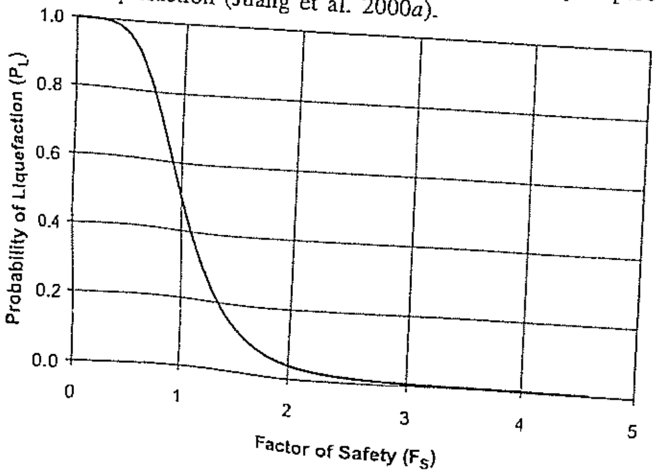


Fig. 10. A mapping function that relates factor of safety to probability of liquefaction (Juang et al. 2000*a*).



critical layer with high probabilities of liquefaction was observed at C-4. Since dynamic compaction had not been carried out in the vicinity of C-4 before the earthquake, the results of the liquefaction analysis appear to explain the sand boil observed at this location.

At location C-12 (shown in Fig. 13) and locations C-2, C-11, and C-13 (shown in Fig. 14), critical layers with high probabilities of liquefaction were observed. However, these analyses were conducted using the CPT data before ground improvement. Since dynamic compaction had been carried out at these locations (see Fig. 1) before the earthquake, the analyses should be redone using the post-compaction CPT data to compare with the field observations during the earthquake. In the improved area (see Fig. 1), C-12 exhibits the greatest liquefaction potential before ground improvement. It is used as an example for investigating the effect of ground improvement; the liquefaction potential at C-12 was reanalyzed using the post-compaction CPT data, and the results of this analysis are presented in the section that follows.

Liquefaction potential of the area with ground improvement

As noted previously, before the Chi-Chi earthquake, the ground improvement project at the site was partially completed. At some locations, CPT soundings before and after ground improvement were available. These data provide an opportunity to examine the effect of ground improvement for mitigating liquefaction potential. As an example, Fig. 15 shows the liquefaction potential at location C-12 before and after ground improvement. The distance between the locations of the two CPT soundings (before and after the earthquake) is about 5 m. In the layer between 2 and 7 m, the probability of liquefaction drops from an average of about 65% before ground improvement to about 10% after ground improvement. The high probability of liquefaction in the layer between 7 and 9.5 m, however, remains high after

1. Hole created by sand boiling during the Chi-Chi earthquake.

improvement, indicating that ground improvement is :tive in this layer. Two possible reasons for this ef- as follows: (*i*) the maximum depth of dynamic com- s less than 10 m, according to the field engineer; he layer is a clay–silt mixture, on which ground im- nt is generally less effective.

of soil strength after liquefaction

he 1999 Chi-Chi earthquake, additional SPTs and re performed at location C-4 where the sand boil rved. Recall that in the general area where C-4 is ground improvement had not been carried out be- arthquake. The additional tests provide data to ex- change in soil strength as inferred from in situ liquefaction.

16 shows CPT and SPT profiles at C-4 before and earthquake. The change in the measured values of ficant. Within the top 2 m, which consists of me- e sand, the value of q_c decreases sharply, appar- to the disturbance caused by sand boiling in the een 2.5 and 5.5 m. The q_c values in the loose ween 2.5 and 8 m), however, increase signifi- bably due to consolidation and rearrangement of fter liquefaction. This assertion agrees well with ed ground settlement after liquefaction, although il variability between C-4 and C-SB (see Fig. 1) contributes to the difference in the measured q_c values. At a depth of about 9 m, where the soil has a high fines content, there is practically no change in q_c. In the layer between 10 and 14 m, which consists of medium dense sand, the value of q_c also decreases significantly. Below a depth of 14 m, there is little change in the value and pattern of q_c, indicating that the depth of liquefaction was less than 14 m at this location during the Chi-Chi earthquake.

The friction ratio (R_f) experienced little change except at a depth of about 6 m, which could be due to soil variability between the two CPT soundings. The SPT N values decrease significantly between 2 and 4 m and between 10 and 14 m, which agrees quite well with the observed changes in q_c. However, in the loose sand layer (between 4 and 8 m), the decreasing trend in the N values does not agree with the observed change in q_c. One possibility for the discrepancy is the soil variability between C-4 and C-SB. Another possible reason for the decrease in N values is the disturbance of very loose sands during the rotary wash boring.

The results of liquefaction analysis in the vicinity of C-4 based on CPT data before and after the Chi-Chi earthquake are also shown in Fig. 16. Seismic parameters from the earthquake, namely $M_w = 7.6$ and $a_{max} = 0.12g$, are used in the analysis. After the earthquake and liquefaction, the "strength" in the loose sand layer, as inferred from q_c values, increases and the probability of liquefaction is reduced sig-

Fig. 12. Liquefaction potential profile along cross section N–S using the CPT analysis (M_w = 7.6, a_{max} = 0.12g).

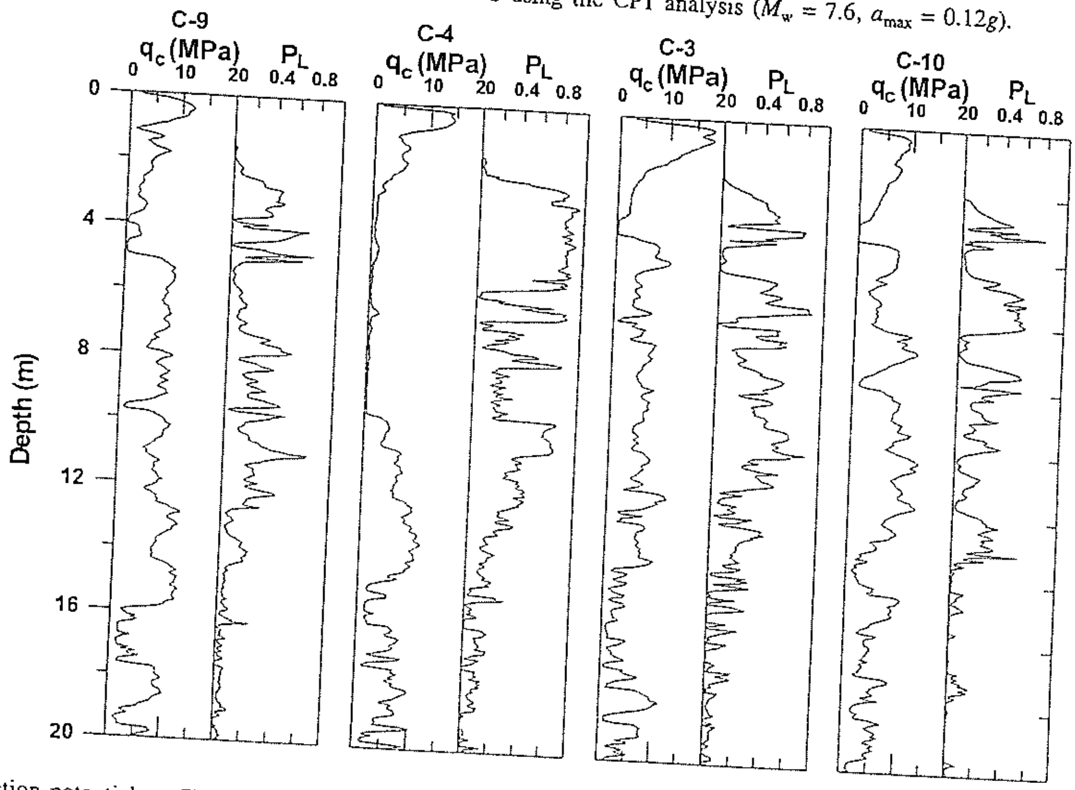
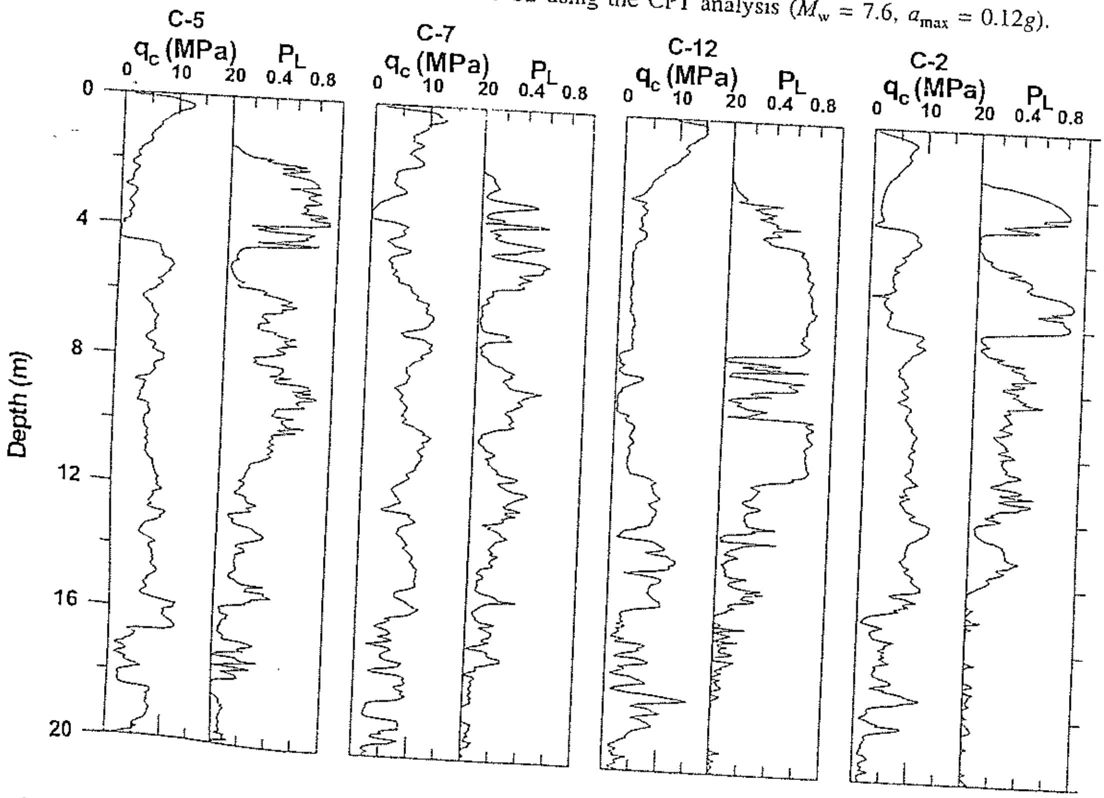


Fig. 13. Liquefaction potential profile along cross section N2–S2 using the CPT analysis (M_w = 7.6, a_{max} = 0.12g).

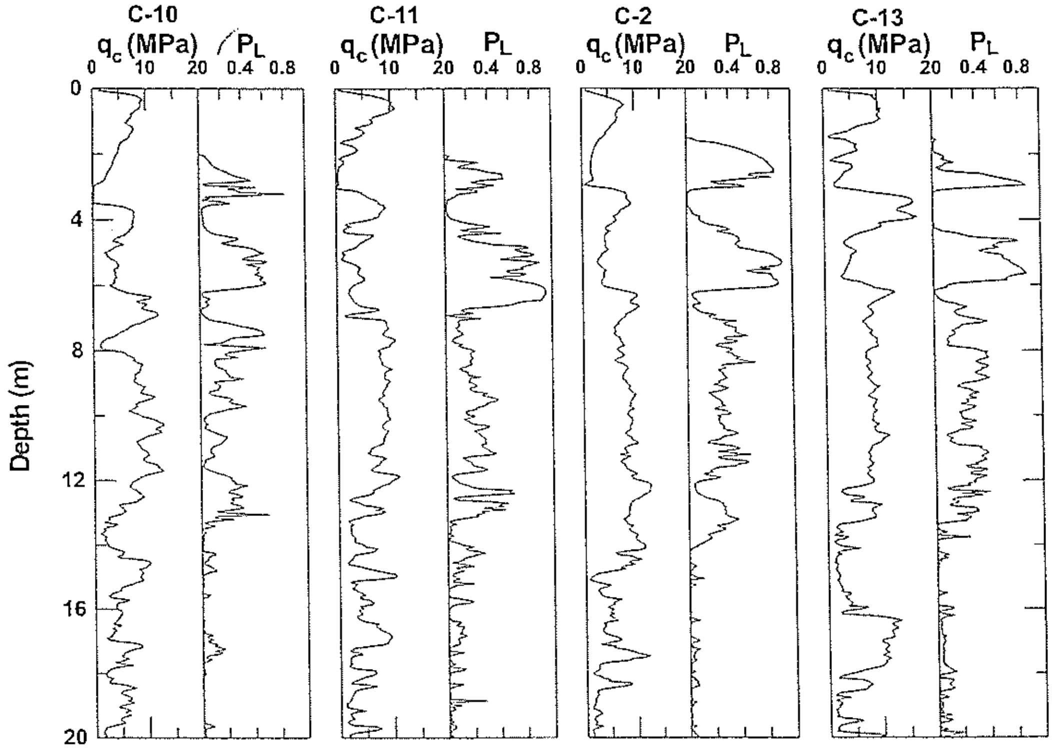


nificantly. On the other hand, the strength in the medium dense sand layer (between 11 and 13 m), as inferred from q_c values decreases in this seismic event, and the probability of liquefaction is increased significantly. Although these observations are interesting, the reader is cautioned not to draw a general conclusion based on limited observations.

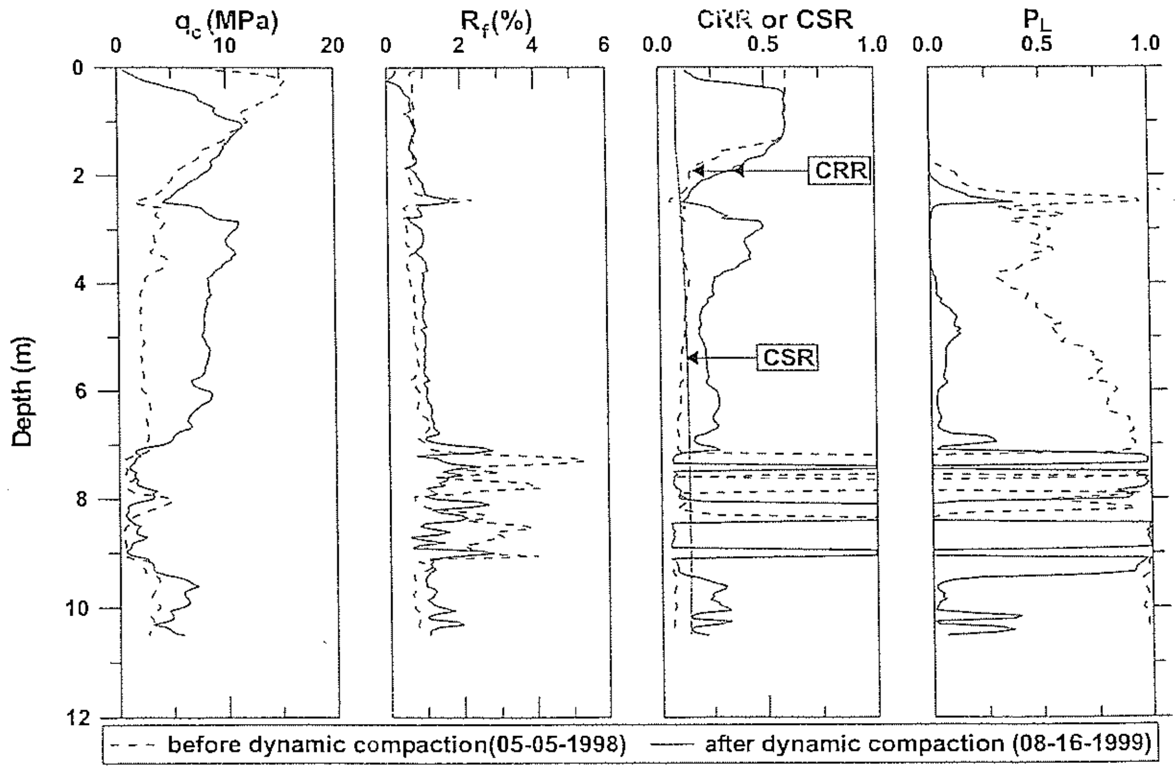
Conclusions

(1) Based on the results of the case study presented, the CPT is shown to be an effective tool for characterizing liquefaction potential at this site before and after an earthquake and before and after ground improvement.

14. Liquefaction potential profile along cross section E–W using the CPT analysis (M_w = 7.6, a_{max} = 0.12g).



15. Results of liquefaction evaluation at C-12 before and after dynamic compaction, both before the 21 September 1999 Chi-Chi quake (M_w = 7.6, a_{max} = 0.12g).

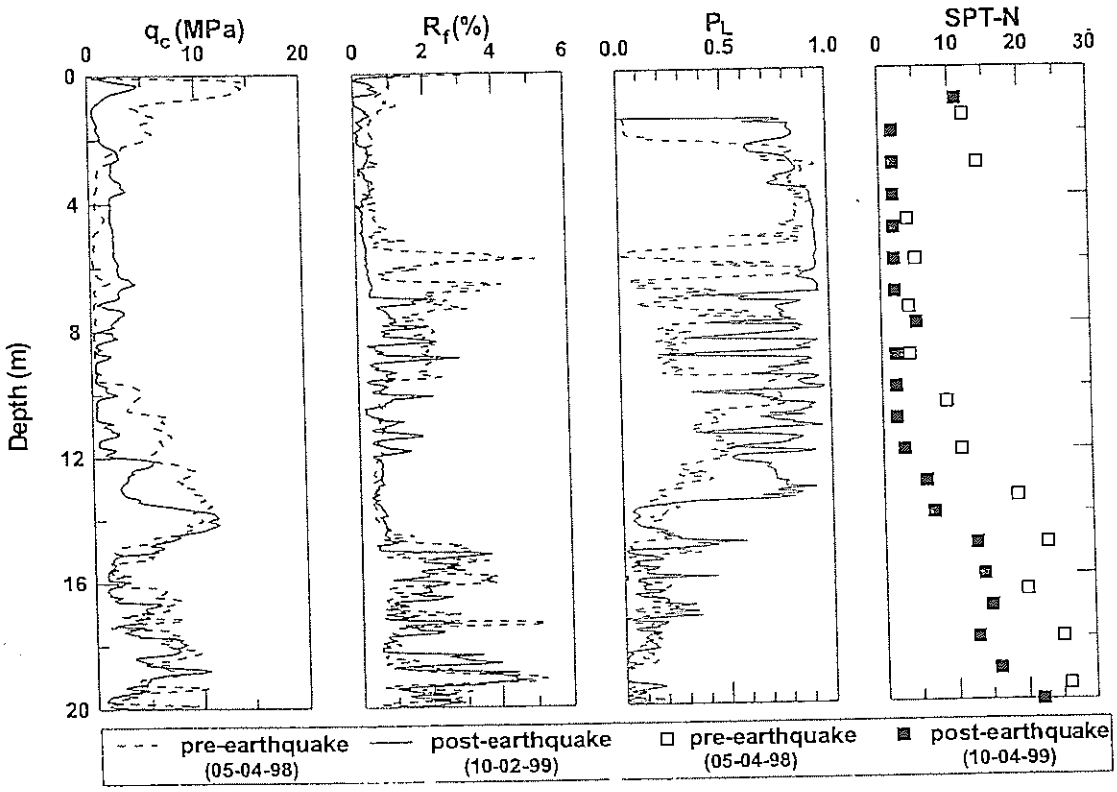


) The effectiveness of ground improvement in reducing iquefaction potential, as reported previously in the liter-:, is confirmed in this case study.

) The CPT-based probabilistic methods, such as the ıod of Juang et al. (2000a), appear to be able to account for liquefaction performance of the site in the post-earthquake investigation.

(4) At the site studied, loose sand became denser, while dense sand became looser after the Chi-Chi earthquake. However, as reported in the literature, there are cases where

Fig. 16. Results of CPTs and SPTs in the liquefied area (C-4 and C-SB) before and after the 21 September 1999 Chi-Chi earthquake



loose sand could become looser after an earthquake. Thus, a site that experienced liquefaction during an earthquake will not necessarily reduce (or increase) its chance of liqnefaction in a future seismic event.

Acknowledgments

This study was supported mainly by the National Science Council of the Republic of Chiua, Taipei, Taiwan, through Grant NSC89-2218E-006-148. This support is greatly appreciated. The second author wishes to acknowledge the support by the National Science Foundation of the United States through Grant CMS-0085143 for his study of the 1999 Chi-Chi, Taiwan, earthquake. Sinotech Engineering Consultants, Inc., Taipei, Taiwan, is thanked for providing part of the in situ data analyzed in this paper. The Journal reviewers are thanked for their thorough review and constructive comments. The authors, however, assume full responsibility for the materials and opinions presented.

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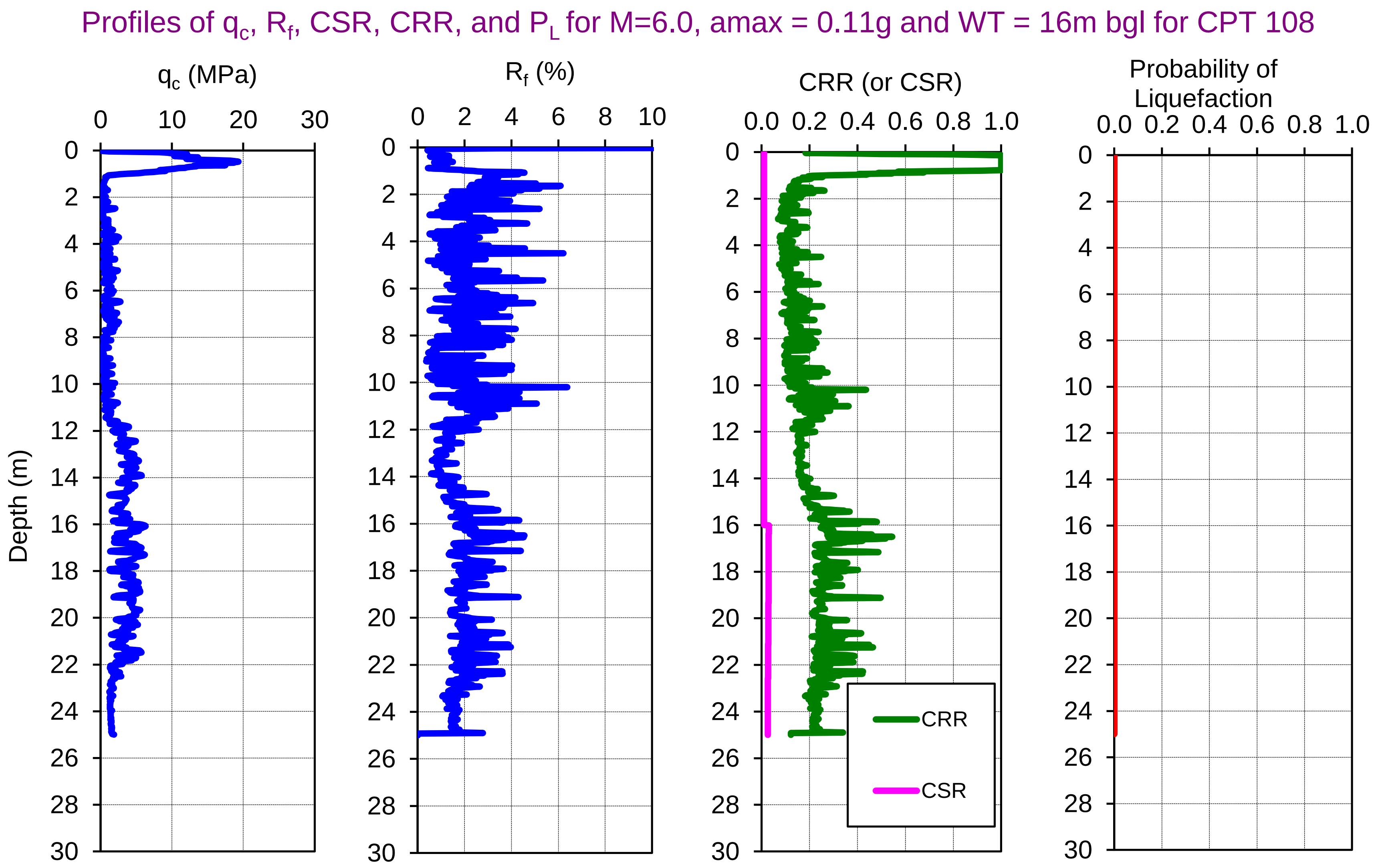
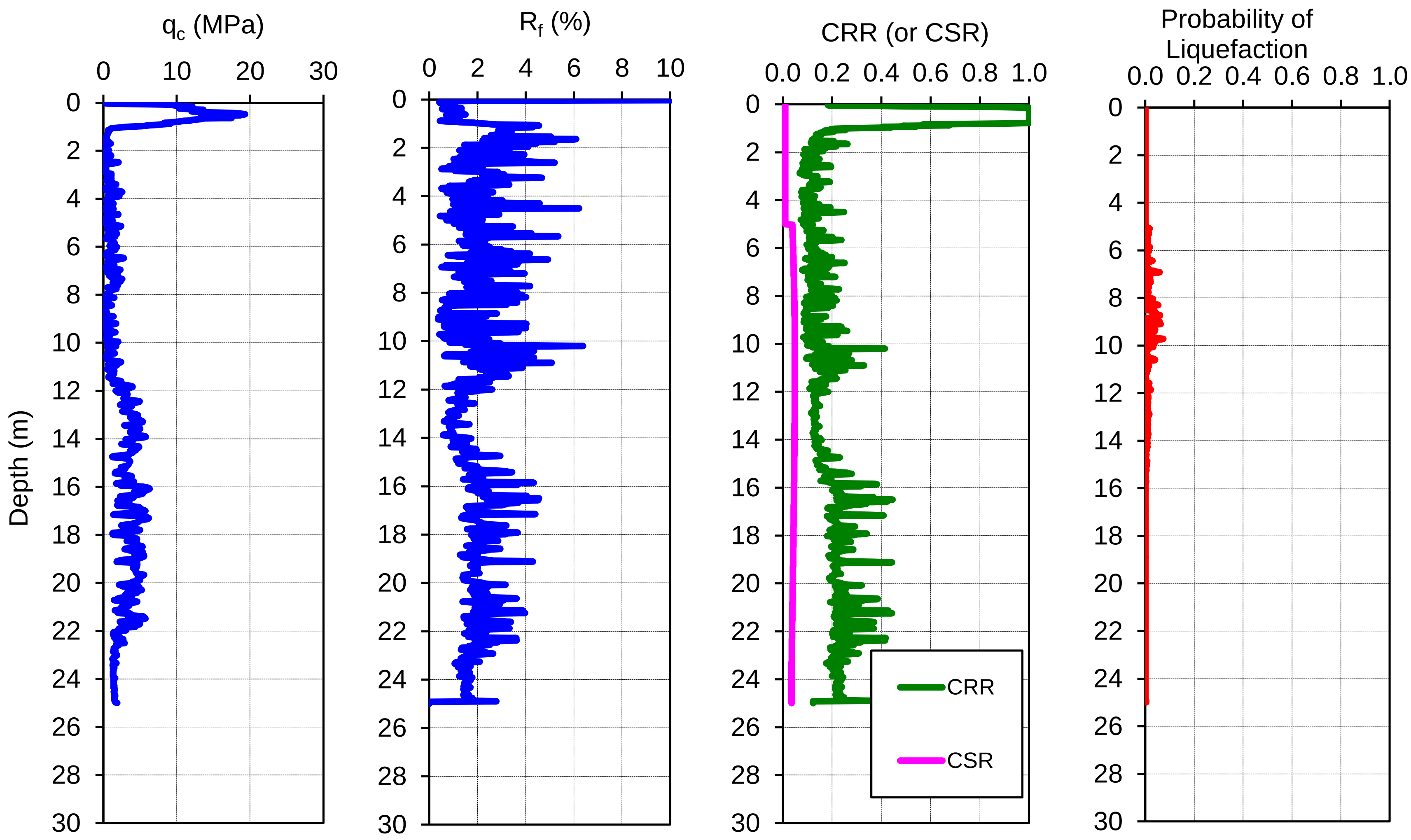
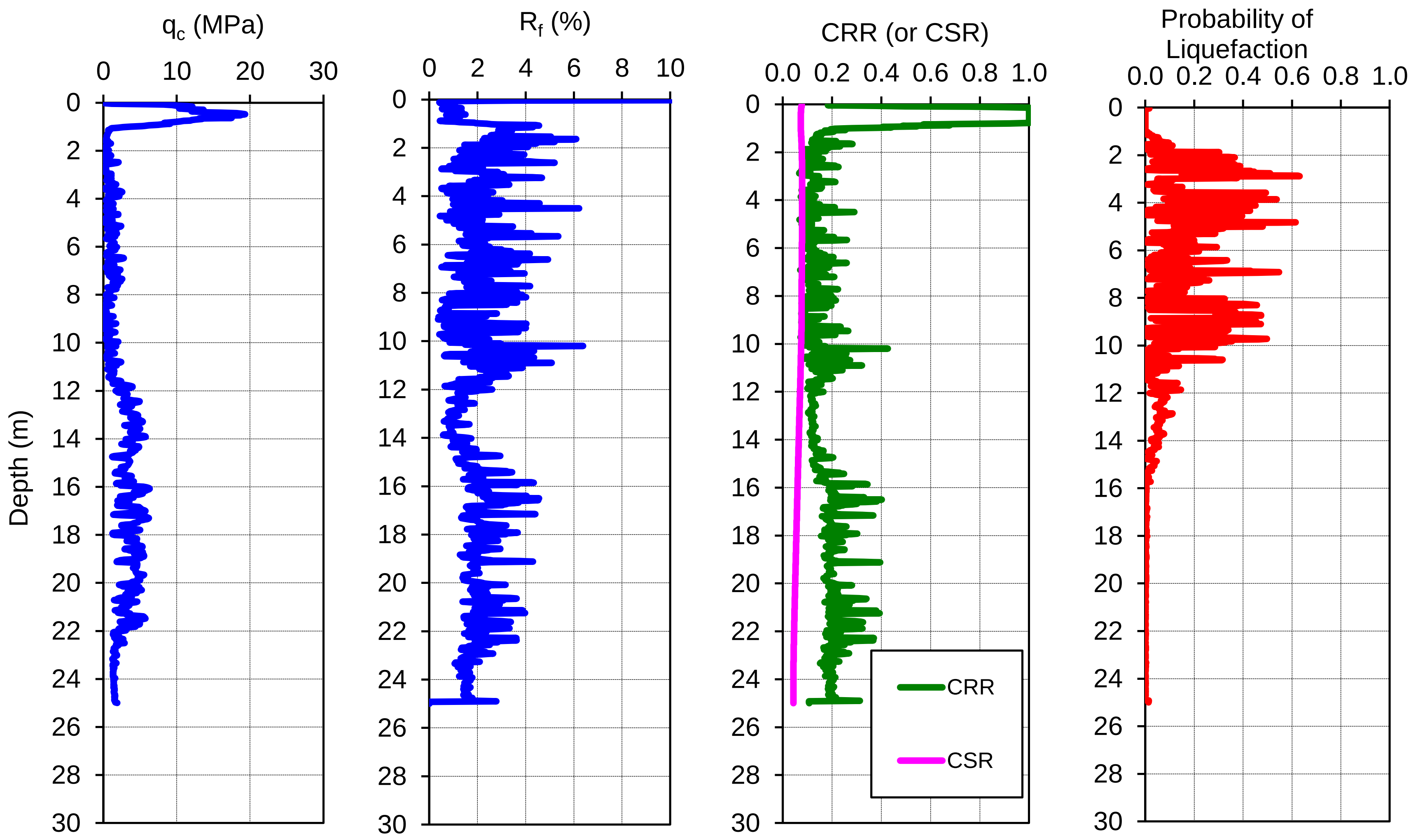

Profiles of qc, Rf, CSR, CRR, and PL for M=6.0, amax = 0.11g and WT = 16m bgl for CPT 108
qc (MPa)
Rf (%)
CRR (or CSR)
Probability of Liquefaction
Depth (m)
CRR
CSR

Profiles of q_c, R_f, CSR, CRR, and P_L for M=6.0, amax = 0.11g and WT = 5m bgl for CPT 108



Profiles of q_c, R_f, CSR, CRR, and P_L for M=6.0, amax = 0.11g and WT = 0m bgl for CPT 108



Spreadsheet Template for Calculating CRR, CSR, Factor of Safety (FS), and Probability of Liquefaction (P_L) based on CPT Measurements

The method implemented in this spreadsheet is applicable to evaluating liquefaction potentail of sandy and silty soils.
For soils above groundwater table, no liquefaction is implied, which is implemented by assigning CSR = 0.01.
Refer to Juang et al. (2001) for details.
By using this speadsheet, the user agrees to assume full risk/responsibility in interpreting the results.
Spreasheet prepared by H. Yuan and C.H. Juang - May 2002

Note: All input data are marked in yellow.

Enter earthquake data: a_{max}, M_w and water table depth

a_{max} (peak horizontal ground acceleration) (g)	0.11
M_w (earthquake magnitude)	6
Calculated MSF (magnitude scaling factor) =	1.77
Water Table Depth (m)	16

CPT 108

Input Data					Intermediate parameters			Results of the Analysis			
Depth (m)	q_c(Mpa)	f_s (kPa)	σ'_v (kPa)	σ_v (kPa)	r_d	R_f (%)	F(%)	CRR	CSR	F_S	P_L
0.02	0.179	25.89	0.41	0.41	1.000	14.46	14.50	0.44	0.01	44.4	0.00
0.04	1.118	39.07	0.83	0.83	1.000	3.49	3.50	0.18	0.01	18.3	0.00
0.06	6.195	69.35	1.25	1.25	1.000	1.12	1.12	0.38	0.01	37.7	0.00
0.08	8.244	51.54	1.67	1.67	0.999	0.63	0.63	0.50	0.01	49.7	0.00
0.1	9.398	51.68	2.10	2.1	0.999	0.55	0.55	0.76	0.01	75.7	0.00
0.12	9.857	41.17	2.53	2.53	0.999	0.42	0.42	0.90	0.01	89.8	0.00
0.14	11.464	50.28	2.96	2.96	0.999	0.44	0.44	1.00	0.01	100.0	0.00
0.16	12.135	68.22	3.40	3.4	0.999	0.56	0.56	1.00	0.01	100.0	0.00
0.18	12.004	69.35	3.83	3.83	0.999	0.58	0.58	1.00	0.01	100.0	0.00
0.2	10.813	87.71	4.27	4.27	0.998	0.81	0.81	1.00	0.01	100.0	0.00
0.22	11.121	83.93	4.70	4.7	0.998	0.75	0.76	1.00	0.01	100.0	0.00
0.24	10.331	110.14	5.14	5.14	0.998	1.07	1.07	1.00	0.01	100.0	0.00
0.26	11.437	101.59	5.58	5.58	0.998	0.89	0.89	1.00	0.01	100.0	0.00
0.28	12.123	110.7	6.02	6.02	0.998	0.91	0.91	1.00	0.01	100.0	0.00
0.3	13.626	136.78	6.45	6.45	0.998	1.00	1.00	1.00	0.01	100.0	0.00
0.32	13.592	142.1	6.89	6.89	0.998	1.05	1.05	1.00	0.01	100.0	0.00
0.34	13.125	144.21	7.33	7.33	0.997	1.10	1.10	1.00	0.01	100.0	0.00
0.36	12.027	160.47	7.77	7.77	0.997	1.33	1.34	1.00	0.01	100.0	0.00
0.38	13.541	70.75	8.21	8.21	0.997	0.52	0.52	1.00	0.01	100.0	0.00
0.4	14.212	77.2	8.65	8.65	0.997	0.54	0.54	1.00	0.01	100.0	0.00
0.42	15.95	131.31	9.09	9.09	0.997	0.82	0.82	1.00	0.01	100.0	0.00
0.44	18.158	132.85	9.53	9.53	0.997	0.73	0.73	1.00	0.01	100.0	0.00
0.46	18.809	163.27	9.97	9.97	0.996	0.87	0.87	1.00	0.01	100.0	0.00
0.48	19.306	199.3	10.41	10.41	0.996	1.03	1.03	1.00	0.01	100.0	0.00
0.5	18.782	253.13	10.85	10.85	0.996	1.35	1.35	1.00	0.01	100.0	0.00
0.52	18.663	196.22	11.29	11.29	0.996	1.05	1.05	1.00	0.01	100.0	0.00
0.54	17.21	158.93	11.73	11.73	0.996	0.92	0.92	1.00	0.01	100.0	0.00
0.56	15.969	165.09	12.17	12.17	0.996	1.03	1.03	1.00	0.01	100.0	0.00
0.58	16.343	145.89	12.61	12.61	0.996	0.89	0.89	1.00	0.01	100.0	0.00
0.6	15.684	160.89	13.05	13.05	0.995	1.03	1.03	1.00	0.01	100.0	0.00
0.62	15.279	229.41	13.49	13.49	0.995	1.50	1.50	1.00	0.01	100.0	0.00
0.64	17.503	122.34	13.93	13.93	0.995	0.70	0.70	1.00	0.01	100.0	0.00
0.66	13.067	139.3	14.37	14.37	0.995	1.07	1.07	1.00	0.01	100.0	0.00
0.68	13.437	155	14.81	14.81	0.995	1.15	1.15	1.00	0.01	100.0	0.00
0.7	12.582	162.85	15.25	15.25	0.995	1.29	1.30	1.00	0.01	100.0	0.00
0.72	12.008	138.04	15.69	15.69	0.994	1.15	1.15	1.00	0.01	100.0	0.00
0.74	11.881	123.04	16.13	16.13	0.994	1.04	1.04	1.00	0.01	100.0	0.00
0.76	10.948	106.64	16.56	16.56	0.994	0.97	0.98	1.00	0.01	100.0	0.00
0.78	10.52	95.28	17.00	17	0.994	0.91	0.91	1.00	0.01	100.0	0.00
0.8	9.938	76.78	17.43	17.43	0.994	0.77	0.77	0.92	0.01	92.1	0.00
0.82	9.124	72.85	17.86	17.86	0.994	0.80	0.80	0.72	0.01	71.8	0.00
0.84	8.287	66.54	18.29	18.29	0.994	0.80	0.80	0.57	0.01	56.9	0.00
0.86	8.63	69.21	18.71	18.71	0.993	0.80	0.80	0.63	0.01	62.6	0.00
0.88	9.109	39.77	19.14	19.14	0.993	0.44	0.44	0.68	0.01	67.7	0.00
0.9	8.101	55.47	19.56	19.56	0.993	0.68	0.69	0.49	0.01	48.6	0.00
0.92	7.468	79.58	19.98	19.98	0.993	1.07	1.07	0.54	0.01	54.4	0.00
0.94	6.21	78.04	20.40	20.4	0.993	1.26	1.26	0.40	0.01	40.5	0.00
0.96	5.655	105.37	20.82	20.82	0.993	1.86	1.87	0.44	0.01	44.1	0.00
0.98	5.311	102.85	21.22	21.22	0.993	1.94	1.94	0.40	0.01	40.2	0.00
1	3.775	90.23	21.63	21.63	0.992	2.39	2.40	0.28	0.01	28.1	0.00
1.02	2.695	69.35	22.02	22.02	0.992	2.57	2.59	0.21	0.01	21.1	0.00
1.04	2.077	59.11	22.41	22.41	0.992	2.85	2.88	0.19	0.01	19.4	0.00
1.06	1.133	50	22.79	22.79	0.992	4.41	4.50	0.26	0.01	25.5	0.00
1.08	0.996	45.37	23.19	23.19	0.992	4.56	4.66	0.25	0.01	25.4	0.00
1.1	1.042	34.3	23.58	23.58	0.992	3.29	3.37	0.17	0.01	17.1	0.00
1.12	0.951	31.92	23.97	23.97	0.991	3.36	3.44	0.17	0.01	17.1	0.00
1.14	0.677	29.11	24.35	24.35	0.991	4.30	4.46	0.21	0.01	20.7	0.00
1.16	0.696	28.55	24.74	24.74	0.991	4.10	4.25	0.20	0.01	19.8	0.00
1.18	0.772	24.35	25.12	25.12	0.991	3.15	3.26	0.15	0.01	15.3	0.00
1.2	0.76	24.49	25.49	25.49	0.991	3.22	3.33	0.16	0.01	15.6	0.00
1.22	0.719	24.35	25.87	25.87	0.991	3.39	3.51	0.16	0.01	16.1	0.00

1.24	0.677	19.79	26.25	26.25	0.991	2.92	3.04	0.14	0.01	13.9	0.00
1.26	0.631	18.09	26.63	26.63	0.990	2.87	2.99	0.14	0.01	13.5	0.00
1.28	0.582	18.51	27.00	27	0.990	3.18	3.34	0.15	0.01	14.6	0.00
1.3	0.559	19.15	27.38	27.38	0.990	3.43	3.60	0.15	0.01	15.5	0.00
1.32	0.559	17.87	27.75	27.75	0.990	3.20	3.36	0.15	0.01	14.5	0.00
1.34	0.563	16.17	28.12	28.12	0.990	2.87	3.02	0.13	0.01	13.3	0.00
1.36	0.498	15.53	28.49	28.49	0.990	3.12	3.31	0.14	0.01	14.0	0.00
1.38	0.464	15.53	28.86	28.86	0.989	3.35	3.57	0.15	0.01	14.6	0.00
1.4	0.46	14.47	29.22	29.22	0.989	3.15	3.36	0.14	0.01	13.9	0.00
1.42	0.46	13.62	29.59	29.59	0.989	2.96	3.16	0.13	0.01	13.2	0.00
1.44	0.449	12.55	29.96	29.96	0.989	2.80	2.99	0.13	0.01	12.7	0.00
1.46	0.452	12.34	30.32	30.32	0.989	2.73	2.93	0.12	0.01	12.4	0.00
1.48	0.426	10.85	30.68	30.68	0.989	2.55	2.74	0.12	0.01	11.8	0.00
1.5	0.395	13.62	31.05	31.05	0.989	3.45	3.74	0.15	0.01	14.5	0.00
1.52	0.388	12.55	31.41	31.41	0.988	3.23	3.52	0.14	0.01	13.8	0.00
1.54	0.392	19.79	31.78	31.78	0.988	5.05	5.49	0.21	0.01	20.7	0.00
1.56	0.395	18.72	32.15	32.15	0.988	4.74	5.16	0.19	0.01	19.4	0.00
1.58	0.548	16.6	32.51	32.51	0.988	3.03	3.22	0.14	0.01	13.8	0.00
1.6	0.673	15.32	32.88	32.88	0.988	2.28	2.39	0.11	0.01	11.4	0.00
1.62	0.525	14.47	33.25	33.25	0.988	2.76	2.94	0.13	0.01	12.7	0.00
1.64	0.376	22.94	33.63	33.63	0.987	6.10	6.70	0.25	0.01	25.2	0.00
1.66	0.441	26.45	34.01	34.01	0.987	6.00	6.50	0.26	0.01	26.3	0.00
1.68	0.837	21.82	34.38	34.38	0.987	2.61	2.72	0.13	0.01	12.9	0.00
1.7	1.042	23.08	34.76	34.76	0.987	2.21	2.29	0.12	0.01	11.8	0.00
1.72	0.795	25.33	35.13	35.13	0.987	3.19	3.33	0.15	0.01	15.2	0.00
1.74	0.536	25.05	35.51	35.51	0.987	4.67	5.01	0.21	0.01	20.7	0.00
1.76	0.422	21.96	35.88	35.88	0.987	5.20	5.69	0.22	0.01	21.7	0.00
1.78	0.529	19.15	36.25	36.25	0.986	3.62	3.89	0.16	0.01	15.9	0.00
1.8	0.468	15.32	36.62	36.62	0.986	3.27	3.55	0.14	0.01	14.3	0.00
1.82	0.354	15.74	36.98	36.98	0.986	4.45	4.96	0.18	0.01	17.6	0.00
1.84	0.342	12.55	37.34	37.34	0.986	3.67	4.12	0.15	0.01	14.8	0.00
1.86	0.403	12.55	37.70	37.7	0.986	3.11	3.44	0.13	0.01	13.4	0.00
1.88	0.38	5.53	38.07	38.07	0.986	1.46	1.62	0.09	0.01	8.9	0.00
1.9	0.384	8.51	38.43	38.43	0.985	2.22	2.46	0.11	0.01	10.8	0.00
1.92	0.445	10.85	38.79	38.79	0.985	2.44	2.67	0.12	0.01	11.5	0.00
1.94	0.445	14.89	39.16	39.16	0.985	3.35	3.67	0.14	0.01	14.4	0.00
1.96	0.369	15.11	39.53	39.53	0.985	4.09	4.59	0.16	0.01	16.4	0.00
1.98	0.726	14.89	39.90	39.9	0.985	2.05	2.17	0.11	0.01	10.8	0.00
2	0.7	12.77	40.27	40.27	0.985	1.82	1.94	0.10	0.01	10.1	0.00
2.02	0.551	13.19	40.64	40.64	0.985	2.39	2.58	0.12	0.01	11.6	0.00
2.04	0.376	12.55	41.01	41.01	0.984	3.34	3.75	0.14	0.01	14.0	0.00
2.06	0.361	7.02	41.37	41.37	0.984	1.94	2.20	0.10	0.01	10.1	0.00
2.08	0.399	5.32	41.73	41.73	0.984	1.33	1.49	0.09	0.01	8.6	0.00
2.1	0.392	4.89	42.09	42.09	0.984	1.25	1.40	0.08	0.01	8.4	0.00
2.12	0.342	5.11	42.46	42.46	0.984	1.49	1.71	0.09	0.01	9.0	0.00
2.14	0.308	5.11	42.83	42.83	0.984	1.66	1.93	0.09	0.01	9.3	0.00
2.16	0.487	13.62	43.20	43.2	0.983	2.80	3.07	0.13	0.01	12.8	0.00
2.18	0.973	17.66	43.58	43.58	0.983	1.82	1.90	0.10	0.01	10.3	0.00
2.2	1.076	17.45	43.96	43.96	0.983	1.62	1.69	0.10	0.01	9.8	0.00
2.22	0.753	16.17	44.33	44.33	0.983	2.15	2.28	0.11	0.01	11.1	0.00
2.24	0.578	16.17	44.71	44.71	0.983	2.80	3.03	0.13	0.01	13.0	0.00
2.26	0.35	12.34	45.07	45.07	0.983	3.53	4.05	0.14	0.01	14.4	0.00
2.28	0.27	10.64	45.44	45.44	0.983	3.94	4.74	0.15	0.01	14.9	0.00
2.3	0.259	4.47	45.79	45.79	0.982	1.73	2.10	0.09	0.01	9.5	0.00
2.32	0.278	4.26	46.14	46.14	0.982	1.53	1.84	0.09	0.01	9.1	0.00
2.34	0.293	4.26	46.50	46.5	0.982	1.45	1.73	0.09	0.01	8.9	0.00
2.36	0.316	4.47	46.85	46.85	0.982	1.41	1.66	0.09	0.01	8.8	0.00
2.38	0.338	4.26	47.20	47.2	0.982	1.26	1.46	0.09	0.01	8.5	0.00
2.4	0.297	4.26	47.57	47.57	0.982	1.43	1.71	0.09	0.01	8.9	0.00
2.42	0.262	4.26	47.92	47.92	0.981	1.63	1.99	0.09	0.01	9.3	0.00
2.44	0.346	4.26	48.28	48.28	0.981	1.23	1.43	0.08	0.01	8.5	0.00
2.46	1.061	10.64	48.64	48.64	0.981	1.00	1.05	0.08	0.01	8.1	0.00
2.48	2.062	21.54	49.04	49.04	0.981	1.04	1.07	0.09	0.01	9.3	0.00
2.5	1.924	27.85	49.43	49.43	0.981	1.45	1.49	0.10	0.01	10.3	0.00
2.52	1.483	34.44	49.83	49.83	0.981	2.32	2.40	0.13	0.01	12.8	0.00
2.54	1.019	33.18	50.22	50.22	0.981	3.26	3.42	0.16	0.01	16.1	0.00
2.56	0.707	29.53	50.61	50.61	0.980	4.18	4.50	0.19	0.01	19.3	0.00
2.58	0.574	25.33	50.98	50.98	0.980	4.41	4.84	0.19	0.01	19.5	0.00
2.6	0.475	21.82	51.35	51.35	0.980	4.59	5.15	0.19	0.01	19.3	0.00
2.62	0.323	16.81	51.72	51.72	0.980	5.20	6.20	0.20	0.01	19.6	0.00
2.64	0.285	8.72	52.07	52.07	0.980	3.06	3.74	0.13	0.01	12.8	0.00
2.66	0.289	2.98	52.43	52.43	0.980	1.03	1.26	0.08	0.01	8.1	0.00
2.68	0.297	3.4	52.78	52.78	0.979	1.14	1.39	0.08	0.01	8.3	0.00
2.7	0.281	2.77	53.13	53.13	0.979	0.99	1.22	0.08	0.01	8.0	0.00
2.72	0.278	2.77	53.48	53.48	0.979	1.00	1.23	0.08	0.01	8.0	0.00
2.74	0.293	3.62	53.84	53.84	0.979	1.24	1.51	0.09	0.01	8.5	0.00
2.76	0.338	2.77	54.19	54.19	0.979	0.82	0.98	0.08	0.01	7.6	0.00
2.78	0.369	3.19	54.54	54.54	0.979	0.86	1.01	0.08	0.01	7.7	0.00
2.8	0.354	7.23	54.90	54.9	0.979	2.04	2.42	0.10	0.01	10.5	0.00
2.82	0.278	6.17	55.26	55.26	0.978	2.22	2.77	0.11	0.01	10.8	0.00
2.84	0.312	4.47	55.62	55.62	0.978	1.43	1.74	0.09	0.01	9.0	0.00
2.86	0.407	2.13	55.97	55.97	0.978	0.52	0.61	0.07	0.01	6.9	0.00
2.88	0.46	2.34	56.33	56.33	0.978	0.51	0.58	0.07	0.01	6.9	0.00
2.9	0.319	5.96	56.70	56.7	0.978	1.87	2.27	0.10	0.01	10.1	0.00

2.92	0.331	7.23	57.07	57.07	0.978	2.18	2.64	0.11	0.01	10.8	0.00
2.94	0.582	8.51	57.45	57.45	0.978	1.46	1.62	0.09	0.01	9.2	0.00
2.96	1.11	11.91	57.83	57.83	0.977	1.07	1.13	0.08	0.01	8.4	0.00
2.98	1.015	17.45	58.21	58.21	0.977	1.72	1.82	0.10	0.01	10.1	0.00
3	0.92	26.17	58.60	58.6	0.977	2.84	3.04	0.14	0.01	14.0	0.00
3.02	1.053	25.19	58.99	58.99	0.977	2.39	2.53	0.12	0.01	12.5	0.00
3.04	1.103	23.64	59.37	59.37	0.977	2.14	2.27	0.12	0.01	11.6	0.00
3.06	0.909	22.8	59.75	59.75	0.977	2.51	2.68	0.13	0.01	12.7	0.00
3.08	0.673	19.36	60.14	60.14	0.976	2.88	3.16	0.14	0.01	13.7	0.00
3.1	0.536	16.6	60.52	60.52	0.976	3.10	3.49	0.14	0.01	14.1	0.00
3.12	0.772	20.14	60.91	60.91	0.976	2.61	2.83	0.13	0.01	12.9	0.00
3.14	1.023	25.75	61.29	61.29	0.976	2.52	2.68	0.13	0.01	13.0	0.00
3.16	1.099	24.35	61.67	61.67	0.976	2.22	2.35	0.12	0.01	11.9	0.00
3.18	1.053	23.64	62.05	62.05	0.976	2.25	2.39	0.12	0.01	12.0	0.00
3.2	0.76	22.8	62.43	62.43	0.976	3.00	3.27	0.14	0.01	14.4	0.00
3.22	0.559	23.93	62.81	62.81	0.975	4.28	4.82	0.19	0.01	18.8	0.00
3.24	0.414	19.36	63.19	63.19	0.975	4.68	5.52	0.19	0.01	19.1	0.00
3.26	0.559	17.02	63.56	63.56	0.975	3.04	3.44	0.14	0.01	14.0	0.00
3.28	0.7	19.15	63.94	63.94	0.975	2.74	3.01	0.13	0.01	13.3	0.00
3.3	0.62	20.28	64.32	64.32	0.975	3.27	3.65	0.15	0.01	15.1	0.00
3.32	0.863	22.38	64.71	64.71	0.975	2.59	2.80	0.13	0.01	13.1	0.00
3.34	1.297	23.93	65.10	65.1	0.974	1.85	1.94	0.11	0.01	10.9	0.00
3.36	1.251	27.15	65.50	65.5	0.974	2.17	2.29	0.12	0.01	12.0	0.00
3.38	1.479	28.97	65.89	65.89	0.974	1.96	2.05	0.11	0.01	11.4	0.00
3.4	1.753	28.83	66.29	66.29	0.974	1.64	1.71	0.11	0.01	10.6	0.00
3.42	1.43	32.76	66.68	66.68	0.974	2.29	2.40	0.13	0.01	12.7	0.00
3.44	1.08	31.36	67.07	67.07	0.974	2.90	3.10	0.15	0.01	14.7	0.00
3.46	0.909	28.41	67.46	67.46	0.974	3.13	3.38	0.15	0.01	15.3	0.00
3.48	0.871	25.61	67.84	67.84	0.973	2.94	3.19	0.14	0.01	14.5	0.00
3.5	0.654	20.28	68.22	68.22	0.973	3.10	3.46	0.15	0.01	14.6	0.00
3.52	0.449	14.89	68.59	68.59	0.973	3.32	3.91	0.15	0.01	14.7	0.00
3.54	0.316	8.94	68.95	68.95	0.973	2.83	3.62	0.13	0.01	12.7	0.00
3.56	0.319	7.45	69.31	69.31	0.973	2.34	2.98	0.11	0.01	11.5	0.00
3.58	0.312	2.55	69.67	69.67	0.973	0.82	1.05	0.08	0.01	7.9	0.00
3.6	0.3	4.04	70.04	70.04	0.972	1.35	1.76	0.09	0.01	9.1	0.00
3.62	0.308	4.68	70.40	70.4	0.972	1.52	1.97	0.10	0.01	9.5	0.00
3.64	0.715	7.66	70.77	70.77	0.972	1.07	1.19	0.08	0.01	8.4	0.00
3.66	1.833	9.57	71.14	71.14	0.972	0.52	0.54	0.08	0.01	7.6	0.00
3.68	2.232	11.28	71.52	71.52	0.972	0.51	0.52	0.08	0.01	7.9	0.00
3.7	2.452	12.77	71.91	71.91	0.972	0.52	0.54	0.08	0.01	8.2	0.00
3.72	2.56	15.74	72.29	72.29	0.972	0.61	0.63	0.09	0.01	8.5	0.00
3.74	2.463	22.8	72.68	72.68	0.971	0.93	0.95	0.09	0.01	9.2	0.00
3.76	2.235	32.9	73.06	73.06	0.971	1.47	1.52	0.11	0.01	10.6	0.00
3.78	1.863	28.97	73.46	73.46	0.971	1.56	1.62	0.10	0.01	10.5	0.00
3.8	1.304	22.66	73.86	73.86	0.971	1.74	1.84	0.11	0.01	10.6	0.00
3.82	0.863	20.42	74.26	74.26	0.971	2.37	2.59	0.12	0.01	12.4	0.00
3.84	0.65	17.23	74.66	74.66	0.971	2.65	2.99	0.13	0.01	13.1	0.00
3.86	0.665	4.89	75.03	75.03	0.970	0.74	0.83	0.08	0.01	7.6	0.00
3.88	1.76	13.83	75.42	75.42	0.970	0.79	0.82	0.08	0.01	8.2	0.00
3.9	2.181	22.1	75.82	75.82	0.970	1.01	1.05	0.09	0.01	9.2	0.00
3.92	1.837	23.64	76.22	76.22	0.970	1.29	1.34	0.10	0.01	9.6	0.00
3.94	1.365	22.24	76.61	76.61	0.970	1.63	1.73	0.10	0.01	10.3	0.00
3.96	0.981	22.1	77.00	77	0.970	2.25	2.44	0.12	0.01	12.2	0.00
3.98	0.726	17.66	77.39	77.39	0.970	2.43	2.72	0.13	0.01	12.6	0.00
4	0.548	10.85	77.77	77.77	0.969	1.98	2.31	0.11	0.01	11.0	0.00
4.02	0.494	11.06	78.14	78.14	0.969	2.24	2.66	0.12	0.01	11.7	0.00
4.04	0.471	4.89	78.50	78.5	0.969	1.04	1.25	0.09	0.01	8.5	0.00
4.06	0.388	4.47	78.87	78.87	0.969	1.15	1.45	0.09	0.01	8.8	0.00
4.08	0.388	9.15	79.24	79.24	0.969	2.36	2.96	0.12	0.01	11.9	0.00
4.1	0.529	5.53	79.60	79.6	0.969	1.05	1.23	0.09	0.01	8.5	0.00
4.12	0.643	6.17	79.97	79.97	0.968	0.96	1.10	0.08	0.01	8.3	0.00
4.14	0.646	7.23	80.35	80.35	0.968	1.12	1.28	0.09	0.01	8.7	0.00
4.16	0.506	10.85	80.73	80.73	0.968	2.14	2.55	0.12	0.01	11.5	0.00
4.18	0.715	21.68	81.11	81.11	0.968	3.03	3.42	0.15	0.01	14.8	0.00
4.2	1.395	24.21	81.50	81.5	0.968	1.74	1.84	0.11	0.01	10.8	0.00
4.22	1.365	21.54	81.88	81.88	0.968	1.58	1.68	0.10	0.01	10.3	0.00
4.24	1.095	20	82.27	82.27	0.968	1.83	1.97	0.11	0.01	10.9	0.00
4.26	0.821	18.94	82.65	82.65	0.967	2.31	2.57	0.12	0.01	12.4	0.00
4.28	0.532	16.17	83.03	83.03	0.967	3.04	3.60	0.14	0.01	14.5	0.00
4.3	0.414	18.94	83.40	83.4	0.967	4.57	5.73	0.19	0.01	19.3	0.00
4.32	0.411	8.51	83.77	83.77	0.967	2.07	2.60	0.11	0.01	11.3	0.00
4.34	0.452	4.47	84.13	84.13	0.967	0.99	1.22	0.09	0.01	8.5	0.00
4.36	0.479	7.23	84.51	84.51	0.967	1.51	1.83	0.10	0.01	9.9	0.00
4.38	0.494	16.81	84.89	84.89	0.966	3.40	4.11	0.16	0.01	15.6	0.00
4.4	0.901	22.52	85.27	85.27	0.966	2.50	2.76	0.13	0.01	13.2	0.00
4.42	1.395	21.96	85.65	85.65	0.966	1.57	1.68	0.10	0.01	10.3	0.00
4.44	1.042	15.11	86.03	86.03	0.966	1.45	1.58	0.10	0.01	9.8	0.00
4.46	0.745	14.68	86.41	86.41	0.966	1.97	2.23	0.11	0.01	11.3	0.00
4.48	0.487	10.21	86.78	86.78	0.966	2.10	2.55	0.12	0.01	11.5	0.00
4.5	0.335	20.84	87.16	87.16	0.966	6.22	8.41	0.25	0.01	24.8	0.00
4.52	0.403	18.3	87.53	87.53	0.965	4.54	5.80	0.19	0.01	19.3	0.00
4.54	0.787	11.06	87.90	87.9	0.965	1.41	1.58	0.10	0.01	9.7	0.00
4.56	1.004	10.64	88.28	88.28	0.965	1.06	1.16	0.09	0.01	8.7	0.00
4.58	0.719	12.55	88.67	88.67	0.965	1.75	1.99	0.11	0.01	10.7	0.00

4.6	0.525	13.62	89.06	89.06	0.965	2.59	3.12	0.13	0.01	13.2	0.00
4.62	1.156	15.53	89.45	89.45	0.965	1.34	1.46	0.10	0.01	9.6	0.00
4.64	2.031	17.66	89.85	89.85	0.965	0.87	0.91	0.09	0.01	8.7	0.00
4.66	2.031	20.14	90.25	90.25	0.964	0.99	1.04	0.09	0.01	9.1	0.00
4.68	1.726	29.95	90.65	90.65	0.964	1.74	1.83	0.11	0.01	11.2	0.00
4.7	1.392	28.41	91.05	91.05	0.964	2.04	2.18	0.12	0.01	12.1	0.00
4.72	1.16	26.17	91.44	91.44	0.964	2.26	2.45	0.13	0.01	12.7	0.00
4.74	0.939	23.64	91.82	91.82	0.964	2.52	2.79	0.14	0.01	13.5	0.00
4.76	0.7	20.28	92.20	92.2	0.964	2.90	3.34	0.15	0.01	14.6	0.00
4.78	0.414	8.72	92.58	92.58	0.963	2.11	2.71	0.12	0.01	11.7	0.00
4.8	0.338	6.38	92.94	92.94	0.963	1.89	2.60	0.11	0.01	11.1	0.00
4.82	0.384	1.7	93.30	93.3	0.963	0.44	0.58	0.07	0.01	7.4	0.00
4.84	0.35	2.13	93.67	93.67	0.963	0.61	0.83	0.08	0.01	7.9	0.00
4.86	0.35	7.45	94.05	94.05	0.963	2.13	2.91	0.12	0.01	11.8	0.00
4.88	0.798	12.98	94.42	94.42	0.963	1.63	1.84	0.10	0.01	10.5	0.00
4.9	1.24	12.34	94.79	94.79	0.963	1.00	1.08	0.09	0.01	8.7	0.00
4.92	0.932	11.49	95.17	95.17	0.962	1.23	1.37	0.09	0.01	9.3	0.00
4.94	0.646	11.91	95.54	95.54	0.962	1.84	2.16	0.11	0.01	11.1	0.00
4.96	0.376	8.3	95.91	95.91	0.962	2.21	2.96	0.12	0.01	12.1	0.00
4.98	0.323	6.6	96.28	96.28	0.962	2.04	2.91	0.12	0.01	11.6	0.00
5	0.297	2.13	96.64	96.64	0.962	0.72	1.06	0.08	0.01	8.3	0.00
5.02	0.304	5.32	97.01	97.01	0.962	1.75	2.57	0.11	0.01	10.9	0.00
5.04	0.418	9.15	97.39	97.39	0.961	2.19	2.85	0.12	0.01	12.1	0.00
5.06	0.901	13.83	97.78	97.78	0.961	1.53	1.72	0.10	0.01	10.3	0.00
5.08	1.601	17.66	98.18	98.18	0.961	1.10	1.18	0.09	0.01	9.2	0.00
5.1	1.768	19.36	98.58	98.58	0.961	1.10	1.16	0.09	0.01	9.3	0.00
5.12	2.147	21.68	98.98	98.98	0.961	1.01	1.06	0.09	0.01	9.3	0.00
5.14	2.417	24.63	99.39	99.39	0.961	1.02	1.06	0.10	0.01	9.6	0.00
5.16	2.359	33.18	99.80	99.8	0.961	1.41	1.47	0.11	0.01	10.8	0.00
5.18	2.054	36.82	100.20	100.2	0.960	1.79	1.88	0.12	0.01	11.9	0.00
5.2	1.548	29.25	100.61	100.61	0.960	1.89	2.02	0.12	0.01	11.9	0.00
5.22	1.106	23.36	101.00	101	0.960	2.11	2.32	0.12	0.01	12.4	0.00
5.24	0.749	17.87	101.39	101.39	0.960	2.39	2.76	0.13	0.01	13.2	0.00
5.26	0.479	16.6	101.78	101.78	0.960	3.47	4.40	0.17	0.01	16.5	0.00
5.28	0.65	17.66	102.17	102.17	0.960	2.72	3.22	0.14	0.01	14.3	0.00
5.3	1.51	18.72	102.56	102.56	0.959	1.24	1.33	0.10	0.01	9.7	0.00
5.32	1.73	27.85	102.95	102.95	0.959	1.61	1.71	0.11	0.01	11.1	0.00
5.34	1.494	26.73	103.35	103.35	0.959	1.79	1.92	0.12	0.01	11.5	0.00
5.36	1.342	23.36	103.74	103.74	0.959	1.74	1.89	0.11	0.01	11.3	0.00
5.38	1.072	21.4	104.13	104.13	0.959	2.00	2.21	0.12	0.01	12.1	0.00
5.4	0.73	20.42	104.53	104.53	0.959	2.80	3.26	0.15	0.01	14.8	0.00
5.42	0.707	21.96	104.92	104.92	0.959	3.11	3.65	0.16	0.01	16.0	0.00
5.44	1.46	31.5	105.31	105.31	0.958	2.16	2.33	0.13	0.01	13.0	0.00
5.46	1.852	28.69	105.70	105.7	0.958	1.55	1.64	0.11	0.01	11.0	0.00
5.48	1.468	23.64	106.09	106.09	0.958	1.61	1.74	0.11	0.01	11.0	0.00
5.5	1.038	21.4	106.48	106.48	0.958	2.06	2.30	0.12	0.01	12.4	0.00
5.52	0.722	20.42	106.88	106.88	0.958	2.83	3.32	0.15	0.01	15.0	0.00
5.54	0.551	23.36	107.27	107.27	0.958	4.24	5.26	0.20	0.01	20.2	0.00
5.56	1.095	29.95	107.65	107.65	0.957	2.74	3.03	0.15	0.01	15.2	0.00
5.58	1.616	24.49	108.04	108.04	0.957	1.52	1.62	0.11	0.01	10.8	0.00
5.6	1.259	20.7	108.42	108.42	0.957	1.64	1.80	0.11	0.01	11.1	0.00
5.62	0.901	17.66	108.81	108.81	0.957	1.96	2.23	0.12	0.01	12.0	0.00
5.64	0.635	20.7	109.19	109.19	0.957	3.26	3.94	0.17	0.01	16.6	0.00
5.66	0.392	20.98	109.57	109.57	0.957	5.35	7.43	0.24	0.01	23.8	0.00
5.68	0.544	22.38	109.95	109.95	0.957	4.11	5.16	0.20	0.01	19.8	0.00
5.7	0.981	19.79	110.33	110.33	0.956	2.02	2.27	0.12	0.01	12.3	0.00
5.72	1.152	18.72	110.72	110.72	0.956	1.63	1.80	0.11	0.01	11.0	0.00
5.74	1.038	25.47	111.10	111.1	0.956	2.45	2.75	0.14	0.01	14.0	0.00
5.76	1.099	23.08	111.49	111.49	0.956	2.10	2.34	0.13	0.01	12.7	0.00
5.78	1.213	23.64	111.89	111.89	0.956	1.95	2.15	0.12	0.01	12.2	0.00
5.8	1.285	29.39	112.28	112.28	0.956	2.29	2.51	0.14	0.01	13.6	0.00
5.82	1.217	26.73	112.68	112.68	0.955	2.20	2.42	0.13	0.01	13.2	0.00
5.84	1.513	23.5	113.07	113.07	0.955	1.55	1.68	0.11	0.01	11.0	0.00
5.86	1.426	17.45	113.46	113.46	0.955	1.22	1.33	0.10	0.01	9.9	0.00
5.88	1.125	24.49	113.86	113.86	0.955	2.18	2.42	0.13	0.01	13.1	0.00
5.9	1.103	23.22	114.25	114.25	0.955	2.11	2.35	0.13	0.01	12.8	0.00
5.92	1.373	21.68	114.64	114.64	0.955	1.58	1.72	0.11	0.01	11.1	0.00
5.94	1.087	19.15	115.03	115.03	0.955	1.76	1.97	0.12	0.01	11.6	0.00
5.96	0.84	17.02	115.42	115.42	0.954	2.03	2.35	0.12	0.01	12.5	0.00
5.98	0.886	20.56	115.82	115.82	0.954	2.32	2.67	0.14	0.01	13.6	0.00
6	1.529	27.85	116.21	116.21	0.954	1.82	1.97	0.12	0.01	12.1	0.00
6.02	1.856	25.61	116.61	116.61	0.954	1.38	1.47	0.11	0.01	10.7	0.00
6.04	1.688	23.64	117.01	117.01	0.954	1.40	1.50	0.11	0.01	10.7	0.00
6.06	1.407	23.08	117.40	117.4	0.954	1.64	1.79	0.11	0.01	11.4	0.00
6.08	1.038	22.8	117.80	117.8	0.953	2.20	2.48	0.13	0.01	13.3	0.00
6.1	1.087	27.29	118.20	118.2	0.953	2.51	2.82	0.15	0.01	14.6	0.00
6.12	1.624	29.95	118.59	118.59	0.953	1.84	1.99	0.12	0.01	12.3	0.00
6.14	1.608	29.95	118.99	118.99	0.953	1.86	2.01	0.12	0.01	12.4	0.00
6.16	1.281	23.64	119.38	119.38	0.953	1.85	2.04	0.12	0.01	12.1	0.00
6.18	1.011	21.82	119.76	119.76	0.953	2.16	2.45	0.13	0.01	13.2	0.00
6.2	0.76	22.8	120.15	120.15	0.953	3.00	3.56	0.16	0.01	16.3	0.00
6.22	0.563	15.53	120.52	120.52	0.952	2.76	3.51	0.15	0.01	15.1	0.00
6.24	0.449	8.09	120.90	120.9	0.952	1.80	2.47	0.12	0.01	11.9	0.00
6.26	0.574	17.87	121.27	121.27	0.952	3.11	3.95	0.17	0.01	16.5	0.00

6.28	0.631	21.4	121.64	121.64	0.952	3.39	4.20	0.18	0.01	17.8	0.00
6.3	0.677	18.94	122.02	122.02	0.952	2.80	3.41	0.15	0.01	15.5	0.00
6.32	0.985	18.3	122.39	122.39	0.952	1.86	2.12	0.12	0.01	12.2	0.00
6.34	0.802	13.83	122.76	122.76	0.951	1.72	2.04	0.12	0.01	11.7	0.00
6.36	0.502	13.62	123.14	123.14	0.951	2.71	3.59	0.15	0.01	15.0	0.00
6.38	0.403	16.81	123.52	123.52	0.951	4.17	6.01	0.20	0.01	20.2	0.00
6.4	0.536	15.32	123.92	123.92	0.951	2.86	3.72	0.16	0.01	15.6	0.00
6.42	1.285	14.04	124.32	124.32	0.951	1.09	1.21	0.10	0.01	9.7	0.00
6.44	2.397	18.51	124.72	124.72	0.951	0.77	0.81	0.09	0.01	9.3	0.00
6.46	2.741	22.66	125.13	125.13	0.951	0.83	0.87	0.10	0.01	9.7	0.00
6.48	2.795	28.97	125.54	125.54	0.950	1.04	1.09	0.10	0.01	10.4	0.00
6.5	2.579	30.37	125.95	125.95	0.950	1.18	1.24	0.11	0.01	10.7	0.00
6.52	2.158	38.64	126.36	126.36	0.950	1.79	1.90	0.13	0.01	12.7	0.00
6.54	1.624	35.98	126.77	126.77	0.950	2.22	2.40	0.14	0.01	14.1	0.00
6.56	1.365	32.9	127.16	127.16	0.950	2.41	2.66	0.15	0.01	14.8	0.00
6.58	1.103	31.5	127.56	127.56	0.950	2.86	3.23	0.17	0.01	16.6	0.00
6.6	0.871	28.97	127.94	127.94	0.950	3.33	3.90	0.18	0.01	18.4	0.00
6.62	0.605	29.81	128.32	128.32	0.949	4.93	6.25	0.25	0.01	25.4	0.00
6.64	0.605	24.35	128.70	128.7	0.949	4.02	5.11	0.21	0.01	20.9	0.00
6.66	0.738	18.51	129.07	129.07	0.949	2.51	3.04	0.15	0.01	14.8	0.00
6.68	0.627	12.98	129.45	129.45	0.949	2.07	2.61	0.13	0.01	13.1	0.00
6.7	0.692	18.3	129.83	129.83	0.949	2.64	3.26	0.15	0.01	15.3	0.00
6.72	0.612	22.8	130.21	130.21	0.949	3.73	4.73	0.20	0.01	19.7	0.00
6.74	1.224	26.17	130.60	130.6	0.948	2.14	2.39	0.14	0.01	13.7	0.00
6.76	1.506	23.5	130.98	130.98	0.948	1.56	1.71	0.12	0.01	11.6	0.00
6.78	1.046	20.14	131.36	131.36	0.948	1.93	2.20	0.13	0.01	12.8	0.00
6.8	0.76	20.56	131.74	131.74	0.948	2.71	3.27	0.16	0.01	15.7	0.00
6.82	0.46	16.81	132.11	132.11	0.948	3.65	5.13	0.19	0.01	19.0	0.00
6.84	0.388	12.77	132.48	132.48	0.948	3.29	5.00	0.18	0.01	17.6	0.00
6.86	0.35	2.34	132.84	132.84	0.948	0.67	1.08	0.09	0.01	9.1	0.00
6.88	0.357	2.55	133.22	133.22	0.947	0.71	1.14	0.09	0.01	9.3	0.00
6.9	0.403	2.77	133.60	133.6	0.947	0.69	1.03	0.09	0.01	9.1	0.00
6.92	0.856	4.47	133.99	133.99	0.947	0.52	0.62	0.08	0.01	8.3	0.00
6.94	1.966	10	134.39	134.39	0.947	0.51	0.55	0.09	0.01	8.5	0.00
6.96	2.332	20.28	134.79	134.79	0.947	0.87	0.92	0.10	0.01	9.8	0.00
6.98	2.255	32.76	135.20	135.2	0.947	1.45	1.55	0.12	0.01	11.7	0.00
7	2.015	35.7	135.60	135.6	0.946	1.77	1.90	0.13	0.01	12.8	0.00
7.02	1.582	28.69	136.00	136	0.946	1.81	1.98	0.13	0.01	12.7	0.00
7.04	1.167	23.79	136.39	136.39	0.946	2.04	2.31	0.13	0.01	13.5	0.00
7.06	0.905	19.36	136.79	136.79	0.946	2.14	2.52	0.14	0.01	13.8	0.00
7.08	0.563	18.09	137.18	137.18	0.946	3.21	4.25	0.18	0.01	17.8	0.00
7.1	0.696	23.5	137.57	137.57	0.946	3.38	4.21	0.19	0.01	18.8	0.00
7.12	1.654	28.27	137.96	137.96	0.946	1.71	1.86	0.12	0.01	12.4	0.00
7.14	1.947	23.64	138.35	138.35	0.945	1.21	1.31	0.11	0.01	10.8	0.00
7.16	1.449	22.24	138.74	138.74	0.945	1.53	1.70	0.12	0.01	11.7	0.00
7.18	1.057	22.8	139.14	139.14	0.945	2.16	2.48	0.14	0.01	14.0	0.00
7.2	0.787	31.07	139.53	139.53	0.945	3.95	4.80	0.22	0.01	22.1	0.00
7.22	0.894	24.35	139.92	139.92	0.945	2.72	3.23	0.16	0.01	16.4	0.00
7.24	1.312	20	140.31	140.31	0.945	1.52	1.71	0.12	0.01	11.7	0.00
7.26	1.365	17.23	140.70	140.7	0.944	1.26	1.41	0.11	0.01	10.8	0.00
7.28	1.057	20.14	141.10	141.1	0.944	1.91	2.20	0.13	0.01	13.1	0.00
7.3	1.289	23.5	141.51	141.51	0.944	1.82	2.05	0.13	0.01	12.9	0.00
7.32	2.293	28.69	141.91	141.91	0.944	1.25	1.33	0.11	0.01	11.2	0.00
7.34	2.575	26.31	142.32	142.32	0.944	1.02	1.08	0.11	0.01	10.6	0.00
7.36	2.313	27.15	142.73	142.73	0.944	1.17	1.25	0.11	0.01	11.0	0.00
7.38	1.916	27.71	143.14	143.14	0.944	1.45	1.56	0.12	0.01	11.7	0.00
7.4	1.829	31.78	143.55	143.55	0.943	1.74	1.89	0.13	0.01	12.9	0.00
7.42	2.096	38.64	143.95	143.95	0.943	1.84	1.98	0.13	0.01	13.5	0.00
7.44	2.347	33.74	144.36	144.36	0.943	1.44	1.53	0.12	0.01	12.0	0.00
7.46	2.019	29.39	144.76	144.76	0.943	1.46	1.57	0.12	0.01	11.9	0.00
7.48	1.544	28.55	145.17	145.17	0.943	1.85	2.04	0.13	0.01	13.2	0.00
7.5	1.266	32.62	145.57	145.57	0.943	2.58	2.91	0.16	0.01	16.4	0.00
7.52	1.411	30.51	145.97	145.97	0.942	2.16	2.41	0.15	0.01	14.6	0.00
7.54	2.023	29.25	146.38	146.38	0.942	1.45	1.56	0.12	0.01	11.9	0.00
7.56	1.867	27.99	146.78	146.78	0.942	1.50	1.63	0.12	0.01	12.0	0.00
7.58	1.662	33.04	147.18	147.18	0.942	1.99	2.18	0.14	0.01	14.0	0.00
7.6	1.749	38.36	147.59	147.59	0.942	2.19	2.40	0.15	0.01	15.0	0.00
7.62	1.954	39.63	147.98	147.98	0.942	2.03	2.19	0.14	0.01	14.4	0.00
7.64	1.574	31.92	148.38	148.38	0.942	2.03	2.24	0.14	0.01	14.2	0.00
7.66	1.129	21.26	148.77	148.77	0.941	1.88	2.17	0.13	0.01	13.4	0.00
7.68	0.852	18.72	149.16	149.16	0.941	2.20	2.66	0.15	0.01	14.6	0.00
7.7	0.567	21.4	149.55	149.55	0.941	3.77	5.13	0.21	0.01	21.2	0.00
7.72	0.703	29.39	149.94	149.94	0.941	4.18	5.31	0.24	0.01	23.8	0.00
7.74	1.525	26.73	150.33	150.33	0.941	1.75	1.94	0.13	0.01	13.0	0.00
7.76	1.772	27.43	150.72	150.72	0.941	1.55	1.69	0.12	0.01	12.3	0.00
7.78	1.346	30.65	151.11	151.11	0.940	2.28	2.57	0.15	0.01	15.3	0.00
7.8	0.977	32.06	151.50	151.5	0.940	3.28	3.88	0.20	0.01	19.9	0.00
7.82	0.768	25.89	151.89	151.89	0.940	3.37	4.20	0.20	0.01	20.0	0.00
7.84	0.89	21.4	152.27	152.27	0.940	2.40	2.90	0.16	0.01	15.7	0.00
7.86	1.004	17.45	152.65	152.65	0.940	1.74	2.05	0.13	0.01	13.0	0.00
7.88	0.795	22.66	153.03	153.03	0.940	2.85	3.53	0.18	0.01	17.6	0.00
7.9	0.658	22.8	153.41	153.41	0.940	3.47	4.52	0.20	0.01	20.3	0.00
7.92	0.806	21.82	153.78	153.78	0.939	2.71	3.35	0.17	0.01	17.0	0.00
7.94	0.924	19.57	154.15	154.15	0.939	2.12	2.54	0.15	0.01	14.6	0.00

7.96	0.544	18.09	154.52	154.52	0.939	3.33	4.64	0.20	0.01	19.5	0.00
7.98	0.43	15.74	154.89	154.89	0.939	3.66	5.72	0.21	0.01	21.0	0.00
8	0.373	10.21	155.25	155.25	0.939	2.74	4.69	0.17	0.01	17.4	0.00
8.02	0.38	4.26	155.60	155.6	0.939	1.12	1.90	0.11	0.01	11.5	0.00
8.04	0.388	3.19	155.97	155.97	0.938	0.82	1.37	0.10	0.01	10.5	0.00
8.06	0.407	8.94	156.34	156.34	0.938	2.20	3.57	0.15	0.01	15.3	0.00
8.08	0.551	21.26	156.72	156.72	0.938	3.86	5.39	0.22	0.01	22.2	0.00
8.1	1.259	24.91	157.10	157.1	0.938	1.98	2.26	0.14	0.01	14.2	0.00
8.12	1.498	24.91	157.48	157.48	0.938	1.66	1.86	0.13	0.01	13.0	0.00
8.14	1.072	23.79	157.86	157.86	0.938	2.22	2.60	0.15	0.01	15.2	0.00
8.16	0.738	22.38	158.24	158.24	0.938	3.03	3.86	0.19	0.01	18.7	0.00
8.18	0.498	20	158.61	158.61	0.937	4.02	5.89	0.23	0.01	23.0	0.00
8.2	0.407	13.83	158.98	158.98	0.937	3.40	5.58	0.20	0.01	20.3	0.00
8.22	0.403	8.94	159.34	159.34	0.937	2.22	3.67	0.16	0.01	15.6	0.00
8.24	0.43	5.32	159.70	159.7	0.937	1.24	1.97	0.12	0.01	11.9	0.00
8.26	0.502	3.4	160.05	160.05	0.937	0.68	0.99	0.10	0.01	9.9	0.00
8.28	0.494	2.98	160.41	160.41	0.937	0.60	0.89	0.10	0.01	9.7	0.00
8.3	0.445	2.34	160.76	160.76	0.937	0.53	0.82	0.09	0.01	9.5	0.00
8.32	0.403	3.4	161.12	161.12	0.936	0.84	1.41	0.11	0.01	10.7	0.00
8.34	0.388	2.55	161.47	161.47	0.936	0.66	1.13	0.10	0.01	10.1	0.00
8.36	0.369	2.98	161.83	161.83	0.936	0.81	1.44	0.11	0.01	10.7	0.00
8.38	0.373	11.28	162.20	162.2	0.936	3.02	5.35	0.19	0.01	19.2	0.00
8.4	0.525	19.15	162.57	162.57	0.936	3.65	5.28	0.22	0.01	21.7	0.00
8.42	1.068	18.94	162.95	162.95	0.936	1.77	2.09	0.14	0.01	13.6	0.00
8.44	1.156	18.94	163.32	163.32	0.935	1.64	1.91	0.13	0.01	13.1	0.00
8.46	0.825	17.02	163.69	163.69	0.935	2.06	2.57	0.15	0.01	14.8	0.00
8.48	0.483	15.53	164.06	164.06	0.935	3.22	4.87	0.20	0.01	19.8	0.00
8.5	0.369	11.28	164.43	164.43	0.935	3.06	5.51	0.20	0.01	19.5	0.00
8.52	0.354	4.26	164.78	164.78	0.935	1.20	2.25	0.12	0.01	12.4	0.00
8.54	0.346	2.34	165.13	165.13	0.935	0.68	1.29	0.10	0.01	10.5	0.00
8.56	0.346	2.34	165.48	165.48	0.935	0.68	1.30	0.10	0.01	10.5	0.00
8.58	0.354	2.34	165.82	165.82	0.934	0.66	1.24	0.10	0.01	10.4	0.00
8.6	0.369	2.34	166.17	166.17	0.934	0.63	1.15	0.10	0.01	10.3	0.00
8.62	0.361	2.34	166.52	166.52	0.934	0.65	1.20	0.10	0.01	10.4	0.00
8.64	0.346	2.77	166.86	166.86	0.934	0.80	1.55	0.11	0.01	11.0	0.00
8.66	0.346	2.77	167.21	167.21	0.934	0.80	1.55	0.11	0.01	11.1	0.00
8.68	0.346	2.77	167.56	167.56	0.934	0.80	1.55	0.11	0.01	11.1	0.00
8.7	0.384	1.91	167.91	167.91	0.933	0.50	0.88	0.10	0.01	9.8	0.00
8.72	0.456	2.13	168.26	168.26	0.933	0.47	0.74	0.10	0.01	9.5	0.00
8.74	0.426	1.91	168.61	168.61	0.933	0.45	0.74	0.10	0.01	9.5	0.00
8.76	0.369	1.91	168.96	168.96	0.933	0.52	0.95	0.10	0.01	10.0	0.00
8.78	0.331	2.13	169.30	169.3	0.933	0.64	1.32	0.11	0.01	10.6	0.00
8.8	0.319	2.13	169.65	169.65	0.933	0.67	1.43	0.11	0.01	10.8	0.00
8.82	0.316	1.91	170.00	170	0.933	0.60	1.31	0.11	0.01	10.6	0.00
8.84	0.327	2.13	170.37	170.37	0.932	0.65	1.36	0.11	0.01	10.7	0.00
8.86	0.38	10.64	170.74	170.74	0.932	2.80	5.08	0.19	0.01	19.0	0.00
8.88	0.89	15.11	171.11	171.11	0.932	1.70	2.10	0.14	0.01	13.7	0.00
8.9	1.395	14.68	171.49	171.49	0.932	1.05	1.20	0.11	0.01	11.2	0.00
8.92	1.076	13.62	171.86	171.86	0.932	1.27	1.51	0.12	0.01	12.0	0.00
8.94	0.757	14.26	172.24	172.24	0.932	1.88	2.44	0.15	0.01	14.6	0.00
8.96	0.43	10.21	172.61	172.61	0.931	2.37	3.97	0.17	0.01	17.1	0.00
8.98	0.357	5.74	172.97	172.97	0.931	1.61	3.12	0.14	0.01	14.5	0.00
9	0.331	1.28	173.32	173.32	0.931	0.39	0.81	0.10	0.01	9.7	0.00
9.02	0.335	2.55	173.67	173.67	0.931	0.76	1.58	0.11	0.01	11.3	0.00
9.04	0.327	1.91	174.01	174.01	0.931	0.58	1.25	0.11	0.01	10.6	0.00
9.06	0.376	2.77	174.35	174.35	0.931	0.74	1.37	0.11	0.01	11.0	0.00
9.08	0.35	1.49	174.70	174.7	0.931	0.43	0.85	0.10	0.01	9.9	0.00
9.1	0.35	1.28	175.04	175.04	0.930	0.37	0.73	0.10	0.01	9.6	0.00
9.12	0.312	2.34	175.39	175.39	0.930	0.75	1.71	0.12	0.01	11.5	0.00
9.14	0.323	2.34	175.76	175.76	0.930	0.72	1.59	0.11	0.01	11.3	0.00
9.16	0.384	2.55	176.14	176.14	0.929	0.66	1.23	0.11	0.01	10.8	0.00
9.18	0.867	18.09	176.52	176.52	0.929	2.09	2.62	0.16	0.01	15.7	0.00
9.2	1.73	24.07	176.90	176.9	0.928	1.39	1.55	0.13	0.01	12.8	0.00
9.22	1.532	24.07	177.29	177.29	0.928	1.57	1.78	0.13	0.01	13.5	0.00
9.24	1.061	23.5	177.67	177.67	0.927	2.21	2.66	0.16	0.01	16.3	0.00
9.26	0.741	20.98	178.05	178.05	0.927	2.83	3.73	0.19	0.01	19.2	0.00
9.28	0.422	17.02	178.42	178.42	0.926	4.03	6.99	0.25	0.01	25.4	0.00
9.3	0.357	11.06	178.78	178.78	0.926	3.10	6.21	0.22	0.01	21.5	0.00
9.32	0.354	2.34	179.13	179.13	0.925	0.66	1.34	0.11	0.01	11.0	0.00
9.34	0.354	2.13	179.48	179.48	0.925	0.60	1.22	0.11	0.01	10.8	0.00
9.36	0.35	2.13	179.82	179.82	0.924	0.61	1.25	0.11	0.01	10.9	0.00
9.38	0.354	2.34	180.17	180.17	0.924	0.66	1.35	0.11	0.01	11.1	0.00
9.4	0.35	2.13	180.51	180.51	0.923	0.61	1.26	0.11	0.01	10.9	0.00
9.42	0.335	2.34	180.86	180.86	0.922	0.70	1.52	0.11	0.01	11.4	0.00
9.44	0.319	10.64	181.22	181.22	0.922	3.34	7.72	0.24	0.01	23.9	0.00
9.46	0.319	12.77	181.59	181.59	0.921	4.00	9.29	0.28	0.01	27.6	0.00
9.48	0.787	13.62	181.96	181.96	0.921	1.73	2.25	0.14	0.01	14.5	0.00
9.5	1.046	18.51	182.34	182.34	0.920	1.77	2.14	0.15	0.01	14.6	0.00
9.52	1.008	29.53	182.73	182.73	0.920	2.93	3.58	0.20	0.01	20.3	0.00
9.54	1.418	33.46	183.12	183.12	0.919	2.36	2.71	0.18	0.01	17.5	0.00
9.56	1.639	30.93	183.50	183.5	0.919	1.89	2.13	0.15	0.01	15.2	0.00
9.58	1.266	26.03	183.89	183.89	0.918	2.06	2.41	0.16	0.01	16.0	0.00
9.6	0.848	23.22	184.27	184.27	0.918	2.74	3.50	0.19	0.01	19.2	0.00
9.62	0.517	19.15	184.65	184.65	0.917	3.70	5.76	0.24	0.01	24.2	0.00

9.64	0.456	13.62	185.02	185.02	0.917	2.99	5.03	0.21	0.01	20.8	0.00
9.66	0.525	9.79	185.39	185.39	0.916	1.86	2.88	0.16	0.01	15.6	0.00
9.68	0.681	4.89	185.76	185.76	0.916	0.72	0.99	0.11	0.01	10.8	0.00
9.7	0.783	4.68	186.13	186.13	0.915	0.60	0.78	0.10	0.01	10.3	0.00
9.72	0.867	3.62	186.50	186.5	0.914	0.42	0.53	0.10	0.01	9.6	0.00
9.74	0.821	4.04	186.87	186.87	0.914	0.49	0.64	0.10	0.01	9.9	0.00
9.76	0.525	4.89	187.24	187.24	0.913	0.93	1.45	0.12	0.01	11.9	0.00
9.78	0.395	6.17	187.60	187.6	0.913	1.56	2.97	0.15	0.01	15.1	0.00
9.8	0.392	3.4	187.96	187.96	0.912	0.87	1.67	0.12	0.01	12.2	0.00
9.82	0.392	2.13	188.31	188.31	0.912	0.54	1.05	0.11	0.01	10.8	0.00
9.84	0.399	2.55	188.66	188.66	0.911	0.64	1.21	0.11	0.01	11.2	0.00
9.86	0.392	2.34	189.01	189.01	0.911	0.60	1.15	0.11	0.01	11.1	0.00
9.88	0.384	2.34	189.37	189.37	0.910	0.61	1.20	0.11	0.01	11.2	0.00
9.9	0.403	2.77	189.75	189.75	0.910	0.69	1.30	0.11	0.01	11.5	0.00
9.92	0.719	17.87	190.14	190.14	0.909	2.49	3.38	0.18	0.01	18.4	0.00
9.94	1.57	27.85	190.53	190.53	0.909	1.77	2.02	0.15	0.01	15.1	0.00
9.96	2.031	26.45	190.92	190.92	0.908	1.30	1.44	0.13	0.01	13.1	0.00
9.98	1.814	25.19	191.31	191.31	0.908	1.39	1.55	0.13	0.01	13.4	0.00
10	1.418	20.42	191.71	191.71	0.907	1.44	1.67	0.14	0.01	13.6	0.00
10.02	0.992	14.68	192.10	192.1	0.906	1.48	1.84	0.14	0.01	13.9	0.00
10.04	0.726	10	192.48	192.48	0.906	1.38	1.87	0.14	0.01	13.6	0.00
10.06	0.627	5.32	192.86	192.86	0.905	0.85	1.23	0.12	0.01	11.7	0.00
10.08	0.555	10	193.25	193.25	0.905	1.80	2.76	0.16	0.01	15.8	0.00
10.1	0.791	23.5	193.63	193.63	0.904	2.97	3.93	0.21	0.01	21.2	0.00
10.12	1.654	25.89	194.02	194.02	0.904	1.57	1.77	0.14	0.01	14.3	0.00
10.14	1.753	26.03	194.40	194.4	0.903	1.48	1.67	0.14	0.01	14.0	0.00
10.16	1.19	28.83	194.79	194.79	0.903	2.42	2.90	0.18	0.01	18.5	0.00
10.18	0.821	34.02	195.18	195.18	0.902	4.14	5.44	0.28	0.01	28.5	0.00
10.2	0.555	35.42	195.57	195.57	0.902	6.38	9.85	0.44	0.01	43.6	0.00
10.22	0.802	34.3	195.95	195.95	0.901	4.28	5.66	0.29	0.01	29.4	0.00
10.24	1.137	30.37	196.33	196.33	0.901	2.67	3.23	0.20	0.01	19.9	0.00
10.26	1.221	33.88	196.72	196.72	0.900	2.77	3.31	0.21	0.01	20.6	0.00
10.28	1.103	32.9	197.10	197.1	0.900	2.98	3.63	0.22	0.01	21.8	0.00
10.3	0.996	27.85	197.48	197.48	0.899	2.80	3.49	0.21	0.01	20.6	0.00
10.32	0.996	25.33	197.87	197.87	0.898	2.54	3.17	0.19	0.01	19.3	0.00
10.34	0.901	22.94	198.24	198.24	0.898	2.55	3.26	0.19	0.01	19.3	0.00
10.36	0.7	13.19	198.62	198.62	0.897	1.88	2.63	0.16	0.01	16.2	0.00
10.38	0.586	21.82	199.01	199.01	0.897	3.72	5.64	0.26	0.01	25.9	0.00
10.4	0.677	29.39	199.39	199.39	0.896	4.34	6.15	0.30	0.01	29.8	0.00
10.42	1.441	27.85	199.77	199.77	0.896	1.93	2.24	0.16	0.01	16.3	0.00
10.44	1.559	26.87	200.15	200.15	0.895	1.72	1.98	0.15	0.01	15.3	0.00
10.46	1.08	26.87	200.54	200.54	0.895	2.49	3.06	0.19	0.01	19.2	0.00
10.48	0.734	24.77	200.92	200.92	0.894	3.37	4.65	0.24	0.01	24.1	0.00
10.5	0.494	20.56	201.29	201.29	0.894	4.16	7.02	0.29	0.01	29.0	0.00
10.52	0.468	15.11	201.65	201.65	0.893	3.23	5.67	0.24	0.01	23.8	0.00
10.54	0.464	4.04	202.01	202.01	0.893	0.87	1.54	0.13	0.01	12.6	0.00
10.56	0.456	2.98	202.37	202.37	0.892	0.65	1.17	0.12	0.01	11.7	0.00
10.58	0.475	3.19	202.73	202.73	0.892	0.67	1.17	0.12	0.01	11.8	0.00
10.6	0.517	3.19	203.08	203.08	0.891	0.62	1.02	0.11	0.01	11.4	0.00
10.62	0.536	3.4	203.44	203.44	0.890	0.63	1.02	0.11	0.01	11.5	0.00
10.64	0.494	8.94	203.80	203.8	0.890	1.81	3.08	0.17	0.01	16.8	0.00
10.66	0.468	18.51	204.16	204.16	0.889	3.96	7.02	0.28	0.01	28.3	0.00
10.68	0.479	20.84	204.53	204.53	0.889	4.35	7.59	0.31	0.01	30.7	0.00
10.7	0.639	17.87	204.91	204.91	0.888	2.80	4.12	0.21	0.01	21.3	0.00
10.72	1.027	23.5	205.30	205.3	0.888	2.29	2.86	0.18	0.01	18.5	0.00
10.74	1.247	27.15	205.69	205.69	0.887	2.18	2.61	0.18	0.01	17.9	0.00
10.76	1.567	30.65	206.09	206.09	0.887	1.96	2.25	0.17	0.01	16.8	0.00
10.78	2.228	37.8	206.50	206.5	0.886	1.70	1.87	0.16	0.01	15.8	0.00
10.8	2.44	47.9	206.90	206.9	0.886	1.96	2.15	0.17	0.01	17.4	0.00
10.82	2.293	47.34	207.30	207.3	0.885	2.06	2.27	0.18	0.01	17.9	0.00
10.84	1.901	39.91	207.71	207.71	0.885	2.10	2.36	0.18	0.01	17.8	0.00
10.86	1.388	19.57	208.10	208.1	0.884	1.41	1.66	0.14	0.01	14.3	0.00
10.88	0.954	22.1	208.50	208.5	0.884	2.32	2.96	0.19	0.01	18.8	0.00
10.9	0.665	33.74	208.89	208.89	0.883	5.07	7.40	0.36	0.01	36.4	0.00
10.92	1.08	35.42	209.28	209.28	0.882	3.28	4.07	0.25	0.01	24.7	0.00
10.94	1.814	31.36	209.67	209.67	0.882	1.73	1.95	0.16	0.01	15.9	0.00
10.96	1.426	29.25	210.06	210.06	0.881	2.05	2.41	0.18	0.01	17.5	0.00
10.98	1.331	37.66	210.46	210.46	0.881	2.83	3.36	0.22	0.01	22.1	0.00
11	0.966	35.28	210.85	210.85	0.880	3.65	4.67	0.27	0.01	27.2	0.00
11.02	1.183	29.95	211.23	211.23	0.880	2.53	3.08	0.20	0.01	20.3	0.00
11.04	1.259	21.4	211.62	211.62	0.879	1.70	2.04	0.16	0.01	15.8	0.00
11.06	0.905	20	211.99	211.99	0.879	2.21	2.89	0.19	0.01	18.6	0.00
11.08	0.589	19.57	212.37	212.37	0.878	3.32	5.20	0.25	0.01	25.0	0.00
11.1	0.532	20.56	212.75	212.75	0.878	3.86	6.44	0.29	0.01	28.6	0.00
11.12	0.627	21.82	213.13	213.13	0.877	3.48	5.27	0.26	0.01	26.0	0.00
11.14	0.962	21.68	213.52	213.52	0.877	2.25	2.90	0.19	0.01	18.9	0.00
11.16	1.414	29.39	213.90	213.9	0.876	2.08	2.45	0.18	0.01	17.9	0.00
11.18	1.502	32.9	214.29	214.29	0.875	2.19	2.55	0.19	0.01	18.6	0.00
11.2	1.418	37.52	214.69	214.69	0.875	2.65	3.12	0.21	0.01	21.3	0.00
11.22	1.38	40.05	215.08	215.08	0.874	2.90	3.44	0.23	0.01	23.0	0.00
11.24	1.194	36.4	215.47	215.47	0.874	3.05	3.72	0.24	0.01	23.8	0.00
11.26	1.236	38.64	215.87	215.87	0.873	3.13	3.79	0.24	0.01	24.4	0.00
11.28	1.449	45.65	216.26	216.26	0.873	3.15	3.70	0.25	0.01	24.9	0.00
11.3	1.38	40.75	216.65	216.65	0.872	2.95	3.50	0.23	0.01	23.5	0.00

11.32	1.373	39.07	217.04	217.04	0.872	2.85	3.38	0.23	0.01	22.8	0.00
11.34	1.297	32.48	217.43	217.43	0.871	2.50	3.01	0.21	0.01	20.6	0.00
11.36	1.03	26.73	217.81	217.81	0.871	2.60	3.29	0.21	0.01	21.1	0.00
11.38	0.772	24.91	218.20	218.2	0.870	3.23	4.50	0.25	0.01	24.9	0.00
11.4	0.722	17.02	218.57	218.57	0.870	2.36	3.38	0.20	0.01	20.0	0.00
11.42	0.703	19.57	218.95	218.95	0.869	2.78	4.04	0.22	0.01	22.4	0.00
11.44	0.688	22.66	219.33	219.33	0.869	3.29	4.83	0.25	0.01	25.5	0.00
11.46	0.916	29.67	219.72	219.72	0.868	3.24	4.26	0.25	0.01	25.2	0.00
11.48	1.3	28.83	220.10	220.1	0.867	2.22	2.67	0.19	0.01	19.1	0.00
11.5	1.346	27.85	220.49	220.49	0.867	2.07	2.47	0.18	0.01	18.3	0.00
11.52	1.125	29.67	220.88	220.88	0.866	2.64	3.28	0.22	0.01	21.6	0.00
11.54	1.133	29.25	221.28	221.28	0.866	2.58	3.21	0.21	0.01	21.3	0.00
11.56	1.422	26.03	221.68	221.68	0.865	1.83	2.17	0.17	0.01	17.1	0.00
11.58	2.235	27.15	222.08	222.08	0.865	1.21	1.35	0.14	0.01	14.2	0.00
11.6	2.413	34.72	222.49	222.49	0.864	1.44	1.59	0.15	0.01	15.4	0.00
11.62	2.347	43.13	222.89	222.89	0.864	1.84	2.03	0.17	0.01	17.5	0.00
11.64	2.154	33.6	223.30	223.3	0.863	1.56	1.74	0.16	0.01	15.9	0.00
11.66	1.715	33.32	223.70	223.7	0.863	1.94	2.23	0.18	0.01	17.9	0.00
11.68	1.338	32.9	224.11	224.11	0.862	2.46	2.95	0.21	0.01	20.8	0.00
11.7	1.285	32.2	224.52	224.52	0.862	2.51	3.04	0.21	0.01	21.1	0.00
11.72	1.882	32.48	224.93	224.93	0.861	1.73	1.96	0.17	0.01	16.8	0.00
11.74	2.617	33.04	225.34	225.34	0.861	1.26	1.38	0.15	0.01	14.7	0.00
11.76	3.011	32.48	225.76	225.76	0.860	1.08	1.17	0.14	0.01	14.1	0.00
11.78	3.443	35.42	226.18	226.18	0.859	1.03	1.10	0.14	0.01	14.2	0.00
11.8	3.76	35.42	226.61	226.61	0.859	0.94	1.00	0.14	0.01	14.1	0.00
11.82	3.972	33.46	227.00	227	0.858	0.84	0.89	0.14	0.01	13.9	0.00
11.84	3.957	31.92	227.40	227.4	0.858	0.81	0.86	0.14	0.01	13.7	0.00
11.86	3.795	23.93	227.80	227.8	0.857	0.63	0.67	0.13	0.01	12.9	0.00
11.88	3.656	26.45	228.20	228.2	0.857	0.72	0.77	0.13	0.01	13.2	0.00
11.9	3.466	36.68	228.63	228.63	0.856	1.06	1.13	0.14	0.01	14.5	0.00
11.92	3.25	46.92	229.05	229.05	0.856	1.44	1.55	0.16	0.01	16.3	0.00
11.94	2.876	40.05	229.46	229.46	0.855	1.39	1.51	0.16	0.01	15.7	0.00
11.96	2.436	41.03	229.88	229.88	0.855	1.68	1.86	0.17	0.01	17.1	0.00
11.98	2.019	45.51	230.29	230.29	0.854	2.25	2.54	0.20	0.01	20.3	0.00
12	1.673	43.55	230.70	230.7	0.854	2.60	3.02	0.22	0.01	22.5	0.00
12.02	1.863	43.55	231.11	231.11	0.853	2.34	2.67	0.21	0.01	20.8	0.00
12.04	2.239	42.29	231.51	231.51	0.853	1.89	2.11	0.18	0.01	18.2	0.00
12.06	1.973	39.21	231.92	231.92	0.852	1.99	2.25	0.19	0.01	18.7	0.00
12.08	2.112	37.38	232.34	232.34	0.851	1.77	1.99	0.18	0.01	17.5	0.00
12.1	2.776	41.31	232.75	232.75	0.851	1.49	1.62	0.16	0.01	16.4	0.00
12.12	3.15	42.01	233.17	233.17	0.850	1.33	1.44	0.16	0.01	15.8	0.00
12.14	3.304	38.79	233.59	233.59	0.850	1.17	1.26	0.15	0.01	15.1	0.00
12.16	3.212	38.08	234.01	234.01	0.849	1.19	1.28	0.15	0.01	15.2	0.00
12.18	3.05	36.4	234.43	234.43	0.849	1.19	1.29	0.15	0.01	15.1	0.00
12.2	3.046	37.52	234.86	234.86	0.848	1.23	1.33	0.15	0.01	15.3	0.00
12.22	3.185	38.5	235.28	235.28	0.848	1.21	1.31	0.15	0.01	15.3	0.00
12.24	3.181	41.03	235.70	235.7	0.847	1.29	1.39	0.16	0.01	15.7	0.00
12.26	3.115	41.73	236.12	236.12	0.847	1.34	1.45	0.16	0.01	16.0	0.00
12.28	3.084	42.01	236.54	236.54	0.846	1.36	1.48	0.16	0.01	16.1	0.00
12.3	2.868	42.01	236.96	236.96	0.846	1.46	1.60	0.17	0.01	16.5	0.00
12.32	2.753	41.17	237.38	237.38	0.845	1.50	1.64	0.17	0.01	16.6	0.00
12.34	2.965	39.77	237.80	237.8	0.845	1.34	1.46	0.16	0.01	16.0	0.00
12.36	3.274	39.77	238.23	238.23	0.844	1.21	1.31	0.16	0.01	15.5	0.00
12.38	3.683	40.75	238.65	238.65	0.843	1.11	1.18	0.15	0.01	15.3	0.00
12.4	4.103	40.89	239.08	239.08	0.843	1.00	1.06	0.15	0.01	15.2	0.00
12.42	4.555	41.17	239.51	239.51	0.842	0.90	0.95	0.15	0.01	15.2	0.00
12.44	4.948	39.35	239.92	239.92	0.842	0.80	0.84	0.15	0.01	15.2	0.00
12.46	4.898	39.91	240.32	240.32	0.841	0.81	0.86	0.15	0.01	15.2	0.00
12.48	4.551	48.32	240.76	240.76	0.841	1.06	1.12	0.16	0.01	16.1	0.00
12.5	4.192	54.63	241.19	241.19	0.840	1.30	1.38	0.17	0.01	17.0	0.00
12.52	3.748	45.23	241.61	241.61	0.840	1.21	1.29	0.16	0.01	16.0	0.00
12.54	3.1	44.39	242.03	242.03	0.839	1.43	1.55	0.17	0.01	16.8	0.00
12.56	2.425	44.25	242.46	242.46	0.839	1.82	2.03	0.19	0.01	18.6	0.00
12.58	2.27	42.71	242.88	242.88	0.838	1.88	2.11	0.19	0.01	18.9	0.00
12.6	2.864	42.01	243.30	243.3	0.838	1.47	1.60	0.17	0.01	16.8	0.00
12.62	3.829	44.67	243.72	243.72	0.837	1.17	1.25	0.16	0.01	16.0	0.00
12.64	3.903	47.48	244.14	244.14	0.837	1.22	1.30	0.16	0.01	16.4	0.00
12.66	3.779	47.34	244.57	244.57	0.836	1.25	1.34	0.16	0.01	16.5	0.00
12.68	3.459	46.21	244.99	244.99	0.835	1.34	1.44	0.17	0.01	16.7	0.00
12.7	3.092	43.41	245.42	245.42	0.835	1.40	1.52	0.17	0.01	16.8	0.00
12.72	2.942	39.07	245.84	245.84	0.834	1.33	1.45	0.16	0.01	16.3	0.00
12.74	2.945	35.84	246.26	246.26	0.834	1.22	1.33	0.16	0.01	15.7	0.00
12.76	3.123	36.54	246.68	246.68	0.833	1.17	1.27	0.16	0.01	15.6	0.00
12.78	3.312	41.59	247.10	247.1	0.833	1.26	1.36	0.16	0.01	16.2	0.00
12.8	3.32	41.31	247.52	247.52	0.832	1.24	1.34	0.16	0.01	16.2	0.00
12.82	3.1	40.33	247.94	247.94	0.832	1.30	1.41	0.16	0.01	16.3	0.00
12.84	2.656	38.93	248.36	248.36	0.831	1.47	1.62	0.17	0.01	17.0	0.00
12.86	2.579	26.59	248.78	248.78	0.831	1.03	1.14	0.15	0.01	14.7	0.00
12.88	2.93	27.99	249.20	249.2	0.830	0.96	1.04	0.15	0.01	14.6	0.00
12.9	3.416	29.25	249.63	249.63	0.830	0.86	0.92	0.14	0.01	14.4	0.00
12.92	3.702	31.21	250.05	250.05	0.829	0.84	0.90	0.15	0.01	14.6	0.00
12.94	3.991	31.64	250.45	250.45	0.829	0.79	0.85	0.15	0.01	14.6	0.00
12.96	4.223	35.14	250.86	250.86	0.828	0.83	0.88	0.15	0.01	15.0	0.00
12.98	4.431	39.77	251.26	251.26	0.827	0.90	0.95	0.16	0.01	15.6	0.00

13	4.616	44.11	251.69	251.69	0.827	0.96	1.01	0.16	0.01	16.1	0.00
13.02	4.713	49.44	252.13	252.13	0.826	1.05	1.11	0.17	0.01	16.7	0.00
13.04	4.454	50.7	252.56	252.56	0.826	1.14	1.21	0.17	0.01	16.9	0.00
13.06	4.049	49.16	252.99	252.99	0.825	1.21	1.30	0.17	0.01	16.9	0.00
13.08	3.71	45.37	253.42	253.42	0.825	1.22	1.31	0.17	0.01	16.7	0.00
13.1	3.679	41.87	253.85	253.85	0.824	1.14	1.22	0.16	0.01	16.2	0.00
13.12	3.702	39.07	254.27	254.27	0.824	1.06	1.13	0.16	0.01	15.8	0.00
13.14	3.802	37.94	254.68	254.68	0.823	1.00	1.07	0.16	0.01	15.6	0.00
13.16	4.146	37.38	255.08	255.08	0.823	0.90	0.96	0.15	0.01	15.5	0.00
13.18	4.601	38.08	255.49	255.49	0.822	0.83	0.88	0.16	0.01	15.6	0.00
13.2	4.89	37.38	255.89	255.89	0.822	0.76	0.81	0.16	0.01	15.6	0.00
13.22	4.979	37.52	256.30	256.3	0.821	0.75	0.79	0.16	0.01	15.7	0.00
13.24	5.103	37.66	256.71	256.71	0.820	0.74	0.78	0.16	0.01	15.7	0.00
13.26	5.292	38.22	257.12	257.12	0.820	0.72	0.76	0.16	0.01	15.9	0.00
13.28	5.373	35.84	257.53	257.53	0.819	0.67	0.70	0.16	0.01	15.7	0.00
13.3	5.334	33.32	257.94	257.94	0.819	0.62	0.66	0.16	0.01	15.5	0.00
13.32	5.215	31.5	258.35	258.35	0.818	0.60	0.64	0.15	0.01	15.3	0.00
13.34	4.921	35.84	258.76	258.76	0.818	0.73	0.77	0.16	0.01	15.6	0.00
13.36	4.562	45.23	259.19	259.19	0.817	0.99	1.05	0.17	0.01	16.5	0.00
13.38	4.188	48.74	259.62	259.62	0.817	1.16	1.24	0.17	0.01	17.1	0.00
13.4	3.771	46.92	260.05	260.05	0.816	1.24	1.34	0.17	0.01	17.2	0.00
13.42	3.216	47.9	260.47	260.47	0.816	1.49	1.62	0.18	0.01	18.2	0.00
13.44	2.861	47.76	260.90	260.9	0.815	1.67	1.84	0.19	0.01	19.0	0.00
13.46	3.046	44.39	261.33	261.33	0.815	1.46	1.59	0.18	0.01	17.9	0.00
13.48	4.161	42.29	261.76	261.76	0.814	1.02	1.08	0.16	0.01	16.4	0.00
13.5	4.574	41.03	262.19	262.19	0.814	0.90	0.95	0.16	0.01	16.2	0.00
13.52	4.69	37.8	262.59	262.59	0.813	0.81	0.85	0.16	0.01	15.9	0.00
13.54	4.829	39.63	263.00	263	0.812	0.82	0.87	0.16	0.01	16.1	0.00
13.56	4.937	41.31	263.41	263.41	0.812	0.84	0.88	0.16	0.01	16.3	0.00
13.58	5.033	42.29	263.81	263.81	0.811	0.84	0.89	0.16	0.01	16.5	0.00
13.6	4.956	42.57	264.22	264.22	0.811	0.86	0.91	0.16	0.01	16.5	0.00
13.62	4.709	42.43	264.63	264.63	0.810	0.90	0.95	0.16	0.01	16.5	0.00
13.64	4.393	40.19	265.03	265.03	0.810	0.91	0.97	0.16	0.01	16.2	0.00
13.66	4.076	36.68	265.44	265.44	0.809	0.90	0.96	0.16	0.01	15.9	0.00
13.68	3.833	34.58	265.84	265.84	0.809	0.90	0.97	0.16	0.01	15.7	0.00
13.7	3.702	32.34	266.27	266.27	0.808	0.87	0.94	0.15	0.01	15.5	0.00
13.72	3.652	31.78	266.69	266.69	0.808	0.87	0.94	0.15	0.01	15.4	0.00
13.74	3.69	33.32	267.12	267.12	0.807	0.90	0.97	0.16	0.01	15.6	0.00
13.76	3.825	35.56	267.55	267.55	0.807	0.93	1.00	0.16	0.01	15.9	0.00
13.78	4.045	40.47	267.98	267.98	0.806	1.00	1.07	0.16	0.01	16.5	0.00
13.8	4.304	42.71	268.41	268.41	0.806	0.99	1.06	0.17	0.01	16.7	0.00
13.82	4.412	41.87	268.82	268.82	0.805	0.95	1.01	0.17	0.01	16.6	0.00
13.84	4.651	42.85	269.22	269.22	0.804	0.92	0.98	0.17	0.01	16.7	0.00
13.86	5.045	29.67	269.63	269.63	0.804	0.59	0.62	0.15	0.01	15.5	0.00
13.88	5.442	31.21	270.04	270.04	0.803	0.57	0.60	0.16	0.01	15.9	0.00
13.9	5.751	38.36	270.45	270.45	0.803	0.67	0.70	0.17	0.01	16.7	0.00
13.92	5.782	45.51	270.86	270.86	0.802	0.79	0.83	0.17	0.01	17.4	0.00
13.94	5.415	58.83	271.30	271.3	0.802	1.09	1.14	0.19	0.01	18.6	0.00
13.96	4.836	55.61	271.73	271.73	0.801	1.15	1.22	0.18	0.01	18.3	0.00
13.98	3.906	56.03	272.17	272.17	0.801	1.43	1.54	0.19	0.01	19.1	0.00
14	3.555	57.43	272.60	272.6	0.800	1.62	1.75	0.20	0.01	19.9	0.00
14.02	3.034	52.94	273.02	273.02	0.800	1.74	1.92	0.20	0.01	20.4	0.00
14.04	3.393	49.58	273.45	273.45	0.799	1.46	1.59	0.19	0.01	18.9	0.00
14.06	4.007	42.71	273.88	273.88	0.799	1.07	1.14	0.17	0.01	17.1	0.00
14.08	4.011	38.93	274.30	274.3	0.798	0.97	1.04	0.17	0.01	16.6	0.00
14.1	3.93	38.22	274.73	274.73	0.798	0.97	1.05	0.17	0.01	16.5	0.00
14.12	3.767	43.69	275.16	275.16	0.797	1.16	1.25	0.17	0.01	17.4	0.00
14.14	3.733	48.6	275.58	275.58	0.796	1.30	1.41	0.18	0.01	18.3	0.00
14.16	3.59	41.31	276.00	276	0.796	1.15	1.25	0.17	0.01	17.3	0.00
14.18	3.239	38.93	276.43	276.43	0.795	1.20	1.31	0.17	0.01	17.4	0.00
14.2	2.783	39.21	276.85	276.85	0.795	1.41	1.56	0.18	0.01	18.3	0.00
14.22	2.479	38.93	277.27	277.27	0.794	1.57	1.77	0.19	0.01	19.2	0.00
14.24	2.803	38.79	277.69	277.69	0.794	1.38	1.54	0.18	0.01	18.2	0.00
14.26	3.779	37.24	278.12	278.12	0.793	0.99	1.06	0.17	0.01	16.6	0.00
14.28	4.161	41.31	278.55	278.55	0.793	0.99	1.06	0.17	0.01	17.0	0.00
14.3	4.489	43.13	278.98	278.98	0.792	0.96	1.02	0.17	0.01	17.2	0.00
14.32	4.825	49.58	279.41	279.41	0.792	1.03	1.09	0.18	0.01	17.9	0.00
14.34	4.871	45.37	279.85	279.85	0.791	0.93	0.99	0.17	0.01	17.5	0.00
14.36	4.84	42.99	280.25	280.25	0.791	0.89	0.94	0.17	0.01	17.2	0.00
14.38	4.725	43.97	280.69	280.69	0.790	0.93	0.99	0.17	0.01	17.4	0.00
14.4	4.439	64.86	281.12	281.12	0.790	1.46	1.56	0.20	0.01	20.3	0.00
14.42	4.142	67.94	281.55	281.55	0.789	1.64	1.76	0.21	0.01	21.2	0.00
14.44	4.026	69.07	281.98	281.98	0.788	1.72	1.84	0.22	0.01	21.7	0.00
14.46	4.014	78.18	282.41	282.41	0.788	1.95	2.10	0.23	0.01	23.5	0.00
14.48	4.404	80.84	282.84	282.84	0.787	1.84	1.96	0.23	0.01	23.1	0.00
14.5	3.656	71.59	283.27	283.27	0.787	1.96	2.12	0.23	0.01	23.2	0.00
14.52	4.138	76.92	283.70	283.7	0.786	1.86	2.00	0.23	0.01	23.0	0.00
14.54	3.883	64.86	284.13	284.13	0.786	1.67	1.80	0.21	0.01	21.3	0.00
14.56	4.03	62.34	284.56	284.56	0.785	1.55	1.66	0.21	0.01	20.6	0.00
14.58	3.968	54.21	284.98	284.98	0.785	1.37	1.47	0.19	0.01	19.4	0.00
14.6	3.636	52.1	285.41	285.41	0.784	1.43	1.55	0.20	0.01	19.6	0.00
14.62	3.629	57.57	285.83	285.83	0.784	1.59	1.72	0.21	0.01	20.6	0.00
14.64	3.571	60.09	286.26	286.26	0.783	1.68	1.83	0.21	0.01	21.2	0.00
14.66	3.312	54.07	286.68	286.68	0.783	1.63	1.79	0.21	0.01	20.7	0.00

14.68	2.783	52.1	287.09	287.09	0.782	1.87	2.09	0.22	0.01	22.1	0.00
14.7	2.151	43.97	287.50	287.5	0.782	2.04	2.36	0.23	0.01	23.1	0.00
14.72	1.456	40.33	287.91	287.91	0.781	2.77	3.45	0.29	0.01	28.7	0.00
14.74	1.217	35.84	288.31	288.31	0.780	2.94	3.86	0.30	0.01	30.2	0.00
14.76	1.281	35.84	288.72	288.72	0.780	2.80	3.61	0.29	0.01	29.0	0.00
14.78	1.776	39.91	289.12	289.12	0.779	2.25	2.68	0.25	0.01	24.6	0.00
14.8	2.637	43.69	289.54	289.54	0.779	1.66	1.86	0.21	0.01	20.6	0.00
14.82	3.142	47.06	289.95	289.95	0.778	1.50	1.65	0.20	0.01	19.9	0.00
14.84	3.335	48.74	290.37	290.37	0.778	1.46	1.60	0.20	0.01	19.8	0.00
14.86	3.362	36.68	290.79	290.79	0.777	1.09	1.19	0.18	0.01	17.5	0.00
14.88	3.455	38.93	291.22	291.22	0.777	1.13	1.23	0.18	0.01	17.8	0.00
14.9	3.528	40.47	291.64	291.64	0.776	1.15	1.25	0.18	0.01	18.0	0.00
14.92	3.594	40.47	292.07	292.07	0.776	1.13	1.23	0.18	0.01	18.0	0.00
14.94	3.636	41.45	292.49	292.49	0.775	1.14	1.24	0.18	0.01	18.1	0.00
14.96	3.567	43.13	292.92	292.92	0.775	1.21	1.32	0.19	0.01	18.5	0.00
14.98	3.521	43.55	293.34	293.34	0.774	1.24	1.35	0.19	0.01	18.7	0.00
15	3.548	43.27	293.77	293.77	0.774	1.22	1.33	0.19	0.01	18.6	0.00
15.02	3.501	42.57	294.19	294.19	0.773	1.22	1.33	0.19	0.01	18.6	0.00
15.04	3.459	41.59	294.61	294.61	0.772	1.20	1.31	0.18	0.01	18.5	0.00
15.06	3.432	41.31	295.04	295.04	0.772	1.20	1.32	0.18	0.01	18.5	0.00
15.08	3.378	46.64	295.46	295.46	0.771	1.38	1.51	0.20	0.01	19.6	0.00
15.1	3.324	52.24	295.88	295.88	0.771	1.57	1.73	0.21	0.01	20.9	0.00
15.12	3.254	51.12	296.30	296.3	0.770	1.57	1.73	0.21	0.01	20.8	0.00
15.14	3.131	52.38	296.72	296.72	0.770	1.67	1.85	0.21	0.01	21.5	0.00
15.16	2.664	50.28	297.14	297.14	0.769	1.89	2.12	0.23	0.01	22.8	0.00
15.18	2.386	47.62	297.56	297.56	0.769	2.00	2.28	0.24	0.01	23.5	0.00
15.2	2.699	47.62	297.98	297.98	0.768	1.76	1.98	0.22	0.01	22.0	0.00
15.22	3.019	47.48	298.39	298.39	0.768	1.57	1.75	0.21	0.01	20.8	0.00
15.24	3.011	44.53	298.81	298.81	0.767	1.48	1.64	0.20	0.01	20.2	0.00
15.26	2.915	42.85	299.22	299.22	0.767	1.47	1.64	0.20	0.01	20.1	0.00
15.28	2.637	50.14	299.64	299.64	0.766	1.90	2.15	0.23	0.01	23.1	0.00
15.3	2.394	50.7	300.05	300.05	0.765	2.12	2.42	0.25	0.01	24.9	0.00
15.32	2.378	50.42	300.46	300.46	0.765	2.12	2.43	0.25	0.01	24.9	0.00
15.34	2.239	56.45	300.87	300.87	0.764	2.52	2.91	0.28	0.01	28.3	0.00
15.36	1.989	55.61	301.28	301.28	0.764	2.80	3.29	0.31	0.01	30.7	0.00
15.38	1.673	53.64	301.68	301.68	0.763	3.21	3.91	0.34	0.01	34.5	0.00
15.4	1.643	51.68	302.08	302.08	0.763	3.15	3.85	0.34	0.01	33.8	0.00
15.42	1.548	53.22	302.48	302.48	0.762	3.44	4.27	0.37	0.01	36.7	0.00
15.44	1.578	52.38	302.89	302.89	0.762	3.32	4.11	0.36	0.01	35.5	0.00
15.46	2.143	52.1	303.30	303.3	0.761	2.43	2.83	0.27	0.01	27.4	0.00
15.48	2.633	53.79	303.71	303.71	0.761	2.04	2.31	0.24	0.01	24.4	0.00
15.5	2.884	56.59	304.13	304.13	0.760	1.96	2.19	0.24	0.01	23.9	0.00
15.52	3.301	58.13	304.55	304.55	0.760	1.76	1.94	0.23	0.01	22.7	0.00
15.54	3.783	62.34	304.98	304.98	0.759	1.65	1.79	0.22	0.01	22.2	0.00
15.56	3.856	71.31	305.40	305.4	0.759	1.85	2.01	0.24	0.01	23.9	0.00
15.58	3.717	69.77	305.82	305.82	0.758	1.88	2.05	0.24	0.01	23.9	0.00
15.6	3.706	69.07	306.25	306.25	0.757	1.86	2.03	0.24	0.01	23.8	0.00
15.62	3.32	68.64	306.67	306.67	0.757	2.07	2.28	0.25	0.01	25.1	0.00
15.64	2.942	65.56	307.10	307.1	0.756	2.23	2.49	0.26	0.01	26.2	0.00
15.66	3.104	61.21	307.52	307.52	0.756	1.97	2.19	0.24	0.01	24.2	0.00
15.68	3.466	56.03	307.94	307.94	0.755	1.62	1.77	0.22	0.01	21.7	0.00
15.7	3.582	53.64	308.37	308.37	0.755	1.50	1.64	0.21	0.01	20.9	0.00
15.72	3.632	50.84	308.79	308.79	0.754	1.40	1.53	0.20	0.01	20.3	0.00
15.74	3.795	71.87	309.22	309.22	0.754	1.89	2.06	0.24	0.01	24.1	0.00
15.76	4.014	83.36	309.65	309.65	0.753	2.08	2.25	0.26	0.01	26.0	0.00
15.78	4.146	76.21	310.07	310.07	0.753	1.84	1.99	0.24	0.01	24.1	0.00
15.8	3.613	75.23	310.49	310.49	0.752	2.08	2.28	0.26	0.01	25.5	0.00
15.82	2.799	68.93	310.91	310.91	0.752	2.46	2.77	0.28	0.01	28.2	0.00
15.84	1.867	79.02	311.33	311.33	0.751	4.23	5.08	0.47	0.01	47.2	0.00
15.86	1.745	75.65	311.74	311.74	0.751	4.34	5.28	0.48	0.01	48.1	0.00
15.88	2.683	76.5	312.15	312.15	0.750	2.85	3.23	0.32	0.01	31.9	0.00
15.9	3.088	81.54	312.57	312.57	0.749	2.64	2.94	0.30	0.01	30.2	0.00
15.92	2.741	84.21	312.99	312.99	0.749	3.07	3.47	0.34	0.01	34.4	0.00
15.94	2.32	84.77	313.41	313.41	0.748	3.65	4.22	0.41	0.01	40.7	0.00
15.96	3.605	86.03	313.84	313.84	0.748	2.39	2.61	0.28	0.01	28.3	0.00
15.98	4.829	96.96	314.27	314.27	0.747	2.01	2.15	0.26	0.01	26.4	0.00
16	5.438	100.89	314.71	314.71	0.747	1.86	1.97	0.26	0.01	25.9	0.00
16.02	5.848	102.85	314.95	315.15	0.746	1.76	1.86	0.26	0.03	8.5	0.00
16.04	6.098	100.89	315.20	315.59	0.746	1.65	1.74	0.25	0.03	8.4	0.00
16.06	6.291	101.45	315.44	316.03	0.745	1.61	1.70	0.25	0.03	8.3	0.00
16.08	6.311	102.01	315.69	316.47	0.745	1.62	1.70	0.25	0.03	8.4	0.00
16.1	6.187	99.49	315.93	316.91	0.744	1.61	1.69	0.25	0.03	8.3	0.00
16.12	6.041	96.82	316.17	317.35	0.744	1.60	1.69	0.25	0.03	8.2	0.00
16.14	5.929	101.73	316.42	317.79	0.743	1.72	1.81	0.25	0.03	8.4	0.00
16.16	5.782	103.97	316.66	318.23	0.743	1.80	1.90	0.26	0.03	8.6	0.00
16.18	5.35	105.37	316.89	318.66	0.742	1.97	2.09	0.27	0.03	8.9	0.00
16.2	4.782	104.39	317.14	319.1	0.741	2.18	2.34	0.28	0.03	9.3	0.00
16.22	4.142	102.43	317.38	319.54	0.741	2.47	2.68	0.30	0.03	9.9	0.00
16.24	4.223	100.47	317.62	319.97	0.740	2.38	2.57	0.29	0.03	9.7	0.00
16.26	4.86	100.75	317.86	320.41	0.740	2.07	2.22	0.27	0.03	9.0	0.00
16.28	5.381	108.04	318.09	320.84	0.739	2.01	2.14	0.27	0.03	9.0	0.00
16.3	5.107	115.75	318.33	321.27	0.739	2.27	2.42	0.29	0.03	9.7	0.00
16.32	4.786	115.33	318.57	321.71	0.738	2.41	2.58	0.30	0.03	10.1	0.00
16.34	4.281	103.69	318.79	322.13	0.738	2.42	2.62	0.30	0.03	9.8	0.00

16.36	3.486	87.57	319.03	322.56	0.737	2.51	2.77	0.29	0.03	9.8	0.00
16.38	2.772	84.49	319.25	322.98	0.737	3.05	3.45	0.34	0.03	11.4	0.00
16.4	2.266	91.64	319.49	323.41	0.736	4.04	4.72	0.46	0.03	15.3	0.00
16.42	2.872	104.11	319.71	323.83	0.736	3.63	4.09	0.42	0.03	13.9	0.00
16.44	4.119	91.64	319.93	324.25	0.735	2.22	2.41	0.27	0.03	9.1	0.00
16.46	3.771	89.81	320.16	324.67	0.735	2.38	2.61	0.29	0.03	9.5	0.00
16.48	2.949	98.08	320.38	325.09	0.734	3.33	3.74	0.38	0.03	12.6	0.00
16.5	2.405	109.58	320.61	325.51	0.733	4.56	5.27	0.54	0.03	18.1	0.00
16.52	2.888	89.53	320.83	325.93	0.733	3.10	3.49	0.35	0.03	11.7	0.00
16.54	3.274	77.76	321.04	326.34	0.732	2.38	2.64	0.28	0.03	9.3	0.00
16.56	2.571	75.51	321.26	326.75	0.732	2.94	3.36	0.33	0.03	10.9	0.00
16.58	1.924	86.87	321.48	327.17	0.731	4.52	5.44	0.52	0.03	17.2	0.00
16.6	2.251	91.78	321.70	327.59	0.731	4.08	4.77	0.46	0.03	15.5	0.00
16.62	3.524	87.29	321.93	328.01	0.730	2.48	2.73	0.29	0.03	9.7	0.00
16.64	3.486	92.62	322.14	328.42	0.730	2.66	2.93	0.31	0.03	10.3	0.00
16.66	2.868	99.77	322.37	328.84	0.729	3.48	3.93	0.40	0.03	13.2	0.00
16.68	2.529	93.88	322.58	329.25	0.729	3.71	4.27	0.42	0.03	14.0	0.00
16.7	2.563	90.37	322.80	329.67	0.728	3.53	4.05	0.40	0.03	13.2	0.00
16.72	2.486	77.48	323.02	330.08	0.728	3.12	3.59	0.35	0.03	11.6	0.00
16.74	1.973	63.04	323.23	330.49	0.727	3.20	3.84	0.35	0.03	11.7	0.00
16.76	1.905	58.13	323.44	330.9	0.727	3.05	3.69	0.33	0.03	11.1	0.00
16.78	1.943	58.83	323.67	331.32	0.726	3.03	3.65	0.33	0.03	11.1	0.00
16.8	2.305	60.23	323.89	331.74	0.725	2.61	3.05	0.29	0.03	9.8	0.00
16.82	4.076	72.01	324.12	332.16	0.725	1.77	1.92	0.23	0.03	7.8	0.00
16.84	4.879	75.23	324.35	332.59	0.724	1.54	1.65	0.22	0.03	7.5	0.00
16.86	4.887	74.25	324.58	333.02	0.724	1.52	1.63	0.22	0.03	7.4	0.00
16.88	5.026	78.32	324.83	333.46	0.723	1.56	1.67	0.23	0.03	7.6	0.00
16.9	5.076	83.22	325.06	333.89	0.723	1.64	1.75	0.23	0.03	7.8	0.00
16.92	5.137	89.67	325.30	334.33	0.722	1.75	1.87	0.24	0.03	8.2	0.00
16.94	5.068	89.95	325.55	334.77	0.722	1.77	1.90	0.25	0.03	8.2	0.00
16.96	5.411	89.53	325.79	335.21	0.721	1.65	1.76	0.24	0.03	8.0	0.00
16.98	5.616	91.21	326.04	335.65	0.721	1.62	1.73	0.24	0.03	8.0	0.00
17	5.724	95.56	326.27	336.08	0.720	1.67	1.77	0.25	0.03	8.2	0.00
17.02	5.504	101.17	326.51	336.52	0.720	1.84	1.96	0.26	0.03	8.6	0.00
17.04	5.006	110.28	326.76	336.96	0.719	2.20	2.36	0.28	0.03	9.5	0.00
17.06	4.362	100.89	326.99	337.39	0.718	2.31	2.51	0.29	0.03	9.6	0.00
17.08	3.686	87.71	327.22	337.81	0.718	2.38	2.62	0.28	0.03	9.5	0.00
17.1	3.042	78.32	327.44	338.23	0.717	2.57	2.90	0.30	0.03	9.9	0.00
17.12	2.154	65.84	327.65	338.64	0.717	3.06	3.63	0.34	0.03	11.3	0.00
17.14	1.487	59.53	327.88	339.06	0.716	4.00	5.19	0.44	0.03	14.7	0.00
17.16	1.361	59.95	328.10	339.48	0.716	4.40	5.87	0.49	0.03	16.3	0.00
17.18	2.405	63.32	328.32	339.9	0.715	2.63	3.07	0.30	0.03	9.9	0.00
17.2	4.358	68.22	328.56	340.33	0.715	1.57	1.70	0.22	0.03	7.4	0.00
17.22	5.647	77.76	328.79	340.76	0.714	1.38	1.47	0.22	0.03	7.4	0.00
17.24	5.767	89.39	329.04	341.2	0.714	1.55	1.65	0.24	0.03	7.9	0.00
17.26	5.867	87.15	329.28	341.64	0.713	1.49	1.58	0.23	0.03	7.8	0.00
17.28	6.056	84.07	329.52	342.08	0.713	1.39	1.47	0.23	0.03	7.6	0.00
17.3	6.187	81.68	329.77	342.52	0.712	1.32	1.40	0.22	0.03	7.5	0.00
17.32	6.141	82.38	330.01	342.96	0.712	1.34	1.42	0.23	0.03	7.6	0.00
17.34	5.932	86.59	330.25	343.4	0.711	1.46	1.55	0.23	0.03	7.8	0.00
17.36	5.709	90.37	330.50	343.84	0.710	1.58	1.68	0.24	0.03	8.0	0.00
17.38	5.396	92.76	330.74	344.28	0.710	1.72	1.84	0.25	0.03	8.2	0.00
17.4	5.033	95.56	330.98	344.71	0.709	1.90	2.04	0.26	0.03	8.6	0.00
17.42	4.821	96.54	331.22	345.15	0.709	2.00	2.16	0.26	0.03	8.8	0.00
17.44	4.786	94.02	331.45	345.58	0.708	1.96	2.12	0.26	0.03	8.7	0.00
17.46	4.721	94.86	331.70	346.02	0.708	2.01	2.17	0.26	0.03	8.8	0.00
17.48	4.725	96.68	331.93	346.45	0.707	2.05	2.21	0.27	0.03	8.9	0.00
17.5	4.381	94.86	332.17	346.88	0.707	2.17	2.35	0.27	0.03	9.1	0.00
17.52	4.076	88.69	332.40	347.31	0.706	2.18	2.38	0.27	0.03	9.0	0.00
17.54	4.057	85.89	332.63	347.74	0.706	2.12	2.32	0.26	0.03	8.8	0.00
17.56	3.648	84.91	332.86	348.16	0.705	2.33	2.57	0.28	0.03	9.4	0.00
17.58	3.019	75.09	333.08	348.58	0.705	2.49	2.81	0.29	0.03	9.7	0.00
17.6	2.467	70.33	333.30	349	0.704	2.85	3.32	0.32	0.03	10.7	0.00
17.62	2.455	78.46	333.53	349.42	0.704	3.20	3.73	0.36	0.03	12.0	0.00
17.64	3.111	82.94	333.76	349.85	0.703	2.67	3.00	0.31	0.03	10.3	0.00
17.66	3.791	78.04	333.99	350.27	0.702	2.06	2.27	0.26	0.03	8.6	0.00
17.68	3.849	78.18	334.21	350.69	0.702	2.03	2.23	0.25	0.03	8.5	0.00
17.7	3.301	77.9	334.43	351.11	0.701	2.36	2.64	0.28	0.03	9.4	0.00
17.72	3.123	75.93	334.67	351.54	0.701	2.43	2.74	0.28	0.03	9.5	0.00
17.74	3.428	76.36	334.90	351.97	0.700	2.23	2.48	0.27	0.03	9.0	0.00
17.76	4.339	73.97	335.13	352.4	0.700	1.70	1.86	0.23	0.03	7.8	0.00
17.78	4.863	76.36	335.37	352.83	0.699	1.57	1.69	0.23	0.03	7.6	0.00
17.8	5.014	89.25	335.60	353.26	0.699	1.78	1.91	0.25	0.03	8.3	0.00
17.82	4.86	92.62	335.84	353.69	0.698	1.91	2.06	0.25	0.03	8.6	0.00
17.84	4.234	87.71	336.07	354.12	0.698	2.07	2.26	0.26	0.03	8.8	0.00
17.86	3.428	64.16	336.29	354.54	0.697	1.87	2.09	0.24	0.03	8.0	0.00
17.88	2.498	62.9	336.51	354.95	0.697	2.52	2.94	0.29	0.03	9.7	0.00
17.9	1.859	57.85	336.72	355.36	0.696	3.11	3.85	0.34	0.03	11.6	0.00
17.92	1.331	48.74	336.92	355.76	0.696	3.66	5.00	0.40	0.03	13.6	0.00
17.94	1.232	41.73	337.13	356.16	0.695	3.39	4.76	0.37	0.03	12.6	0.00
17.96	1.262	36.12	337.33	356.56	0.694	2.86	3.99	0.32	0.03	10.8	0.00
17.98	1.281	40.61	337.54	356.96	0.694	3.17	4.39	0.35	0.03	11.8	0.00
18	1.532	43.69	337.74	357.36	0.693	2.85	3.72	0.32	0.03	10.7	0.00
18.02	2.475	42.99	337.95	357.77	0.693	1.74	2.03	0.22	0.03	7.5	0.00

18.04	3.119	62.9	338.18	358.19	0.692	2.02	2.28	0.25	0.03	8.3	0.00
18.06	3.59	76.64	338.40	358.61	0.692	2.13	2.37	0.26	0.03	8.8	0.00
18.08	3.987	85.61	338.63	359.03	0.691	2.15	2.36	0.27	0.03	9.0	0.00
18.1	3.837	83.22	338.86	359.46	0.691	2.17	2.39	0.27	0.03	9.0	0.00
18.12	3.258	81.26	339.09	359.89	0.690	2.49	2.80	0.29	0.03	9.8	0.00
18.14	3.594	80.84	339.33	360.32	0.690	2.25	2.50	0.27	0.03	9.2	0.00
18.16	4.601	84.77	339.55	360.74	0.689	1.84	2.00	0.25	0.03	8.3	0.00
18.18	4.578	84.49	339.78	361.17	0.689	1.85	2.00	0.25	0.03	8.3	0.00
18.2	4.261	85.19	340.02	361.6	0.688	2.00	2.18	0.26	0.03	8.6	0.00
18.22	3.849	87.99	340.25	362.03	0.688	2.29	2.52	0.28	0.03	9.4	0.00
18.24	3.212	86.73	340.49	362.46	0.687	2.70	3.04	0.31	0.03	10.6	0.00
18.26	3.192	91.21	340.71	362.88	0.686	2.86	3.22	0.33	0.03	11.1	0.00
18.28	3.787	90.79	340.94	363.31	0.686	2.40	2.65	0.29	0.03	9.7	0.00
18.3	4.427	92.62	341.18	363.74	0.685	2.09	2.28	0.27	0.03	9.0	0.00
18.32	4.532	92.2	341.41	364.17	0.685	2.03	2.21	0.26	0.03	8.9	0.00
18.34	4.466	90.23	341.64	364.6	0.684	2.02	2.20	0.26	0.03	8.8	0.00
18.36	4.57	89.11	341.88	365.03	0.684	1.95	2.12	0.25	0.03	8.6	0.00
18.38	4.609	86.87	342.12	365.47	0.683	1.88	2.05	0.25	0.03	8.4	0.00
18.4	4.389	87.99	342.36	365.9	0.683	2.00	2.19	0.26	0.03	8.7	0.00
18.42	4.373	87.01	342.59	366.33	0.682	1.99	2.17	0.26	0.03	8.7	0.00
18.44	4.798	84.63	342.83	366.77	0.682	1.76	1.91	0.24	0.03	8.2	0.00
18.46	5.215	80	343.07	367.2	0.681	1.53	1.65	0.23	0.03	7.7	0.00
18.48	5.3	82.24	343.31	367.64	0.681	1.55	1.67	0.23	0.03	7.8	0.00
18.5	5.323	98.22	343.55	368.07	0.680	1.85	1.98	0.25	0.03	8.6	0.00
18.52	5.064	95.28	343.79	368.51	0.680	1.88	2.03	0.25	0.03	8.6	0.00
18.54	4.385	90.93	344.02	368.94	0.679	2.07	2.26	0.26	0.03	8.9	0.00
18.56	3.544	88.27	344.26	369.37	0.678	2.49	2.78	0.29	0.03	10.0	0.00
18.58	2.957	87.15	344.48	369.79	0.678	2.95	3.37	0.34	0.03	11.5	0.00
18.6	2.88	84.77	344.71	370.22	0.677	2.94	3.38	0.34	0.03	11.4	0.00
18.62	3.486	88.27	344.94	370.64	0.677	2.53	2.83	0.30	0.03	10.1	0.00
18.64	3.493	85.75	345.17	371.07	0.676	2.45	2.75	0.29	0.03	9.9	0.00
18.66	3.899	89.25	345.41	371.5	0.676	2.29	2.53	0.28	0.03	9.5	0.00
18.68	4.69	85.19	345.64	371.93	0.675	1.82	1.97	0.24	0.03	8.3	0.00
18.7	4.995	89.81	345.87	372.36	0.675	1.80	1.94	0.25	0.03	8.4	0.00
18.72	5.381	88.55	346.12	372.8	0.674	1.65	1.77	0.24	0.03	8.1	0.00
18.74	5.269	91.78	346.35	373.23	0.674	1.74	1.87	0.24	0.03	8.3	0.00
18.76	4.736	91.78	346.59	373.67	0.673	1.94	2.10	0.25	0.03	8.7	0.00
18.78	4.192	84.91	346.83	374.1	0.673	2.03	2.22	0.26	0.03	8.8	0.00
18.8	4.478	84.07	347.07	374.54	0.672	1.88	2.05	0.25	0.03	8.4	0.00
18.82	5.215	84.35	347.31	374.97	0.672	1.62	1.74	0.23	0.03	8.0	0.00
18.84	5.535	70.05	347.55	375.41	0.671	1.27	1.36	0.21	0.03	7.2	0.00
18.86	5.52	72.57	347.79	375.85	0.670	1.31	1.41	0.21	0.03	7.3	0.00
18.88	5.539	73.83	348.04	376.29	0.670	1.33	1.43	0.22	0.03	7.4	0.00
18.9	5.508	75.51	348.28	376.73	0.669	1.37	1.47	0.22	0.03	7.5	0.00
18.92	5.392	73.69	348.51	377.16	0.669	1.37	1.47	0.22	0.03	7.4	0.00
18.94	5.242	74.81	348.76	377.6	0.668	1.43	1.54	0.22	0.03	7.5	0.00
18.96	5.11	81.12	349.00	378.04	0.668	1.59	1.71	0.23	0.03	7.9	0.00
18.98	4.867	87.99	349.24	378.47	0.667	1.81	1.96	0.25	0.03	8.4	0.00
19	4.331	89.95	349.47	378.9	0.667	2.08	2.28	0.26	0.03	9.0	0.00
19.02	3.528	76.64	349.69	379.32	0.666	2.17	2.43	0.26	0.03	9.0	0.00
19.04	2.834	66.68	349.92	379.74	0.666	2.35	2.72	0.28	0.03	9.4	0.00
19.06	2.282	58.55	350.14	380.16	0.665	2.57	3.08	0.29	0.03	10.0	0.00
19.08	2.1	51.68	350.36	380.57	0.665	2.46	3.01	0.28	0.03	9.7	0.00
19.1	1.844	69.21	350.57	380.98	0.664	3.75	4.73	0.42	0.03	14.5	0.00
19.12	1.817	78.18	350.79	381.4	0.663	4.30	5.45	0.50	0.03	17.1	0.00
19.14	3.432	85.89	351.02	381.82	0.663	2.50	2.82	0.29	0.03	10.1	0.00
19.16	4.439	90.23	351.25	382.25	0.662	2.03	2.22	0.26	0.03	8.9	0.00
19.18	4.3	85.05	351.48	382.68	0.662	1.98	2.17	0.25	0.03	8.7	0.00
19.2	4.62	85.33	351.72	383.11	0.661	1.85	2.01	0.25	0.03	8.4	0.00
19.22	4.62	81.96	351.95	383.54	0.661	1.77	1.93	0.24	0.03	8.2	0.00
19.24	4.605	83.79	352.19	383.97	0.660	1.82	1.99	0.24	0.03	8.4	0.00
19.26	4.559	81.26	352.42	384.4	0.660	1.78	1.95	0.24	0.03	8.2	0.00
19.28	4.512	76.07	352.66	384.84	0.659	1.69	1.84	0.23	0.03	8.0	0.00
19.3	4.47	78.04	352.90	385.27	0.659	1.75	1.91	0.24	0.03	8.1	0.00
19.32	4.597	79.58	353.13	385.7	0.658	1.73	1.89	0.24	0.03	8.1	0.00
19.34	4.454	80.14	353.36	386.13	0.658	1.80	1.97	0.24	0.03	8.3	0.00
19.36	4.277	79.16	353.60	386.56	0.657	1.85	2.03	0.24	0.03	8.4	0.00
19.38	4.038	81.4	353.83	386.99	0.657	2.02	2.23	0.25	0.03	8.8	0.00
19.4	4.238	81.82	354.08	387.43	0.656	1.93	2.12	0.25	0.03	8.6	0.00
19.42	4.408	83.22	354.31	387.86	0.655	1.89	2.07	0.25	0.03	8.5	0.00
19.44	4.393	81.96	354.54	388.29	0.655	1.87	2.05	0.24	0.03	8.4	0.00
19.46	4.35	84.77	354.78	388.72	0.654	1.95	2.14	0.25	0.03	8.7	0.00
19.48	4.381	81.82	355.01	389.15	0.654	1.87	2.05	0.24	0.03	8.5	0.00
19.5	4.389	81.96	355.25	389.58	0.653	1.87	2.05	0.24	0.03	8.5	0.00
19.52	4.408	80.56	355.48	390.01	0.653	1.83	2.00	0.24	0.03	8.4	0.00
19.54	4.404	83.08	355.72	390.45	0.652	1.89	2.07	0.25	0.03	8.5	0.00
19.56	4.508	89.39	355.96	390.88	0.652	1.98	2.17	0.26	0.03	8.9	0.00
19.58	4.532	92.9	356.19	391.31	0.651	2.05	2.24	0.26	0.03	9.1	0.00
19.6	4.516	93.88	356.42	391.74	0.651	2.08	2.28	0.26	0.03	9.2	0.00
19.62	4.759	85.33	356.67	392.18	0.650	1.79	1.95	0.24	0.03	8.4	0.00
19.64	5.176	85.47	356.91	392.62	0.650	1.65	1.79	0.24	0.03	8.2	0.00
19.66	5.562	81.68	357.15	393.05	0.649	1.47	1.58	0.23	0.03	7.8	0.00
19.68	5.489	77.34	357.39	393.49	0.649	1.41	1.52	0.22	0.03	7.6	0.00
19.7	5.319	75.79	357.63	393.93	0.648	1.42	1.54	0.22	0.03	7.6	0.00

19.72	5.056	74.95	357.87	394.36	0.647	1.48	1.61	0.22	0.03	7.7	0.00
19.74	4.929	78.32	358.11	394.8	0.647	1.59	1.73	0.23	0.03	7.9	0.00
19.76	4.786	76.36	358.35	395.24	0.646	1.60	1.74	0.23	0.03	7.9	0.00
19.78	4.705	65.14	358.59	395.67	0.646	1.38	1.51	0.21	0.03	7.3	0.00
19.8	4.69	67.38	358.82	396.1	0.645	1.44	1.57	0.21	0.03	7.4	0.00
19.82	4.782	70.89	359.07	396.54	0.645	1.48	1.62	0.22	0.03	7.6	0.00
19.84	4.91	72.29	359.30	396.97	0.644	1.47	1.60	0.22	0.03	7.6	0.00
19.86	4.96	70.47	359.54	397.41	0.644	1.42	1.54	0.22	0.03	7.5	0.00
19.88	5.01	71.59	359.78	397.84	0.643	1.43	1.55	0.22	0.03	7.5	0.00
19.9	4.898	74.25	360.02	398.28	0.643	1.52	1.65	0.22	0.03	7.7	0.00
19.92	4.674	77.2	360.25	398.71	0.642	1.65	1.81	0.23	0.03	8.0	0.00
19.94	4.35	78.04	360.49	399.14	0.642	1.79	1.98	0.24	0.03	8.3	0.00
19.96	3.949	76.36	360.72	399.57	0.641	1.93	2.15	0.25	0.03	8.6	0.00
19.98	3.837	81.26	360.96	400	0.641	2.12	2.36	0.26	0.03	9.1	0.00
20	3.71	82.24	361.18	400.42	0.640	2.22	2.48	0.27	0.03	9.4	0.00
20.02	3.493	79.72	361.40	400.84	0.639	2.28	2.58	0.27	0.03	9.6	0.00
20.04	3.092	76.21	361.63	401.26	0.639	2.46	2.83	0.29	0.03	10.1	0.00
20.06	2.44	63.04	361.85	401.68	0.638	2.58	3.09	0.30	0.03	10.4	0.00
20.08	2.135	67.52	362.07	402.09	0.638	3.16	3.90	0.36	0.03	12.5	0.00
20.1	2.363	55.19	362.29	402.51	0.637	2.34	2.82	0.27	0.03	9.6	0.00
20.12	2.915	56.45	362.50	402.92	0.637	1.94	2.25	0.24	0.03	8.4	0.00
20.14	2.633	64.72	362.74	403.35	0.636	2.46	2.90	0.29	0.03	10.0	0.00
20.16	3.331	80.56	362.96	403.77	0.636	2.42	2.75	0.29	0.03	10.0	0.00
20.18	4.91	86.31	363.19	404.2	0.635	1.76	1.92	0.24	0.03	8.4	0.00
20.2	4.705	83.22	363.42	404.62	0.635	1.77	1.94	0.24	0.03	8.4	0.00
20.22	4.072	88.55	363.65	405.05	0.634	2.17	2.41	0.27	0.03	9.4	0.00
20.24	3.575	84.63	363.90	405.49	0.634	2.37	2.67	0.28	0.03	9.9	0.00
20.26	4.018	82.66	364.13	405.92	0.633	2.06	2.29	0.26	0.03	9.0	0.00
20.28	5.141	87.43	364.36	406.35	0.633	1.70	1.85	0.24	0.03	8.4	0.00
20.3	5.238	94.16	364.60	406.78	0.632	1.80	1.95	0.25	0.03	8.7	0.00
20.32	4.856	86.17	364.83	407.21	0.631	1.77	1.94	0.24	0.03	8.5	0.00
20.34	4.173	83.08	365.06	407.64	0.631	1.99	2.21	0.25	0.03	8.9	0.00
20.36	3.613	72.29	365.30	408.07	0.630	2.00	2.26	0.25	0.03	8.8	0.00
20.38	3.285	78.18	365.53	408.5	0.630	2.38	2.72	0.28	0.03	9.9	0.00
20.4	4.088	79.72	365.77	408.93	0.629	1.95	2.17	0.25	0.03	8.8	0.00
20.42	4.539	81.4	365.99	409.35	0.629	1.79	1.97	0.24	0.03	8.4	0.00
20.44	4.014	77.62	366.22	409.78	0.628	1.93	2.15	0.25	0.03	8.7	0.00
20.46	3.227	78.04	366.45	410.2	0.628	2.42	2.77	0.29	0.03	10.1	0.00
20.48	3.019	70.19	366.68	410.63	0.627	2.32	2.69	0.28	0.03	9.7	0.00
20.5	3.073	67.94	366.91	411.05	0.627	2.21	2.55	0.26	0.03	9.3	0.00
20.52	3.312	61.78	367.13	411.47	0.626	1.87	2.13	0.24	0.03	8.3	0.00
20.54	3.165	70.05	367.35	411.89	0.626	2.21	2.54	0.27	0.03	9.4	0.00
20.56	3.656	82.38	367.58	412.31	0.625	2.25	2.54	0.27	0.03	9.6	0.00
20.58	3.876	79.3	367.80	412.73	0.625	2.05	2.29	0.26	0.03	9.0	0.00
20.6	3.239	84.77	368.02	413.15	0.624	2.62	3.00	0.31	0.03	10.8	0.00
20.62	2.409	80.84	368.24	413.56	0.623	3.36	4.05	0.38	0.03	13.6	0.00
20.64	2.12	76.92	368.46	413.98	0.623	3.63	4.51	0.42	0.03	14.7	0.00
20.66	1.932	69.63	368.67	414.38	0.622	3.60	4.59	0.41	0.03	14.6	0.00
20.68	1.939	54.07	368.87	414.78	0.622	2.79	3.55	0.32	0.03	11.3	0.00
20.7	1.875	48.74	369.08	415.19	0.621	2.60	3.34	0.30	0.03	10.6	0.00
20.72	1.464	45.09	369.30	415.6	0.621	3.08	4.30	0.35	0.03	12.5	0.00
20.74	1.779	50.28	369.52	416.02	0.620	2.83	3.69	0.32	0.03	11.5	0.00
20.76	3.281	54.91	369.73	416.43	0.620	1.67	1.92	0.22	0.03	7.8	0.00
20.78	4.616	63.74	369.96	416.85	0.619	1.38	1.52	0.21	0.03	7.4	0.00
20.8	4.389	72.71	370.19	417.28	0.619	1.66	1.83	0.23	0.03	8.1	0.00
20.82	3.845	77.62	370.42	417.7	0.618	2.02	2.26	0.25	0.03	9.0	0.00
20.84	3.131	79.86	370.64	418.12	0.618	2.55	2.94	0.30	0.03	10.6	0.00
20.86	2.841	81.96	370.87	418.55	0.617	2.88	3.38	0.33	0.03	11.8	0.00
20.88	2.791	81.68	371.10	418.97	0.617	2.93	3.44	0.34	0.03	12.0	0.00
20.9	2.942	79.58	371.32	419.39	0.616	2.70	3.15	0.31	0.03	11.1	0.00
20.92	3.277	71.87	371.53	419.8	0.615	2.19	2.52	0.26	0.03	9.4	0.00
20.94	3.54	71.17	371.76	420.22	0.615	2.01	2.28	0.25	0.03	8.9	0.00
20.96	3.42	74.39	371.98	420.64	0.614	2.18	2.48	0.26	0.03	9.4	0.00
20.98	2.764	68.22	372.21	421.06	0.614	2.47	2.91	0.29	0.03	10.3	0.00
21	2.467	66.4	372.43	421.48	0.613	2.69	3.25	0.31	0.03	11.0	0.00
21.02	2.425	56.31	372.64	421.89	0.613	2.32	2.81	0.27	0.03	9.8	0.00
21.04	2.826	53.36	372.87	422.31	0.612	1.89	2.22	0.24	0.03	8.5	0.00
21.06	2.899	66.4	373.08	422.72	0.612	2.29	2.68	0.27	0.03	9.7	0.00
21.08	3.065	61.5	373.30	423.13	0.611	2.01	2.33	0.25	0.03	8.8	0.00
21.1	2.59	57.29	373.51	423.54	0.611	2.21	2.64	0.26	0.03	9.4	0.00
21.12	1.981	59.81	373.72	423.95	0.610	3.02	3.84	0.34	0.03	12.3	0.00
21.14	1.567	60.79	373.95	424.37	0.610	3.88	5.32	0.45	0.03	16.1	0.00
21.16	2.193	63.46	374.16	424.78	0.609	2.89	3.59	0.33	0.03	11.8	0.00
21.18	3.181	61.78	374.37	425.19	0.608	1.94	2.24	0.24	0.03	8.7	0.00
21.2	3.158	57.43	374.59	425.6	0.608	1.82	2.10	0.23	0.03	8.3	0.00
21.22	2.621	64.16	374.80	426.01	0.607	2.45	2.92	0.29	0.03	10.3	0.00
21.24	2.004	79.72	375.03	426.43	0.607	3.98	5.05	0.46	0.03	16.7	0.00
21.26	2.425	82.94	375.25	426.85	0.606	3.42	4.15	0.39	0.03	14.1	0.00
21.28	3.663	76.64	375.46	427.26	0.606	2.09	2.37	0.26	0.03	9.3	0.00
21.3	3.571	69.35	375.69	427.68	0.605	1.94	2.21	0.24	0.03	8.8	0.00
21.32	3.15	73.13	375.92	428.11	0.605	2.32	2.69	0.28	0.03	9.9	0.00
21.34	3.355	69.77	376.15	428.54	0.604	2.08	2.38	0.26	0.03	9.2	0.00
21.36	4.153	70.33	376.39	428.97	0.604	1.69	1.89	0.23	0.03	8.2	0.00
21.38	5.064	73.83	376.62	429.4	0.603	1.46	1.59	0.22	0.03	7.9	0.00

21.4	5.431	77.06	376.87	429.84	0.603	1.42	1.54	0.22	0.03	7.9	0.00
21.42	5.55	80.56	377.10	430.27	0.602	1.45	1.57	0.22	0.03	8.0	0.00
21.44	5.547	80.42	377.34	430.71	0.602	1.45	1.57	0.22	0.03	8.0	0.00
21.46	5.685	81.68	377.59	431.15	0.601	1.44	1.55	0.22	0.03	8.1	0.00
21.48	5.74	85.47	377.83	431.59	0.600	1.49	1.61	0.23	0.03	8.2	0.00
21.5	5.543	90.65	378.08	432.03	0.600	1.64	1.77	0.24	0.03	8.6	0.00
21.52	5.269	98.93	378.31	432.46	0.599	1.88	2.05	0.25	0.03	9.2	0.00
21.54	4.84	103.69	378.55	432.9	0.599	2.14	2.35	0.27	0.03	9.9	0.00
21.56	4.223	108.32	378.78	433.32	0.598	2.57	2.86	0.31	0.03	11.3	0.00
21.58	3.2	96.4	379.01	433.75	0.598	3.01	3.48	0.35	0.03	12.7	0.00
21.6	2.648	86.73	379.23	434.17	0.597	3.28	3.92	0.38	0.03	13.7	0.00
21.62	2.255	76.36	379.46	434.59	0.597	3.39	4.19	0.39	0.03	14.1	0.00
21.64	2.313	70.05	379.68	435.01	0.596	3.03	3.73	0.35	0.03	12.6	0.00
21.66	2.745	67.66	379.91	435.43	0.596	2.46	2.93	0.29	0.03	10.5	0.00
21.68	4.447	73.83	380.14	435.86	0.595	1.66	1.84	0.23	0.03	8.3	0.00
21.7	4.995	77.9	380.37	436.29	0.595	1.56	1.71	0.23	0.03	8.2	0.00
21.72	4.952	81.96	380.61	436.72	0.594	1.66	1.82	0.23	0.03	8.4	0.00
21.74	4.813	83.64	380.84	437.15	0.594	1.74	1.91	0.24	0.03	8.6	0.00
21.76	4.505	81.54	381.07	437.58	0.593	1.81	2.00	0.24	0.03	8.8	0.00
21.78	4.296	79.86	381.31	438.01	0.592	1.86	2.07	0.24	0.03	8.8	0.00
21.8	4.15	89.67	381.54	438.44	0.592	2.16	2.42	0.27	0.03	9.8	0.00
21.82	4.373	97.38	381.78	438.87	0.591	2.23	2.48	0.28	0.03	10.1	0.00
21.84	3.987	94.02	382.00	439.29	0.591	2.36	2.65	0.29	0.03	10.5	0.00
21.86	3.204	88.41	382.22	439.71	0.590	2.76	3.20	0.32	0.03	11.8	0.00
21.88	2.401	80	382.45	440.13	0.590	3.33	4.08	0.38	0.03	14.0	0.00
21.9	2.151	63.46	382.66	440.54	0.589	2.95	3.71	0.34	0.03	12.4	0.00
21.92	2.073	51.68	382.88	440.96	0.589	2.49	3.17	0.29	0.03	10.7	0.00
21.94	2.521	51.4	383.10	441.37	0.588	2.04	2.47	0.25	0.03	9.1	0.00
21.96	3.023	49.44	383.31	441.78	0.588	1.64	1.92	0.22	0.03	8.0	0.00
21.98	3.092	50.7	383.53	442.19	0.587	1.64	1.91	0.22	0.03	8.0	0.00
22	2.621	49.16	383.74	442.6	0.587	1.88	2.26	0.24	0.03	8.7	0.00
22.02	1.996	42.43	383.95	443.01	0.586	2.13	2.73	0.26	0.03	9.5	0.00
22.04	1.54	36.4	384.16	443.41	0.586	2.36	3.32	0.29	0.03	10.5	0.00
22.06	1.399	30.93	384.35	443.8	0.585	2.21	3.24	0.28	0.03	10.1	0.00
22.08	1.422	23.64	384.56	444.2	0.584	1.66	2.42	0.23	0.03	8.4	0.00
22.1	1.35	19.57	384.75	444.59	0.584	1.45	2.16	0.21	0.03	7.9	0.00
22.12	1.335	22.52	384.93	444.97	0.583	1.69	2.53	0.23	0.03	8.6	0.00
22.14	1.316	22.38	385.13	445.36	0.583	1.70	2.57	0.23	0.03	8.6	0.00
22.16	1.354	24.07	385.33	445.76	0.582	1.78	2.65	0.24	0.03	8.8	0.00
22.18	1.395	27.99	385.52	446.15	0.582	2.01	2.95	0.26	0.03	9.5	0.00
22.2	1.582	28.97	385.73	446.55	0.581	1.83	2.55	0.24	0.03	8.8	0.00
22.22	1.882	32.48	385.92	446.94	0.581	1.73	2.26	0.23	0.03	8.4	0.00
22.24	2.174	35.14	386.13	447.34	0.580	1.62	2.04	0.22	0.03	8.0	0.00
22.26	1.89	38.5	386.33	447.74	0.580	2.04	2.67	0.25	0.03	9.3	0.00
22.28	1.498	54.07	386.54	448.15	0.579	3.61	5.15	0.42	0.03	15.6	0.00
22.3	1.722	49.16	386.75	448.55	0.579	2.85	3.86	0.33	0.03	12.3	0.00
22.32	2.459	45.93	386.95	448.95	0.578	1.87	2.29	0.24	0.03	8.7	0.00
22.34	2.733	54.63	387.16	449.36	0.578	2.00	2.39	0.25	0.03	9.1	0.00
22.36	2.123	59.95	387.37	449.76	0.577	2.82	3.58	0.33	0.03	12.1	0.00
22.38	1.734	62.76	387.58	450.17	0.576	3.62	4.89	0.42	0.03	15.6	0.00
22.4	1.894	56.03	387.79	450.57	0.576	2.96	3.88	0.34	0.03	12.7	0.00
22.42	2.162	45.79	388.00	450.98	0.575	2.12	2.68	0.26	0.03	9.6	0.00
22.44	1.981	47.9	388.21	451.39	0.575	2.42	3.13	0.29	0.03	10.6	0.00
22.46	2.147	60.79	388.43	451.8	0.574	2.83	3.59	0.33	0.03	12.1	0.00
22.48	2.814	54.49	388.64	452.21	0.574	1.94	2.31	0.24	0.03	9.0	0.00
22.5	2.899	54.21	388.85	452.61	0.573	1.87	2.22	0.24	0.03	8.8	0.00
22.52	2.479	52.1	389.06	453.02	0.573	2.10	2.57	0.26	0.03	9.5	0.00
22.54	2.027	48.04	389.27	453.43	0.572	2.37	3.05	0.28	0.03	10.5	0.00
22.56	1.738	43.55	389.48	453.83	0.572	2.51	3.39	0.30	0.03	11.1	0.00
22.58	1.814	41.03	389.69	454.24	0.571	2.26	3.02	0.27	0.03	10.2	0.00
22.6	2.046	36.12	389.89	454.64	0.571	1.77	2.27	0.23	0.03	8.6	0.00
22.62	1.806	29.39	390.10	455.04	0.570	1.63	2.18	0.22	0.03	8.2	0.00
22.64	1.665	31.21	390.29	455.43	0.570	1.87	2.58	0.24	0.03	9.0	0.00
22.66	1.734	28.27	390.50	455.83	0.569	1.63	2.21	0.22	0.03	8.3	0.00
22.68	1.726	23.22	390.70	456.23	0.568	1.35	1.83	0.20	0.03	7.5	0.00
22.7	1.521	22.94	390.89	456.62	0.568	1.51	2.16	0.22	0.03	8.1	0.00
22.72	1.418	27.01	391.09	457.01	0.567	1.90	2.81	0.25	0.03	9.4	0.00
22.74	1.475	25.61	391.29	457.41	0.567	1.74	2.52	0.24	0.03	8.8	0.00
22.76	1.441	18.94	391.48	457.8	0.566	1.31	1.93	0.20	0.03	7.6	0.00
22.78	1.468	21.96	391.68	458.19	0.566	1.50	2.17	0.22	0.03	8.1	0.00
22.8	1.605	27.85	391.87	458.58	0.565	1.74	2.43	0.23	0.03	8.7	0.00
22.82	1.65	29.11	392.07	458.97	0.565	1.76	2.44	0.23	0.03	8.8	0.00
22.84	1.471	31.36	392.27	459.37	0.564	2.13	3.10	0.27	0.03	10.1	0.00
22.86	1.331	31.07	392.46	459.76	0.564	2.33	3.57	0.29	0.03	11.0	0.00
22.88	1.384	30.65	392.66	460.15	0.563	2.21	3.32	0.28	0.03	10.5	0.00
22.9	1.624	38.08	392.86	460.55	0.563	2.34	3.27	0.29	0.03	10.7	0.00
22.92	1.673	44.39	393.05	460.94	0.562	2.65	3.66	0.31	0.03	11.8	0.00
22.94	1.696	41.45	393.26	461.34	0.562	2.44	3.36	0.29	0.03	11.0	0.00
22.96	1.726	37.1	393.45	461.73	0.561	2.15	2.93	0.27	0.03	10.0	0.00
22.98	1.76	30.65	393.66	462.13	0.560	1.74	2.36	0.23	0.03	8.7	0.00
23	1.863	28.83	393.86	462.53	0.560	1.55	2.06	0.22	0.03	8.1	0.00
23.02	1.84	27.57	394.06	462.93	0.560	1.50	2.00	0.21	0.03	8.0	0.00
23.04	1.726	25.33	394.26	463.32	0.560	1.47	2.01	0.21	0.03	7.9	0.00
23.06	1.57	22.66	394.46	463.72	0.560	1.44	2.05	0.21	0.03	8.0	0.00

23.08	1.445	20	394.66	464.11	0.559	1.38	2.04	0.21	0.03	7.9	0.00
23.1	1.449	19.57	394.85	464.5	0.559	1.35	1.99	0.21	0.03	7.8	0.00
23.12	1.433	18.72	395.04	464.89	0.559	1.31	1.93	0.20	0.03	7.7	0.00
23.14	1.35	20	395.24	465.28	0.559	1.48	2.26	0.22	0.03	8.2	0.00
23.16	1.251	20.84	395.43	465.67	0.559	1.67	2.65	0.24	0.03	8.9	0.00
23.18	1.224	21.54	395.61	466.05	0.559	1.76	2.84	0.25	0.03	9.3	0.00
23.2	1.274	22.94	395.81	466.44	0.558	1.80	2.84	0.25	0.03	9.3	0.00
23.22	1.319	24.07	396.00	466.83	0.558	1.82	2.82	0.25	0.03	9.3	0.00
23.24	1.357	25.47	396.19	467.21	0.558	1.88	2.86	0.25	0.03	9.5	0.00
23.26	1.395	29.11	396.38	467.6	0.558	2.09	3.14	0.27	0.03	10.1	0.00
23.28	1.483	23.79	396.58	468	0.558	1.60	2.34	0.23	0.03	8.5	0.00
23.3	1.548	16.81	396.78	468.39	0.558	1.09	1.56	0.19	0.03	7.0	0.00
23.32	1.673	18.72	396.97	468.78	0.557	1.12	1.55	0.19	0.03	7.0	0.00
23.34	1.772	18.72	397.17	469.18	0.557	1.06	1.44	0.18	0.03	6.8	0.00
23.36	1.719	19.79	397.37	469.57	0.557	1.15	1.58	0.19	0.03	7.1	0.00
23.38	1.414	21.4	397.56	469.96	0.557	1.51	2.27	0.22	0.03	8.3	0.00
23.4	1.266	21.4	397.76	470.35	0.557	1.69	2.69	0.24	0.03	9.0	0.00
23.42	1.274	20.28	397.95	470.74	0.557	1.59	2.52	0.23	0.03	8.7	0.00
23.44	1.274	20.56	398.14	471.13	0.556	1.61	2.56	0.23	0.03	8.7	0.00
23.46	1.281	21.82	398.33	471.51	0.556	1.70	2.70	0.24	0.03	9.0	0.00
23.48	1.369	16.17	398.52	471.9	0.556	1.18	1.80	0.20	0.03	7.4	0.00
23.5	1.441	18.94	398.72	472.29	0.556	1.31	1.96	0.20	0.03	7.7	0.00
23.52	1.468	19.57	398.91	472.68	0.556	1.33	1.97	0.21	0.03	7.7	0.00
23.54	1.51	20	399.10	473.07	0.556	1.32	1.93	0.20	0.03	7.7	0.00
23.56	1.407	19.36	399.30	473.46	0.556	1.38	2.07	0.21	0.03	7.9	0.00
23.58	1.319	20	399.49	473.85	0.555	1.52	2.37	0.22	0.03	8.4	0.00
23.6	1.346	18.3	399.68	474.24	0.555	1.36	2.10	0.21	0.03	7.9	0.00
23.62	1.342	17.45	399.87	474.62	0.555	1.30	2.01	0.21	0.03	7.8	0.00
23.64	1.361	19.79	400.06	475.01	0.555	1.45	2.23	0.22	0.03	8.2	0.00
23.66	1.369	20.98	400.26	475.4	0.555	1.53	2.35	0.22	0.03	8.4	0.00
23.68	1.361	21.96	400.45	475.79	0.555	1.61	2.48	0.23	0.03	8.7	0.00
23.7	1.327	22.24	400.63	476.17	0.554	1.68	2.61	0.24	0.03	8.9	0.00
23.72	1.327	22.38	400.83	476.56	0.554	1.69	2.63	0.24	0.03	8.9	0.00
23.74	1.312	21.54	401.02	476.95	0.554	1.64	2.58	0.23	0.03	8.8	0.00
23.76	1.327	21.26	401.20	477.33	0.554	1.60	2.50	0.23	0.03	8.7	0.00
23.78	1.357	22.1	401.40	477.72	0.554	1.63	2.51	0.23	0.03	8.7	0.00
23.8	1.346	21.82	401.59	478.11	0.554	1.62	2.51	0.23	0.03	8.7	0.00
23.82	1.323	21.4	401.78	478.49	0.553	1.62	2.53	0.23	0.03	8.7	0.00
23.84	1.312	21.68	401.97	478.88	0.553	1.65	2.60	0.24	0.03	8.9	0.00
23.86	1.312	16.17	402.16	479.27	0.553	1.23	1.94	0.20	0.03	7.6	0.00
23.88	1.312	20	402.35	479.65	0.553	1.52	2.40	0.23	0.03	8.5	0.00
23.9	1.316	20.7	402.54	480.04	0.553	1.57	2.48	0.23	0.03	8.6	0.00
23.92	1.342	23.93	402.73	480.43	0.553	1.78	2.78	0.25	0.03	9.2	0.00
23.94	1.38	24.35	402.93	480.82	0.552	1.76	2.71	0.24	0.03	9.1	0.00
23.96	1.593	25.47	403.12	481.21	0.552	1.60	2.29	0.22	0.03	8.4	0.00
23.98	1.544	25.61	403.32	481.6	0.552	1.66	2.41	0.23	0.03	8.6	0.00
24	1.487	24.91	403.51	481.99	0.552	1.68	2.48	0.23	0.03	8.7	0.00
24.02	1.479	24.49	403.70	482.38	0.552	1.66	2.46	0.23	0.03	8.7	0.00
24.04	1.395	23.79	403.90	482.77	0.552	1.71	2.61	0.24	0.03	8.9	0.00
24.06	1.376	22.8	404.09	483.16	0.552	1.66	2.55	0.23	0.03	8.8	0.00
24.08	1.388	21.68	404.29	483.55	0.551	1.56	2.40	0.23	0.03	8.5	0.00
24.1	1.384	20.7	404.48	483.94	0.551	1.50	2.30	0.22	0.03	8.3	0.00
24.12	1.411	21.4	404.67	484.33	0.551	1.52	2.31	0.22	0.03	8.3	0.00
24.14	1.411	20.56	404.86	484.71	0.551	1.46	2.22	0.22	0.03	8.2	0.00
24.16	1.422	20.98	405.05	485.1	0.551	1.48	2.24	0.22	0.03	8.2	0.00
24.18	1.433	22.24	405.24	485.49	0.551	1.55	2.35	0.22	0.03	8.4	0.00
24.2	1.433	23.08	405.44	485.88	0.550	1.61	2.44	0.23	0.03	8.6	0.00
24.22	1.422	21.82	405.63	486.27	0.550	1.53	2.33	0.22	0.03	8.4	0.00
24.24	1.395	21.54	405.83	486.66	0.550	1.54	2.37	0.23	0.03	8.5	0.00
24.26	1.43	21.54	406.02	487.05	0.550	1.51	2.28	0.22	0.03	8.3	0.00
24.28	1.502	21.4	406.21	487.44	0.550	1.42	2.11	0.21	0.03	8.0	0.00
24.3	1.506	23.22	406.41	487.83	0.550	1.54	2.28	0.22	0.03	8.3	0.00
24.32	1.433	24.49	406.60	488.22	0.549	1.71	2.59	0.24	0.03	8.9	0.00
24.34	1.392	22.66	406.79	488.61	0.549	1.63	2.51	0.23	0.03	8.7	0.00
24.36	1.399	23.08	406.99	489	0.549	1.65	2.54	0.23	0.03	8.8	0.00
24.38	1.483	23.5	407.18	489.39	0.549	1.58	2.37	0.23	0.03	8.5	0.00
24.4	1.544	21.82	407.38	489.78	0.549	1.41	2.07	0.21	0.03	7.9	0.00
24.42	1.54	22.24	407.58	490.18	0.549	1.44	2.12	0.21	0.03	8.0	0.00
24.44	1.513	22.52	407.77	490.57	0.548	1.49	2.20	0.22	0.03	8.2	0.00
24.46	1.54	22.38	407.97	490.96	0.548	1.45	2.13	0.21	0.03	8.1	0.00
24.48	1.529	22.1	408.16	491.35	0.548	1.45	2.13	0.21	0.03	8.1	0.00
24.5	1.456	22.1	408.36	491.74	0.548	1.52	2.29	0.22	0.03	8.3	0.00
24.52	1.445	21.82	408.55	492.13	0.548	1.51	2.29	0.22	0.03	8.3	0.00
24.54	1.433	22.38	408.74	492.52	0.548	1.56	2.38	0.23	0.03	8.5	0.00
24.56	1.456	22.94	408.94	492.91	0.548	1.58	2.38	0.23	0.03	8.5	0.00
24.58	1.475	22.24	409.13	493.3	0.547	1.51	2.27	0.22	0.03	8.3	0.00
24.6	1.487	23.36	409.32	493.69	0.547	1.57	2.35	0.23	0.03	8.5	0.00
24.62	1.506	24.63	409.53	494.09	0.547	1.64	2.43	0.23	0.03	8.6	0.00
24.64	1.559	21.96	409.72	494.48	0.547	1.41	2.06	0.21	0.03	7.9	0.00
24.66	1.578	23.5	409.92	494.87	0.547	1.49	2.17	0.22	0.03	8.2	0.00
24.68	1.593	24.07	410.11	495.26	0.547	1.51	2.19	0.22	0.03	8.2	0.00
24.7	1.616	23.5	410.31	495.66	0.546	1.45	2.10	0.21	0.03	8.0	0.00
24.72	1.601	24.07	410.51	496.05	0.546	1.50	2.18	0.22	0.03	8.2	0.00
24.74	1.502	24.77	410.70	496.44	0.546	1.65	2.46	0.23	0.03	8.7	0.00

24.76	1.49	26.59	410.89	496.83	0.546	1.78	2.68	0.24	0.03	9.1	0.00
24.78	1.532	24.63	411.10	497.23	0.546	1.61	2.38	0.23	0.03	8.6	0.00
24.8	1.563	24.49	411.29	497.62	0.546	1.57	2.30	0.22	0.03	8.4	0.00
24.82	1.574	26.31	411.49	498.01	0.545	1.67	2.45	0.23	0.03	8.7	0.00
24.84	1.555	27.43	411.68	498.4	0.545	1.76	2.60	0.24	0.03	9.0	0.00
24.86	1.525	28.13	411.88	498.8	0.545	1.84	2.74	0.25	0.03	9.3	0.00
24.88	1.483	28.27	412.08	499.19	0.545	1.91	2.87	0.25	0.03	9.6	0.00
24.9	1.529	42.57	412.27	499.58	0.545	2.78	4.14	0.34	0.03	12.7	0.00
24.92	1.548		412.46	499.97	0.545	0.00	0.06	0.12	0.03	4.6	0.00
24.94	1.586		412.66	500.36	0.544	0.00	0.06	0.12	0.03	4.6	0.00
24.96	1.627		412.85	500.75	0.544	0.00	0.06	0.12	0.03	4.6	0.00
24.98	1.631		413.05	501.14	0.544	0.00	0.06	0.12	0.03	4.6	0.00
25	1.897		413.24	501.53	0.544	0.00	0.06	0.12	0.03	4.6	0.00
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Spreadsheet Template for Calculating CRR, CSR, Factor of Safety (FS), and Probability of Liquefaction (P_L) based on CPT Measurements

The method implemented in this spreadsheet is applicable to evaluating liquefaction potentail of sandy and silty soils.
For soils above groundwater table, no liquefaction is implied, which is implemented by assigning CSR = 0.01.
Refer to Juang et al. (2001) for details.
By using this speadsheet, the user agrees to assume full risk/responsibility in interpreting the results.
Spreasheet prepared by H. Yuan and C.H. Juang - May 2002

Note: All input data are marked in yellow.

a_{max} (peak horizontal ground acceleration) (g)	0.11
M_w (earthquake magnitude)	6
Calculated MSF (magnitude scaling factor) =	1.77
Water Table Depth (m)	5

CPT 108

Input Data					Intermediate parameters			Results of the Analysis			
Depth (m)	q_c(Mpa)	f_s (kPa)	σ'_v (kPa)	σ_v (kPa)	r_d	R_f (%)	F(%)	CRR	CSR	F_S	P_L
0.02	0.179	25.89	0.41	0.41	1.000	14.46	14.50	0.44	0.01	44.4	0.00
0.04	1.118	39.07	0.83	0.83	1.000	3.49	3.50	0.18	0.01	18.3	0.00
0.06	6.195	69.35	1.25	1.25	1.000	1.12	1.12	0.38	0.01	37.7	0.00
0.08	8.244	51.54	1.67	1.67	0.999	0.63	0.63	0.50	0.01	49.7	0.00
0.1	9.398	51.68	2.10	2.1	0.999	0.55	0.55	0.76	0.01	75.7	0.00
0.12	9.857	41.17	2.53	2.53	0.999	0.42	0.42	0.90	0.01	89.8	0.00
0.14	11.464	50.28	2.96	2.96	0.999	0.44	0.44	1.00	0.01	100.0	0.00
0.16	12.135	68.22	3.40	3.4	0.999	0.56	0.56	1.00	0.01	100.0	0.00
0.18	12.004	69.35	3.83	3.83	0.999	0.58	0.58	1.00	0.01	100.0	0.00
0.2	10.813	87.71	4.27	4.27	0.998	0.81	0.81	1.00	0.01	100.0	0.00
0.22	11.121	83.93	4.70	4.7	0.998	0.75	0.76	1.00	0.01	100.0	0.00
0.24	10.331	110.14	5.14	5.14	0.998	1.07	1.07	1.00	0.01	100.0	0.00
0.26	11.437	101.59	5.58	5.58	0.998	0.89	0.89	1.00	0.01	100.0	0.00
0.28	12.123	110.7	6.02	6.02	0.998	0.91	0.91	1.00	0.01	100.0	0.00
0.3	13.626	136.78	6.45	6.45	0.998	1.00	1.00	1.00	0.01	100.0	0.00
0.32	13.592	142.1	6.89	6.89	0.998	1.05	1.05	1.00	0.01	100.0	0.00
0.34	13.125	144.21	7.33	7.33	0.997	1.10	1.10	1.00	0.01	100.0	0.00
0.36	12.027	160.47	7.77	7.77	0.997	1.33	1.34	1.00	0.01	100.0	0.00
0.38	13.541	70.75	8.21	8.21	0.997	0.52	0.52	1.00	0.01	100.0	0.00
0.4	14.212	77.2	8.65	8.65	0.997	0.54	0.54	1.00	0.01	100.0	0.00
0.42	15.95	131.31	9.09	9.09	0.997	0.82	0.82	1.00	0.01	100.0	0.00
0.44	18.158	132.85	9.53	9.53	0.997	0.73	0.73	1.00	0.01	100.0	0.00
0.46	18.809	163.27	9.97	9.97	0.996	0.87	0.87	1.00	0.01	100.0	0.00
0.48	19.306	199.3	10.41	10.41	0.996	1.03	1.03	1.00	0.01	100.0	0.00
0.5	18.782	253.13	10.85	10.85	0.996	1.35	1.35	1.00	0.01	100.0	0.00
0.52	18.663	196.22	11.29	11.29	0.996	1.05	1.05	1.00	0.01	100.0	0.00
0.54	17.21	158.93	11.73	11.73	0.996	0.92	0.92	1.00	0.01	100.0	0.00
0.56	15.969	165.09	12.17	12.17	0.996	1.03	1.03	1.00	0.01	100.0	0.00
0.58	16.343	145.89	12.61	12.61	0.996	0.89	0.89	1.00	0.01	100.0	0.00
0.6	15.684	160.89	13.05	13.05	0.995	1.03	1.03	1.00	0.01	100.0	0.00
0.62	15.279	229.41	13.49	13.49	0.995	1.50	1.50	1.00	0.01	100.0	0.00
0.64	17.503	122.34	13.93	13.93	0.995	0.70	0.70	1.00	0.01	100.0	0.00
0.66	13.067	139.3	14.37	14.37	0.995	1.07	1.07	1.00	0.01	100.0	0.00
0.68	13.437	155	14.81	14.81	0.995	1.15	1.15	1.00	0.01	100.0	0.00
0.7	12.582	162.85	15.25	15.25	0.995	1.29	1.30	1.00	0.01	100.0	0.00
0.72	12.008	138.04	15.69	15.69	0.994	1.15	1.15	1.00	0.01	100.0	0.00
0.74	11.881	123.04	16.13	16.13	0.994	1.04	1.04	1.00	0.01	100.0	0.00
0.76	10.948	106.64	16.56	16.56	0.994	0.97	0.98	1.00	0.01	100.0	0.00
0.78	10.52	95.28	17.00	17	0.994	0.91	0.91	1.00	0.01	100.0	0.00
0.8	9.938	76.78	17.43	17.43	0.994	0.77	0.77	0.92	0.01	92.1	0.00
0.82	9.124	72.85	17.86	17.86	0.994	0.80	0.80	0.72	0.01	71.8	0.00
0.84	8.287	66.54	18.29	18.29	0.994	0.80	0.80	0.57	0.01	56.9	0.00
0.86	8.63	69.21	18.71	18.71	0.993	0.80	0.80	0.63	0.01	62.6	0.00
0.88	9.109	39.77	19.14	19.14	0.993	0.44	0.44	0.68	0.01	67.7	0.00
0.9	8.101	55.47	19.56	19.56	0.993	0.68	0.69	0.49	0.01	48.6	0.00
0.92	7.468	79.58	19.98	19.98	0.993	1.07	1.07	0.54	0.01	54.4	0.00
0.94	6.21	78.04	20.40	20.4	0.993	1.26	1.26	0.40	0.01	40.5	0.00
0.96	5.655	105.37	20.82	20.82	0.993	1.86	1.87	0.44	0.01	44.1	0.00
0.98	5.311	102.85	21.22	21.22	0.993	1.94	1.94	0.40	0.01	40.2	0.00
1	3.775	90.23	21.63	21.63	0.992	2.39	2.40	0.28	0.01	28.1	0.00
1.02	2.695	69.35	22.02	22.02	0.992	2.57	2.59	0.21	0.01	21.1	0.00
1.04	2.077	59.11	22.41	22.41	0.992	2.85	2.88	0.19	0.01	19.4	0.00
1.06	1.133	50	22.79	22.79	0.992	4.41	4.50	0.26	0.01	25.5	0.00
1.08	0.996	45.37	23.19	23.19	0.992	4.56	4.66	0.25	0.01	25.4	0.00
1.1	1.042	34.3	23.58	23.58	0.992	3.29	3.37	0.17	0.01	17.1	0.00
1.12	0.951	31.92	23.97	23.97	0.991	3.36	3.44	0.17	0.01	17.1	0.00
1.14	0.677	29.11	24.35	24.35	0.991	4.30	4.46	0.21	0.01	20.7	0.00
1.16	0.696	28.55	24.74	24.74	0.991	4.10	4.25	0.20	0.01	19.8	0.00
1.18	0.772	24.35	25.12	25.12	0.991	3.15	3.26	0.15	0.01	15.3	0.00
1.2	0.76	24.49	25.49	25.49	0.991	3.22	3.33	0.16	0.01	15.6	0.00
1.22	0.719	24.35	25.87	25.87	0.991	3.39	3.51	0.16	0.01	16.1	0.00

1.24	0.677	19.79	26.25	26.25	0.991	2.92	3.04	0.14	0.01	13.9	0.00
1.26	0.631	18.09	26.63	26.63	0.990	2.87	2.99	0.14	0.01	13.5	0.00
1.28	0.582	18.51	27.00	27	0.990	3.18	3.34	0.15	0.01	14.6	0.00
1.3	0.559	19.15	27.38	27.38	0.990	3.43	3.60	0.15	0.01	15.5	0.00
1.32	0.559	17.87	27.75	27.75	0.990	3.20	3.36	0.15	0.01	14.5	0.00
1.34	0.563	16.17	28.12	28.12	0.990	2.87	3.02	0.13	0.01	13.3	0.00
1.36	0.498	15.53	28.49	28.49	0.990	3.12	3.31	0.14	0.01	14.0	0.00
1.38	0.464	15.53	28.86	28.86	0.989	3.35	3.57	0.15	0.01	14.6	0.00
1.4	0.46	14.47	29.22	29.22	0.989	3.15	3.36	0.14	0.01	13.9	0.00
1.42	0.46	13.62	29.59	29.59	0.989	2.96	3.16	0.13	0.01	13.2	0.00
1.44	0.449	12.55	29.96	29.96	0.989	2.80	2.99	0.13	0.01	12.7	0.00
1.46	0.452	12.34	30.32	30.32	0.989	2.73	2.93	0.12	0.01	12.4	0.00
1.48	0.426	10.85	30.68	30.68	0.989	2.55	2.74	0.12	0.01	11.8	0.00
1.5	0.395	13.62	31.05	31.05	0.989	3.45	3.74	0.15	0.01	14.5	0.00
1.52	0.388	12.55	31.41	31.41	0.988	3.23	3.52	0.14	0.01	13.8	0.00
1.54	0.392	19.79	31.78	31.78	0.988	5.05	5.49	0.21	0.01	20.7	0.00
1.56	0.395	18.72	32.15	32.15	0.988	4.74	5.16	0.19	0.01	19.4	0.00
1.58	0.548	16.6	32.51	32.51	0.988	3.03	3.22	0.14	0.01	13.8	0.00
1.6	0.673	15.32	32.88	32.88	0.988	2.28	2.39	0.11	0.01	11.4	0.00
1.62	0.525	14.47	33.25	33.25	0.988	2.76	2.94	0.13	0.01	12.7	0.00
1.64	0.376	22.94	33.63	33.63	0.987	6.10	6.70	0.25	0.01	25.2	0.00
1.66	0.441	26.45	34.01	34.01	0.987	6.00	6.50	0.26	0.01	26.3	0.00
1.68	0.837	21.82	34.38	34.38	0.987	2.61	2.72	0.13	0.01	12.9	0.00
1.7	1.042	23.08	34.76	34.76	0.987	2.21	2.29	0.12	0.01	11.8	0.00
1.72	0.795	25.33	35.13	35.13	0.987	3.19	3.33	0.15	0.01	15.2	0.00
1.74	0.536	25.05	35.51	35.51	0.987	4.67	5.01	0.21	0.01	20.7	0.00
1.76	0.422	21.96	35.88	35.88	0.987	5.20	5.69	0.22	0.01	21.7	0.00
1.78	0.529	19.15	36.25	36.25	0.986	3.62	3.89	0.16	0.01	15.9	0.00
1.8	0.468	15.32	36.62	36.62	0.986	3.27	3.55	0.14	0.01	14.3	0.00
1.82	0.354	15.74	36.98	36.98	0.986	4.45	4.96	0.18	0.01	17.6	0.00
1.84	0.342	12.55	37.34	37.34	0.986	3.67	4.12	0.15	0.01	14.8	0.00
1.86	0.403	12.55	37.70	37.7	0.986	3.11	3.44	0.13	0.01	13.4	0.00
1.88	0.38	5.53	38.07	38.07	0.986	1.46	1.62	0.09	0.01	8.9	0.00
1.9	0.384	8.51	38.43	38.43	0.985	2.22	2.46	0.11	0.01	10.8	0.00
1.92	0.445	10.85	38.79	38.79	0.985	2.44	2.67	0.12	0.01	11.5	0.00
1.94	0.445	14.89	39.16	39.16	0.985	3.35	3.67	0.14	0.01	14.4	0.00
1.96	0.369	15.11	39.53	39.53	0.985	4.09	4.59	0.16	0.01	16.4	0.00
1.98	0.726	14.89	39.90	39.9	0.985	2.05	2.17	0.11	0.01	10.8	0.00
2	0.7	12.77	40.27	40.27	0.985	1.82	1.94	0.10	0.01	10.1	0.00
2.02	0.551	13.19	40.64	40.64	0.985	2.39	2.58	0.12	0.01	11.6	0.00
2.04	0.376	12.55	41.01	41.01	0.984	3.34	3.75	0.14	0.01	14.0	0.00
2.06	0.361	7.02	41.37	41.37	0.984	1.94	2.20	0.10	0.01	10.1	0.00
2.08	0.399	5.32	41.73	41.73	0.984	1.33	1.49	0.09	0.01	8.6	0.00
2.1	0.392	4.89	42.09	42.09	0.984	1.25	1.40	0.08	0.01	8.4	0.00
2.12	0.342	5.11	42.46	42.46	0.984	1.49	1.71	0.09	0.01	9.0	0.00
2.14	0.308	5.11	42.83	42.83	0.984	1.66	1.93	0.09	0.01	9.3	0.00
2.16	0.487	13.62	43.20	43.2	0.983	2.80	3.07	0.13	0.01	12.8	0.00
2.18	0.973	17.66	43.58	43.58	0.983	1.82	1.90	0.10	0.01	10.3	0.00
2.2	1.076	17.45	43.96	43.96	0.983	1.62	1.69	0.10	0.01	9.8	0.00
2.22	0.753	16.17	44.33	44.33	0.983	2.15	2.28	0.11	0.01	11.1	0.00
2.24	0.578	16.17	44.71	44.71	0.983	2.80	3.03	0.13	0.01	13.0	0.00
2.26	0.35	12.34	45.07	45.07	0.983	3.53	4.05	0.14	0.01	14.4	0.00
2.28	0.27	10.64	45.44	45.44	0.983	3.94	4.74	0.15	0.01	14.9	0.00
2.3	0.259	4.47	45.79	45.79	0.982	1.73	2.10	0.09	0.01	9.5	0.00
2.32	0.278	4.26	46.14	46.14	0.982	1.53	1.84	0.09	0.01	9.1	0.00
2.34	0.293	4.26	46.50	46.5	0.982	1.45	1.73	0.09	0.01	8.9	0.00
2.36	0.316	4.47	46.85	46.85	0.982	1.41	1.66	0.09	0.01	8.8	0.00
2.38	0.338	4.26	47.20	47.2	0.982	1.26	1.46	0.09	0.01	8.5	0.00
2.4	0.297	4.26	47.57	47.57	0.982	1.43	1.71	0.09	0.01	8.9	0.00
2.42	0.262	4.26	47.92	47.92	0.981	1.63	1.99	0.09	0.01	9.3	0.00
2.44	0.346	4.26	48.28	48.28	0.981	1.23	1.43	0.08	0.01	8.5	0.00
2.46	1.061	10.64	48.64	48.64	0.981	1.00	1.05	0.08	0.01	8.1	0.00
2.48	2.062	21.54	49.04	49.04	0.981	1.04	1.07	0.09	0.01	9.3	0.00
2.5	1.924	27.85	49.43	49.43	0.981	1.45	1.49	0.10	0.01	10.3	0.00
2.52	1.483	34.44	49.83	49.83	0.981	2.32	2.40	0.13	0.01	12.8	0.00
2.54	1.019	33.18	50.22	50.22	0.981	3.26	3.42	0.16	0.01	16.1	0.00
2.56	0.707	29.53	50.61	50.61	0.980	4.18	4.50	0.19	0.01	19.3	0.00
2.58	0.574	25.33	50.98	50.98	0.980	4.41	4.84	0.19	0.01	19.5	0.00
2.6	0.475	21.82	51.35	51.35	0.980	4.59	5.15	0.19	0.01	19.3	0.00
2.62	0.323	16.81	51.72	51.72	0.980	5.20	6.20	0.20	0.01	19.6	0.00
2.64	0.285	8.72	52.07	52.07	0.980	3.06	3.74	0.13	0.01	12.8	0.00
2.66	0.289	2.98	52.43	52.43	0.980	1.03	1.26	0.08	0.01	8.1	0.00
2.68	0.297	3.4	52.78	52.78	0.979	1.14	1.39	0.08	0.01	8.3	0.00
2.7	0.281	2.77	53.13	53.13	0.979	0.99	1.22	0.08	0.01	8.0	0.00
2.72	0.278	2.77	53.48	53.48	0.979	1.00	1.23	0.08	0.01	8.0	0.00
2.74	0.293	3.62	53.84	53.84	0.979	1.24	1.51	0.09	0.01	8.5	0.00
2.76	0.338	2.77	54.19	54.19	0.979	0.82	0.98	0.08	0.01	7.6	0.00
2.78	0.369	3.19	54.54	54.54	0.979	0.86	1.01	0.08	0.01	7.7	0.00
2.8	0.354	7.23	54.90	54.9	0.979	2.04	2.42	0.10	0.01	10.5	0.00
2.82	0.278	6.17	55.26	55.26	0.978	2.22	2.77	0.11	0.01	10.8	0.00
2.84	0.312	4.47	55.62	55.62	0.978	1.43	1.74	0.09	0.01	9.0	0.00
2.86	0.407	2.13	55.97	55.97	0.978	0.52	0.61	0.07	0.01	6.9	0.00
2.88	0.46	2.34	56.33	56.33	0.978	0.51	0.58	0.07	0.01	6.9	0.00
2.9	0.319	5.96	56.70	56.7	0.978	1.87	2.27	0.10	0.01	10.1	0.00

2.92	0.331	7.23	57.07	57.07	0.978	2.18	2.64	0.11	0.01	10.8	0.00
2.94	0.582	8.51	57.45	57.45	0.978	1.46	1.62	0.09	0.01	9.2	0.00
2.96	1.11	11.91	57.83	57.83	0.977	1.07	1.13	0.08	0.01	8.4	0.00
2.98	1.015	17.45	58.21	58.21	0.977	1.72	1.82	0.10	0.01	10.1	0.00
3	0.92	26.17	58.60	58.6	0.977	2.84	3.04	0.14	0.01	14.0	0.00
3.02	1.053	25.19	58.99	58.99	0.977	2.39	2.53	0.12	0.01	12.5	0.00
3.04	1.103	23.64	59.37	59.37	0.977	2.14	2.27	0.12	0.01	11.6	0.00
3.06	0.909	22.8	59.75	59.75	0.977	2.51	2.68	0.13	0.01	12.7	0.00
3.08	0.673	19.36	60.14	60.14	0.976	2.88	3.16	0.14	0.01	13.7	0.00
3.1	0.536	16.6	60.52	60.52	0.976	3.10	3.49	0.14	0.01	14.1	0.00
3.12	0.772	20.14	60.91	60.91	0.976	2.61	2.83	0.13	0.01	12.9	0.00
3.14	1.023	25.75	61.29	61.29	0.976	2.52	2.68	0.13	0.01	13.0	0.00
3.16	1.099	24.35	61.67	61.67	0.976	2.22	2.35	0.12	0.01	11.9	0.00
3.18	1.053	23.64	62.05	62.05	0.976	2.25	2.39	0.12	0.01	12.0	0.00
3.2	0.76	22.8	62.43	62.43	0.976	3.00	3.27	0.14	0.01	14.4	0.00
3.22	0.559	23.93	62.81	62.81	0.975	4.28	4.82	0.19	0.01	18.8	0.00
3.24	0.414	19.36	63.19	63.19	0.975	4.68	5.52	0.19	0.01	19.1	0.00
3.26	0.559	17.02	63.56	63.56	0.975	3.04	3.44	0.14	0.01	14.0	0.00
3.28	0.7	19.15	63.94	63.94	0.975	2.74	3.01	0.13	0.01	13.3	0.00
3.3	0.62	20.28	64.32	64.32	0.975	3.27	3.65	0.15	0.01	15.1	0.00
3.32	0.863	22.38	64.71	64.71	0.975	2.59	2.80	0.13	0.01	13.1	0.00
3.34	1.297	23.93	65.10	65.1	0.974	1.85	1.94	0.11	0.01	10.9	0.00
3.36	1.251	27.15	65.50	65.5	0.974	2.17	2.29	0.12	0.01	12.0	0.00
3.38	1.479	28.97	65.89	65.89	0.974	1.96	2.05	0.11	0.01	11.4	0.00
3.4	1.753	28.83	66.29	66.29	0.974	1.64	1.71	0.11	0.01	10.6	0.00
3.42	1.43	32.76	66.68	66.68	0.974	2.29	2.40	0.13	0.01	12.7	0.00
3.44	1.08	31.36	67.07	67.07	0.974	2.90	3.10	0.15	0.01	14.7	0.00
3.46	0.909	28.41	67.46	67.46	0.974	3.13	3.38	0.15	0.01	15.3	0.00
3.48	0.871	25.61	67.84	67.84	0.973	2.94	3.19	0.14	0.01	14.5	0.00
3.5	0.654	20.28	68.22	68.22	0.973	3.10	3.46	0.15	0.01	14.6	0.00
3.52	0.449	14.89	68.59	68.59	0.973	3.32	3.91	0.15	0.01	14.7	0.00
3.54	0.316	8.94	68.95	68.95	0.973	2.83	3.62	0.13	0.01	12.7	0.00
3.56	0.319	7.45	69.31	69.31	0.973	2.34	2.98	0.11	0.01	11.5	0.00
3.58	0.312	2.55	69.67	69.67	0.973	0.82	1.05	0.08	0.01	7.9	0.00
3.6	0.3	4.04	70.04	70.04	0.972	1.35	1.76	0.09	0.01	9.1	0.00
3.62	0.308	4.68	70.40	70.4	0.972	1.52	1.97	0.10	0.01	9.5	0.00
3.64	0.715	7.66	70.77	70.77	0.972	1.07	1.19	0.08	0.01	8.4	0.00
3.66	1.833	9.57	71.14	71.14	0.972	0.52	0.54	0.08	0.01	7.6	0.00
3.68	2.232	11.28	71.52	71.52	0.972	0.51	0.52	0.08	0.01	7.9	0.00
3.7	2.452	12.77	71.91	71.91	0.972	0.52	0.54	0.08	0.01	8.2	0.00
3.72	2.56	15.74	72.29	72.29	0.972	0.61	0.63	0.09	0.01	8.5	0.00
3.74	2.463	22.8	72.68	72.68	0.971	0.93	0.95	0.09	0.01	9.2	0.00
3.76	2.235	32.9	73.06	73.06	0.971	1.47	1.52	0.11	0.01	10.6	0.00
3.78	1.863	28.97	73.46	73.46	0.971	1.56	1.62	0.10	0.01	10.5	0.00
3.8	1.304	22.66	73.86	73.86	0.971	1.74	1.84	0.11	0.01	10.6	0.00
3.82	0.863	20.42	74.26	74.26	0.971	2.37	2.59	0.12	0.01	12.4	0.00
3.84	0.65	17.23	74.66	74.66	0.971	2.65	2.99	0.13	0.01	13.1	0.00
3.86	0.665	4.89	75.03	75.03	0.970	0.74	0.83	0.08	0.01	7.6	0.00
3.88	1.76	13.83	75.42	75.42	0.970	0.79	0.82	0.08	0.01	8.2	0.00
3.9	2.181	22.1	75.82	75.82	0.970	1.01	1.05	0.09	0.01	9.2	0.00
3.92	1.837	23.64	76.22	76.22	0.970	1.29	1.34	0.10	0.01	9.6	0.00
3.94	1.365	22.24	76.61	76.61	0.970	1.63	1.73	0.10	0.01	10.3	0.00
3.96	0.981	22.1	77.00	77	0.970	2.25	2.44	0.12	0.01	12.2	0.00
3.98	0.726	17.66	77.39	77.39	0.970	2.43	2.72	0.13	0.01	12.6	0.00
4	0.548	10.85	77.77	77.77	0.969	1.98	2.31	0.11	0.01	11.0	0.00
4.02	0.494	11.06	78.14	78.14	0.969	2.24	2.66	0.12	0.01	11.7	0.00
4.04	0.471	4.89	78.50	78.5	0.969	1.04	1.25	0.09	0.01	8.5	0.00
4.06	0.388	4.47	78.87	78.87	0.969	1.15	1.45	0.09	0.01	8.8	0.00
4.08	0.388	9.15	79.24	79.24	0.969	2.36	2.96	0.12	0.01	11.9	0.00
4.1	0.529	5.53	79.60	79.6	0.969	1.05	1.23	0.09	0.01	8.5	0.00
4.12	0.643	6.17	79.97	79.97	0.968	0.96	1.10	0.08	0.01	8.3	0.00
4.14	0.646	7.23	80.35	80.35	0.968	1.12	1.28	0.09	0.01	8.7	0.00
4.16	0.506	10.85	80.73	80.73	0.968	2.14	2.55	0.12	0.01	11.5	0.00
4.18	0.715	21.68	81.11	81.11	0.968	3.03	3.42	0.15	0.01	14.8	0.00
4.2	1.395	24.21	81.50	81.5	0.968	1.74	1.84	0.11	0.01	10.8	0.00
4.22	1.365	21.54	81.88	81.88	0.968	1.58	1.68	0.10	0.01	10.3	0.00
4.24	1.095	20	82.27	82.27	0.968	1.83	1.97	0.11	0.01	10.9	0.00
4.26	0.821	18.94	82.65	82.65	0.967	2.31	2.57	0.12	0.01	12.4	0.00
4.28	0.532	16.17	83.03	83.03	0.967	3.04	3.60	0.14	0.01	14.5	0.00
4.3	0.414	18.94	83.40	83.4	0.967	4.57	5.73	0.19	0.01	19.3	0.00
4.32	0.411	8.51	83.77	83.77	0.967	2.07	2.60	0.11	0.01	11.3	0.00
4.34	0.452	4.47	84.13	84.13	0.967	0.99	1.22	0.09	0.01	8.5	0.00
4.36	0.479	7.23	84.51	84.51	0.967	1.51	1.83	0.10	0.01	9.9	0.00
4.38	0.494	16.81	84.89	84.89	0.966	3.40	4.11	0.16	0.01	15.6	0.00
4.4	0.901	22.52	85.27	85.27	0.966	2.50	2.76	0.13	0.01	13.2	0.00
4.42	1.395	21.96	85.65	85.65	0.966	1.57	1.68	0.10	0.01	10.3	0.00
4.44	1.042	15.11	86.03	86.03	0.966	1.45	1.58	0.10	0.01	9.8	0.00
4.46	0.745	14.68	86.41	86.41	0.966	1.97	2.23	0.11	0.01	11.3	0.00
4.48	0.487	10.21	86.78	86.78	0.966	2.10	2.55	0.12	0.01	11.5	0.00
4.5	0.335	20.84	87.16	87.16	0.966	6.22	8.41	0.25	0.01	24.8	0.00
4.52	0.403	18.3	87.53	87.53	0.965	4.54	5.80	0.19	0.01	19.3	0.00
4.54	0.787	11.06	87.90	87.9	0.965	1.41	1.58	0.10	0.01	9.7	0.00
4.56	1.004	10.64	88.28	88.28	0.965	1.06	1.16	0.09	0.01	8.7	0.00
4.58	0.719	12.55	88.67	88.67	0.965	1.75	1.99	0.11	0.01	10.7	0.00

4.6	0.525	13.62	89.06	89.06	0.965	2.59	3.12		0.13	0.01	13.2	0.00
4.62	1.156	15.53	89.45	89.45	0.965	1.34	1.46		0.10	0.01	9.6	0.00
4.64	2.031	17.66	89.85	89.85	0.965	0.87	0.91		0.09	0.01	8.7	0.00
4.66	2.031	20.14	90.25	90.25	0.964	0.99	1.04		0.09	0.01	9.1	0.00
4.68	1.726	29.95	90.65	90.65	0.964	1.74	1.83		0.11	0.01	11.2	0.00
4.7	1.392	28.41	91.05	91.05	0.964	2.04	2.18		0.12	0.01	12.1	0.00
4.72	1.16	26.17	91.44	91.44	0.964	2.26	2.45		0.13	0.01	12.7	0.00
4.74	0.939	23.64	91.82	91.82	0.964	2.52	2.79		0.14	0.01	13.5	0.00
4.76	0.7	20.28	92.20	92.2	0.964	2.90	3.34		0.15	0.01	14.6	0.00
4.78	0.414	8.72	92.58	92.58	0.963	2.11	2.71		0.12	0.01	11.7	0.00
4.8	0.338	6.38	92.94	92.94	0.963	1.89	2.60		0.11	0.01	11.1	0.00
4.82	0.384	1.7	93.30	93.3	0.963	0.44	0.58		0.07	0.01	7.4	0.00
4.84	0.35	2.13	93.67	93.67	0.963	0.61	0.83		0.08	0.01	7.9	0.00
4.86	0.35	7.45	94.05	94.05	0.963	2.13	2.91		0.12	0.01	11.8	0.00
4.88	0.798	12.98	94.42	94.42	0.963	1.63	1.84		0.10	0.01	10.5	0.00
4.9	1.24	12.34	94.79	94.79	0.963	1.00	1.08		0.09	0.01	8.7	0.00
4.92	0.932	11.49	95.17	95.17	0.962	1.23	1.37		0.09	0.01	9.3	0.00
4.94	0.646	11.91	95.54	95.54	0.962	1.84	2.16		0.11	0.01	11.1	0.00
4.96	0.376	8.3	95.91	95.91	0.962	2.21	2.96		0.12	0.01	12.1	0.00
4.98	0.323	6.6	96.28	96.28	0.962	2.04	2.91		0.12	0.01	11.6	0.00
5	0.297	2.13	96.64	96.64	0.962	0.72	1.06		0.08	0.01	8.3	0.00
5.02	0.304	5.32	96.81	97.01	0.962	1.75	2.57		0.11	0.04	2.8	0.01
5.04	0.418	9.15	97.00	97.39	0.961	2.19	2.85		0.12	0.04	3.1	0.01
5.06	0.901	13.83	97.19	97.78	0.961	1.53	1.72		0.10	0.04	2.6	0.01
5.08	1.601	17.66	97.40	98.18	0.961	1.10	1.18		0.09	0.04	2.4	0.02
5.1	1.768	19.36	97.60	98.58	0.961	1.10	1.16		0.09	0.04	2.4	0.02
5.12	2.147	21.68	97.80	98.98	0.961	1.01	1.06		0.09	0.04	2.4	0.02
5.14	2.417	24.63	98.02	99.39	0.961	1.02	1.06		0.10	0.04	2.4	0.01
5.16	2.359	33.18	98.23	99.8	0.961	1.41	1.47		0.11	0.04	2.7	0.01
5.18	2.054	36.82	98.43	100.2	0.960	1.79	1.88		0.12	0.04	3.0	0.01
5.2	1.548	29.25	98.65	100.61	0.960	1.89	2.02		0.12	0.04	3.0	0.01
5.22	1.106	23.36	98.84	101	0.960	2.11	2.32		0.12	0.04	3.1	0.00
5.24	0.749	17.87	99.04	101.39	0.960	2.39	2.76		0.13	0.04	3.3	0.00
5.26	0.479	16.6	99.23	101.78	0.960	3.47	4.40		0.16	0.04	4.1	0.00
5.28	0.65	17.66	99.42	102.17	0.960	2.72	3.22		0.14	0.04	3.6	0.00
5.3	1.51	18.72	99.62	102.56	0.959	1.24	1.33		0.10	0.04	2.4	0.02
5.32	1.73	27.85	99.81	102.95	0.959	1.61	1.71		0.11	0.04	2.8	0.01
5.34	1.494	26.73	100.01	103.35	0.959	1.79	1.92		0.11	0.04	2.9	0.01
5.36	1.342	23.36	100.21	103.74	0.959	1.74	1.89		0.11	0.04	2.8	0.01
5.38	1.072	21.4	100.40	104.13	0.959	2.00	2.21		0.12	0.04	3.0	0.01
5.4	0.73	20.42	100.61	104.53	0.959	2.80	3.26		0.15	0.04	3.7	0.00
5.42	0.707	21.96	100.80	104.92	0.959	3.11	3.65		0.16	0.04	3.9	0.00
5.44	1.46	31.5	100.99	105.31	0.958	2.16	2.33		0.13	0.04	3.2	0.00
5.46	1.852	28.69	101.19	105.7	0.958	1.55	1.64		0.11	0.04	2.7	0.01
5.48	1.468	23.64	101.38	106.09	0.958	1.61	1.74		0.11	0.04	2.7	0.01
5.5	1.038	21.4	101.58	106.48	0.958	2.06	2.30		0.12	0.04	3.0	0.01
5.52	0.722	20.42	101.78	106.88	0.958	2.83	3.32		0.15	0.04	3.7	0.00
5.54	0.551	23.36	101.97	107.27	0.958	4.24	5.26		0.20	0.04	5.0	0.00
5.56	1.095	29.95	102.16	107.65	0.957	2.74	3.03		0.15	0.04	3.7	0.00
5.58	1.616	24.49	102.35	108.04	0.957	1.52	1.62		0.11	0.04	2.6	0.01
5.6	1.259	20.7	102.53	108.42	0.957	1.64	1.80		0.11	0.04	2.7	0.01
5.62	0.901	17.66	102.73	108.81	0.957	1.96	2.23		0.12	0.04	2.9	0.01
5.64	0.635	20.7	102.91	109.19	0.957	3.26	3.94		0.16	0.04	4.0	0.00
5.66	0.392	20.98	103.10	109.57	0.957	5.35	7.43		0.24	0.04	5.8	0.00
5.68	0.544	22.38	103.28	109.95	0.957	4.11	5.16		0.20	0.04	4.8	0.00
5.7	0.981	19.79	103.46	110.33	0.956	2.02	2.27		0.12	0.04	2.9	0.01
5.72	1.152	18.72	103.66	110.72	0.956	1.63	1.80		0.11	0.04	2.6	0.01
5.74	1.038	25.47	103.84	111.1	0.956	2.45	2.75		0.14	0.04	3.4	0.00
5.76	1.099	23.08	104.03	111.49	0.956	2.10	2.34		0.13	0.04	3.0	0.01
5.78	1.213	23.64	104.24	111.89	0.956	1.95	2.15		0.12	0.04	2.9	0.01
5.8	1.285	29.39	104.43	112.28	0.956	2.29	2.51		0.13	0.04	3.2	0.00
5.82	1.217	26.73	104.64	112.68	0.955	2.20	2.42		0.13	0.04	3.1	0.00
5.84	1.513	23.5	104.83	113.07	0.955	1.55	1.68		0.11	0.04	2.6	0.01
5.86	1.426	17.45	105.02	113.46	0.955	1.22	1.33		0.10	0.04	2.3	0.02
5.88	1.125	24.49	105.23	113.86	0.955	2.18	2.42		0.13	0.04	3.1	0.01
5.9	1.103	23.22	105.42	114.25	0.955	2.11	2.35		0.13	0.04	3.0	0.01
5.92	1.373	21.68	105.61	114.64	0.955	1.58	1.72		0.11	0.04	2.6	0.01
5.94	1.087	19.15	105.81	115.03	0.955	1.76	1.97		0.11	0.04	2.7	0.01
5.96	0.84	17.02	106.00	115.42	0.954	2.03	2.35		0.12	0.04	2.9	0.01
5.98	0.886	20.56	106.21	115.82	0.954	2.32	2.67		0.13	0.04	3.2	0.00
6	1.529	27.85	106.40	116.21	0.954	1.82	1.97		0.12	0.04	2.8	0.01
6.02	1.856	25.61	106.60	116.61	0.954	1.38	1.47		0.10	0.04	2.5	0.01
6.04	1.688	23.64	106.81	117.01	0.954	1.40	1.50		0.10	0.04	2.5	0.01
6.06	1.407	23.08	107.00	117.4	0.954	1.64	1.79		0.11	0.04	2.6	0.01
6.08	1.038	22.8	107.21	117.8	0.953	2.20	2.48		0.13	0.04	3.1	0.01
6.1	1.087	27.29	107.41	118.2	0.953	2.51	2.82		0.14	0.04	3.4	0.00
6.12	1.624	29.95	107.60	118.59	0.953	1.84	1.99		0.12	0.04	2.8	0.01
6.14	1.608	29.95	107.81	118.99	0.953	1.86	2.01		0.12	0.04	2.8	0.01
6.16	1.281	23.64	108.00	119.38	0.953	1.85	2.04		0.12	0.04	2.8	0.01
6.18	1.011	21.82	108.18	119.76	0.953	2.16	2.45		0.13	0.04	3.0	0.01
6.2	0.76	22.8	108.38	120.15	0.953	3.00	3.56		0.16	0.04	3.8	0.00
6.22	0.563	15.53	108.55	120.52	0.952	2.76	3.51		0.15	0.04	3.5	0.00
6.24	0.449	8.09	108.74	120.9	0.952	1.80	2.47		0.12	0.04	2.7	0.01
6.26	0.574	17.87	108.91	121.27	0.952	3.11	3.95		0.16	0.04	3.8	0.00

6.28	0.631	21.4	109.08	121.64	0.952	3.39	4.20	0.17	0.04	4.1	0.00
6.3	0.677	18.94	109.27	122.02	0.952	2.80	3.41	0.15	0.04	3.5	0.00
6.32	0.985	18.3	109.44	122.39	0.952	1.86	2.12	0.12	0.04	2.8	0.01
6.34	0.802	13.83	109.61	122.76	0.951	1.72	2.04	0.11	0.04	2.6	0.01
6.36	0.502	13.62	109.80	123.14	0.951	2.71	3.59	0.15	0.04	3.4	0.00
6.38	0.403	16.81	109.98	123.52	0.951	4.17	6.01	0.20	0.04	4.6	0.00
6.4	0.536	15.32	110.19	123.92	0.951	2.86	3.72	0.15	0.04	3.5	0.00
6.42	1.285	14.04	110.39	124.32	0.951	1.09	1.21	0.09	0.04	2.2	0.02
6.44	2.397	18.51	110.59	124.72	0.951	0.77	0.81	0.09	0.04	2.1	0.03
6.46	2.741	22.66	110.81	125.13	0.951	0.83	0.87	0.09	0.04	2.2	0.02
6.48	2.795	28.97	111.02	125.54	0.950	1.04	1.09	0.10	0.04	2.3	0.02
6.5	2.579	30.37	111.24	125.95	0.950	1.18	1.24	0.10	0.04	2.4	0.02
6.52	2.158	38.64	111.45	126.36	0.950	1.79	1.90	0.12	0.04	2.8	0.01
6.54	1.624	35.98	111.66	126.77	0.950	2.22	2.40	0.14	0.04	3.1	0.00
6.56	1.365	32.9	111.86	127.16	0.950	2.41	2.66	0.14	0.04	3.3	0.00
6.58	1.103	31.5	112.06	127.56	0.950	2.86	3.23	0.16	0.04	3.7	0.00
6.6	0.871	28.97	112.24	127.94	0.950	3.33	3.90	0.18	0.04	4.1	0.00
6.62	0.605	29.81	112.43	128.32	0.949	4.93	6.25	0.25	0.04	5.7	0.00
6.64	0.605	24.35	112.61	128.7	0.949	4.02	5.11	0.21	0.04	4.7	0.00
6.66	0.738	18.51	112.79	129.07	0.949	2.51	3.04	0.14	0.04	3.3	0.00
6.68	0.627	12.98	112.97	129.45	0.949	2.07	2.61	0.13	0.04	2.9	0.01
6.7	0.692	18.3	113.15	129.83	0.949	2.64	3.26	0.15	0.04	3.4	0.00
6.72	0.612	22.8	113.34	130.21	0.949	3.73	4.73	0.19	0.04	4.4	0.00
6.74	1.224	26.17	113.53	130.6	0.948	2.14	2.39	0.13	0.04	3.0	0.01
6.76	1.506	23.5	113.71	130.98	0.948	1.56	1.71	0.11	0.04	2.5	0.01
6.78	1.046	20.14	113.90	131.36	0.948	1.93	2.20	0.12	0.04	2.8	0.01
6.8	0.76	20.56	114.08	131.74	0.948	2.71	3.27	0.15	0.04	3.4	0.00
6.82	0.46	16.81	114.26	132.11	0.948	3.65	5.13	0.19	0.04	4.2	0.00
6.84	0.388	12.77	114.43	132.48	0.948	3.29	5.00	0.17	0.04	3.9	0.00
6.86	0.35	2.34	114.59	132.84	0.948	0.67	1.08	0.09	0.04	2.0	0.04
6.88	0.357	2.55	114.78	133.22	0.947	0.71	1.14	0.09	0.04	2.0	0.04
6.9	0.403	2.77	114.96	133.6	0.947	0.69	1.03	0.09	0.04	2.0	0.04
6.92	0.856	4.47	115.15	133.99	0.947	0.52	0.62	0.08	0.04	1.8	0.06
6.94	1.966	10	115.36	134.39	0.947	0.51	0.55	0.08	0.04	1.8	0.05
6.96	2.332	20.28	115.56	134.79	0.947	0.87	0.92	0.09	0.04	2.1	0.03
6.98	2.255	32.76	115.78	135.2	0.947	1.45	1.55	0.11	0.04	2.5	0.01
7	2.015	35.7	115.98	135.6	0.946	1.77	1.90	0.12	0.04	2.7	0.01
7.02	1.582	28.69	116.18	136	0.946	1.81	1.98	0.12	0.04	2.7	0.01
7.04	1.167	23.79	116.38	136.39	0.946	2.04	2.31	0.13	0.04	2.9	0.01
7.06	0.905	19.36	116.58	136.79	0.946	2.14	2.52	0.13	0.04	2.9	0.01
7.08	0.563	18.09	116.78	137.18	0.946	3.21	4.25	0.17	0.04	3.8	0.00
7.1	0.696	23.5	116.97	137.57	0.946	3.38	4.21	0.18	0.04	4.0	0.00
7.12	1.654	28.27	117.16	137.96	0.946	1.71	1.86	0.12	0.04	2.6	0.01
7.14	1.947	23.64	117.36	138.35	0.945	1.21	1.31	0.10	0.05	2.3	0.02
7.16	1.449	22.24	117.55	138.74	0.945	1.53	1.70	0.11	0.05	2.5	0.01
7.18	1.057	22.8	117.75	139.14	0.945	2.16	2.48	0.13	0.05	3.0	0.01
7.2	0.787	31.07	117.95	139.53	0.945	3.95	4.80	0.21	0.05	4.7	0.00
7.22	0.894	24.35	118.14	139.92	0.945	2.72	3.23	0.16	0.05	3.5	0.00
7.24	1.312	20	118.34	140.31	0.945	1.52	1.71	0.11	0.05	2.4	0.01
7.26	1.365	17.23	118.53	140.7	0.944	1.26	1.41	0.10	0.05	2.3	0.02
7.28	1.057	20.14	118.73	141.1	0.944	1.91	2.20	0.12	0.05	2.7	0.01
7.3	1.289	23.5	118.95	141.51	0.944	1.82	2.05	0.12	0.05	2.7	0.01
7.32	2.293	28.69	119.15	141.91	0.944	1.25	1.33	0.11	0.05	2.3	0.02
7.34	2.575	26.31	119.36	142.32	0.944	1.02	1.08	0.10	0.05	2.2	0.02
7.36	2.313	27.15	119.58	142.73	0.944	1.17	1.25	0.10	0.05	2.3	0.02
7.38	1.916	27.71	119.79	143.14	0.944	1.45	1.56	0.11	0.05	2.4	0.01
7.4	1.829	31.78	120.01	143.55	0.943	1.74	1.89	0.12	0.05	2.7	0.01
7.42	2.096	38.64	120.21	143.95	0.943	1.84	1.98	0.13	0.05	2.8	0.01
7.44	2.347	33.74	120.42	144.36	0.943	1.44	1.53	0.11	0.05	2.5	0.01
7.46	2.019	29.39	120.63	144.76	0.943	1.46	1.57	0.11	0.05	2.5	0.01
7.48	1.544	28.55	120.84	145.17	0.943	1.85	2.04	0.12	0.05	2.7	0.01
7.5	1.266	32.62	121.05	145.57	0.943	2.58	2.91	0.15	0.05	3.4	0.00
7.52	1.411	30.51	121.25	145.97	0.942	2.16	2.41	0.14	0.05	3.0	0.01
7.54	2.023	29.25	121.46	146.38	0.942	1.45	1.56	0.11	0.05	2.4	0.01
7.56	1.867	27.99	121.67	146.78	0.942	1.50	1.63	0.11	0.05	2.5	0.01
7.58	1.662	33.04	121.87	147.18	0.942	1.99	2.18	0.13	0.05	2.9	0.01
7.6	1.749	38.36	122.08	147.59	0.942	2.19	2.40	0.14	0.05	3.1	0.01
7.62	1.954	39.63	122.28	147.98	0.942	2.03	2.19	0.14	0.05	2.9	0.01
7.64	1.574	31.92	122.48	148.38	0.942	2.03	2.24	0.13	0.05	2.9	0.01
7.66	1.129	21.26	122.68	148.77	0.941	1.88	2.17	0.13	0.05	2.7	0.01
7.68	0.852	18.72	122.87	149.16	0.941	2.20	2.66	0.14	0.05	3.0	0.01
7.7	0.567	21.4	123.06	149.55	0.941	3.77	5.13	0.20	0.05	4.4	0.00
7.72	0.703	29.39	123.26	149.94	0.941	4.18	5.31	0.23	0.05	4.9	0.00
7.74	1.525	26.73	123.45	150.33	0.941	1.75	1.94	0.12	0.05	2.6	0.01
7.76	1.772	27.43	123.64	150.72	0.941	1.55	1.69	0.12	0.05	2.5	0.01
7.78	1.346	30.65	123.84	151.11	0.940	2.28	2.57	0.14	0.05	3.1	0.01
7.8	0.977	32.06	124.03	151.5	0.940	3.28	3.88	0.19	0.05	4.0	0.00
7.82	0.768	25.89	124.23	151.89	0.940	3.37	4.20	0.19	0.05	4.1	0.00
7.84	0.89	21.4	124.41	152.27	0.940	2.40	2.90	0.15	0.05	3.2	0.00
7.86	1.004	17.45	124.59	152.65	0.940	1.74	2.05	0.12	0.05	2.6	0.01
7.88	0.795	22.66	124.78	153.03	0.940	2.85	3.53	0.17	0.05	3.6	0.00
7.9	0.658	22.8	124.96	153.41	0.940	3.47	4.52	0.19	0.05	4.1	0.00
7.92	0.806	21.82	125.13	153.78	0.939	2.71	3.35	0.16	0.05	3.4	0.00
7.94	0.924	19.57	125.31	154.15	0.939	2.12	2.54	0.14	0.05	2.9	0.01

7.96	0.544	18.09	125.48	154.52	0.939	3.33	4.64	0.19	0.05	4.0	0.00
7.98	0.43	15.74	125.66	154.89	0.939	3.66	5.72	0.20	0.05	4.3	0.00
8	0.373	10.21	125.82	155.25	0.939	2.74	4.69	0.16	0.05	3.5	0.00
8.02	0.38	4.26	125.97	155.6	0.939	1.12	1.90	0.11	0.05	2.3	0.02
8.04	0.388	3.19	126.15	155.97	0.938	0.82	1.37	0.10	0.05	2.1	0.03
8.06	0.407	8.94	126.32	156.34	0.938	2.20	3.57	0.14	0.05	3.0	0.01
8.08	0.551	21.26	126.51	156.72	0.938	3.86	5.39	0.21	0.05	4.5	0.00
8.1	1.259	24.91	126.69	157.1	0.938	1.98	2.26	0.13	0.05	2.8	0.01
8.12	1.498	24.91	126.87	157.48	0.938	1.66	1.86	0.12	0.05	2.5	0.01
8.14	1.072	23.79	127.06	157.86	0.938	2.22	2.60	0.14	0.05	3.0	0.01
8.16	0.738	22.38	127.24	158.24	0.938	3.03	3.86	0.18	0.05	3.7	0.00
8.18	0.498	20	127.41	158.61	0.937	4.02	5.89	0.22	0.05	4.7	0.00
8.2	0.407	13.83	127.59	158.98	0.937	3.40	5.58	0.19	0.05	4.1	0.00
8.22	0.403	8.94	127.75	159.34	0.937	2.22	3.67	0.15	0.05	3.1	0.01
8.24	0.43	5.32	127.92	159.7	0.937	1.24	1.97	0.11	0.05	2.3	0.02
8.26	0.502	3.4	128.07	160.05	0.937	0.68	0.99	0.09	0.05	1.9	0.04
8.28	0.494	2.98	128.23	160.41	0.937	0.60	0.89	0.09	0.05	1.9	0.05
8.3	0.445	2.34	128.39	160.76	0.937	0.53	0.82	0.09	0.05	1.8	0.05
8.32	0.403	3.4	128.55	161.12	0.936	0.84	1.41	0.10	0.05	2.1	0.03
8.34	0.388	2.55	128.70	161.47	0.936	0.66	1.13	0.09	0.05	1.9	0.04
8.36	0.369	2.98	128.87	161.83	0.936	0.81	1.44	0.10	0.05	2.1	0.03
8.38	0.373	11.28	129.04	162.2	0.936	3.02	5.35	0.18	0.05	3.8	0.00
8.4	0.525	19.15	129.22	162.57	0.936	3.65	5.28	0.20	0.05	4.3	0.00
8.42	1.068	18.94	129.40	162.95	0.936	1.77	2.09	0.12	0.05	2.6	0.01
8.44	1.156	18.94	129.57	163.32	0.935	1.64	1.91	0.12	0.05	2.5	0.01
8.46	0.825	17.02	129.75	163.69	0.935	2.06	2.57	0.14	0.05	2.8	0.01
8.48	0.483	15.53	129.92	164.06	0.935	3.22	4.87	0.19	0.05	3.9	0.00
8.5	0.369	11.28	130.10	164.43	0.935	3.06	5.51	0.18	0.05	3.9	0.00
8.52	0.354	4.26	130.25	164.78	0.935	1.20	2.25	0.11	0.05	2.4	0.02
8.54	0.346	2.34	130.40	165.13	0.935	0.68	1.29	0.09	0.05	2.0	0.04
8.56	0.346	2.34	130.56	165.48	0.935	0.68	1.30	0.09	0.05	2.0	0.04
8.58	0.354	2.34	130.70	165.82	0.934	0.66	1.24	0.09	0.05	2.0	0.04
8.6	0.369	2.34	130.85	166.17	0.934	0.63	1.15	0.09	0.05	1.9	0.04
8.62	0.361	2.34	131.01	166.52	0.934	0.65	1.20	0.09	0.05	2.0	0.04
8.64	0.346	2.77	131.15	166.86	0.934	0.80	1.55	0.10	0.05	2.1	0.03
8.66	0.346	2.77	131.31	167.21	0.934	0.80	1.55	0.10	0.05	2.1	0.03
8.68	0.346	2.77	131.46	167.56	0.934	0.80	1.55	0.10	0.05	2.1	0.03
8.7	0.384	1.91	131.61	167.91	0.933	0.50	0.88	0.09	0.05	1.8	0.05
8.72	0.456	2.13	131.77	168.26	0.933	0.47	0.74	0.09	0.05	1.8	0.06
8.74	0.426	1.91	131.92	168.61	0.933	0.45	0.74	0.09	0.05	1.8	0.06
8.76	0.369	1.91	132.07	168.96	0.933	0.52	0.95	0.09	0.05	1.8	0.05
8.78	0.331	2.13	132.22	169.3	0.933	0.64	1.32	0.10	0.05	2.0	0.04
8.8	0.319	2.13	132.37	169.65	0.933	0.67	1.43	0.10	0.05	2.0	0.03
8.82	0.316	1.91	132.53	170	0.933	0.60	1.31	0.10	0.05	2.0	0.04
8.84	0.327	2.13	132.70	170.37	0.932	0.65	1.36	0.10	0.05	2.0	0.04
8.86	0.38	10.64	132.87	170.74	0.932	2.80	5.08	0.18	0.05	3.6	0.00
8.88	0.89	15.11	133.05	171.11	0.932	1.70	2.10	0.12	0.05	2.5	0.01
8.9	1.395	14.68	133.23	171.49	0.932	1.05	1.20	0.10	0.05	2.1	0.03
8.92	1.076	13.62	133.40	171.86	0.932	1.27	1.51	0.11	0.05	2.2	0.02
8.94	0.757	14.26	133.59	172.24	0.932	1.88	2.44	0.13	0.05	2.7	0.01
8.96	0.43	10.21	133.76	172.61	0.931	2.37	3.97	0.16	0.05	3.2	0.00
8.98	0.357	5.74	133.93	172.97	0.931	1.61	3.12	0.13	0.05	2.7	0.01
9	0.331	1.28	134.08	173.32	0.931	0.39	0.81	0.09	0.05	1.8	0.06
9.02	0.335	2.55	134.23	173.67	0.931	0.76	1.58	0.10	0.05	2.1	0.03
9.04	0.327	1.91	134.38	174.01	0.931	0.58	1.25	0.09	0.05	1.9	0.04
9.06	0.376	2.77	134.52	174.35	0.931	0.74	1.37	0.10	0.05	2.0	0.03
9.08	0.35	1.49	134.68	174.7	0.931	0.43	0.85	0.09	0.05	1.8	0.06
9.1	0.35	1.28	134.82	175.04	0.930	0.37	0.73	0.09	0.05	1.7	0.06
9.12	0.312	2.34	134.97	175.39	0.930	0.75	1.71	0.10	0.05	2.1	0.03
9.14	0.323	2.34	135.15	175.76	0.930	0.72	1.59	0.10	0.05	2.1	0.03
9.16	0.384	2.55	135.33	176.14	0.929	0.66	1.23	0.10	0.05	2.0	0.04
9.18	0.867	18.09	135.51	176.52	0.929	2.09	2.62	0.14	0.05	2.9	0.01
9.2	1.73	24.07	135.70	176.9	0.928	1.39	1.55	0.11	0.05	2.3	0.02
9.22	1.532	24.07	135.89	177.29	0.928	1.57	1.78	0.12	0.05	2.4	0.01
9.24	1.061	23.5	136.08	177.67	0.927	2.21	2.66	0.15	0.05	3.0	0.01
9.26	0.741	20.98	136.26	178.05	0.927	2.83	3.73	0.17	0.05	3.6	0.00
9.28	0.422	17.02	136.43	178.42	0.926	4.03	6.99	0.24	0.05	4.9	0.00
9.3	0.357	11.06	136.60	178.78	0.926	3.10	6.21	0.20	0.05	4.1	0.00
9.32	0.354	2.34	136.75	179.13	0.925	0.66	1.34	0.10	0.05	2.0	0.04
9.34	0.354	2.13	136.90	179.48	0.925	0.60	1.22	0.10	0.05	1.9	0.04
9.36	0.35	2.13	137.05	179.82	0.924	0.61	1.25	0.10	0.05	2.0	0.04
9.38	0.354	2.34	137.20	180.17	0.924	0.66	1.35	0.10	0.05	2.0	0.04
9.4	0.35	2.13	137.35	180.51	0.923	0.61	1.26	0.10	0.05	2.0	0.04
9.42	0.335	2.34	137.50	180.86	0.922	0.70	1.52	0.10	0.05	2.1	0.03
9.44	0.319	10.64	137.66	181.22	0.922	3.34	7.72	0.22	0.05	4.6	0.00
9.46	0.319	12.77	137.84	181.59	0.921	4.00	9.29	0.26	0.05	5.3	0.00
9.48	0.787	13.62	138.01	181.96	0.921	1.73	2.25	0.13	0.05	2.6	0.01
9.5	1.046	18.51	138.20	182.34	0.920	1.77	2.14	0.13	0.05	2.6	0.01
9.52	1.008	29.53	138.39	182.73	0.920	2.93	3.58	0.18	0.05	3.7	0.00
9.54	1.418	33.46	138.58	183.12	0.919	2.36	2.71	0.16	0.05	3.2	0.00
9.56	1.639	30.93	138.77	183.5	0.919	1.89	2.13	0.13	0.05	2.7	0.01
9.58	1.266	26.03	138.96	183.89	0.918	2.06	2.41	0.14	0.05	2.9	0.01
9.6	0.848	23.22	139.14	184.27	0.918	2.74	3.50	0.17	0.05	3.5	0.00
9.62	0.517	19.15	139.33	184.65	0.917	3.70	5.76	0.22	0.05	4.5	0.00

9.64	0.456	13.62	139.50	185.02	0.917	2.99	5.03	0.19	0.05	3.9	0.00
9.66	0.525	9.79	139.68	185.39	0.916	1.86	2.88	0.14	0.05	2.8	0.01
9.68	0.681	4.89	139.85	185.76	0.916	0.72	0.99	0.09	0.05	1.9	0.04
9.7	0.783	4.68	140.02	186.13	0.915	0.60	0.78	0.09	0.05	1.8	0.05
9.72	0.867	3.62	140.20	186.5	0.914	0.42	0.53	0.08	0.05	1.7	0.07
9.74	0.821	4.04	140.37	186.87	0.914	0.49	0.64	0.09	0.05	1.7	0.06
9.76	0.525	4.89	140.54	187.24	0.913	0.93	1.45	0.10	0.05	2.1	0.03
9.78	0.395	6.17	140.71	187.6	0.913	1.56	2.97	0.13	0.05	2.7	0.01
9.8	0.392	3.4	140.87	187.96	0.912	0.87	1.67	0.11	0.05	2.2	0.03
9.82	0.392	2.13	141.03	188.31	0.912	0.54	1.05	0.09	0.05	1.9	0.04
9.84	0.399	2.55	141.18	188.66	0.911	0.64	1.21	0.10	0.05	2.0	0.04
9.86	0.392	2.34	141.33	189.01	0.911	0.60	1.15	0.10	0.05	1.9	0.04
9.88	0.384	2.34	141.50	189.37	0.910	0.61	1.20	0.10	0.05	2.0	0.04
9.9	0.403	2.77	141.68	189.75	0.910	0.69	1.30	0.10	0.05	2.0	0.03
9.92	0.719	17.87	141.87	190.14	0.909	2.49	3.38	0.16	0.05	3.3	0.00
9.94	1.57	27.85	142.07	190.53	0.909	1.77	2.02	0.13	0.05	2.7	0.01
9.96	2.031	26.45	142.26	190.92	0.908	1.30	1.44	0.11	0.05	2.3	0.02
9.98	1.814	25.19	142.46	191.31	0.908	1.39	1.55	0.12	0.05	2.4	0.02
10	1.418	20.42	142.66	191.71	0.907	1.44	1.67	0.12	0.05	2.4	0.02
10.02	0.992	14.68	142.85	192.1	0.906	1.48	1.84	0.12	0.05	2.4	0.02
10.04	0.726	10	143.04	192.48	0.906	1.38	1.87	0.12	0.05	2.4	0.02
10.06	0.627	5.32	143.22	192.86	0.905	0.85	1.23	0.10	0.05	2.0	0.03
10.08	0.555	10	143.42	193.25	0.905	1.80	2.76	0.14	0.05	2.8	0.01
10.1	0.791	23.5	143.60	193.63	0.904	2.97	3.93	0.19	0.05	3.8	0.00
10.12	1.654	25.89	143.79	194.02	0.904	1.57	1.77	0.12	0.05	2.5	0.01
10.14	1.753	26.03	143.98	194.4	0.903	1.48	1.67	0.12	0.05	2.4	0.01
10.16	1.19	28.83	144.17	194.79	0.903	2.42	2.90	0.16	0.05	3.3	0.00
10.18	0.821	34.02	144.36	195.18	0.902	4.14	5.44	0.26	0.05	5.2	0.00
10.2	0.555	35.42	144.56	195.57	0.902	6.38	9.85	0.41	0.05	8.4	0.00
10.22	0.802	34.3	144.74	195.95	0.901	4.28	5.66	0.27	0.05	5.4	0.00
10.24	1.137	30.37	144.93	196.33	0.901	2.67	3.23	0.17	0.05	3.5	0.00
10.26	1.221	33.88	145.12	196.72	0.900	2.77	3.31	0.18	0.05	3.6	0.00
10.28	1.103	32.9	145.30	197.1	0.900	2.98	3.63	0.19	0.05	3.9	0.00
10.3	0.996	27.85	145.49	197.48	0.899	2.80	3.49	0.18	0.05	3.7	0.00
10.32	0.996	25.33	145.68	197.87	0.898	2.54	3.17	0.17	0.05	3.4	0.00
10.34	0.901	22.94	145.85	198.24	0.898	2.55	3.26	0.17	0.05	3.4	0.00
10.36	0.7	13.19	146.04	198.62	0.897	1.88	2.63	0.14	0.05	2.8	0.01
10.38	0.586	21.82	146.23	199.01	0.897	3.72	5.64	0.23	0.05	4.7	0.00
10.4	0.677	29.39	146.42	199.39	0.896	4.34	6.15	0.27	0.05	5.5	0.00
10.42	1.441	27.85	146.60	199.77	0.896	1.93	2.24	0.14	0.05	2.8	0.01
10.44	1.559	26.87	146.78	200.15	0.895	1.72	1.98	0.13	0.05	2.7	0.01
10.46	1.08	26.87	146.98	200.54	0.895	2.49	3.06	0.17	0.05	3.4	0.00
10.48	0.734	24.77	147.16	200.92	0.894	3.37	4.65	0.21	0.05	4.3	0.00
10.5	0.494	20.56	147.34	201.29	0.894	4.16	7.02	0.26	0.05	5.3	0.00
10.52	0.468	15.11	147.50	201.65	0.893	3.23	5.67	0.21	0.05	4.3	0.00
10.54	0.464	4.04	147.66	202.01	0.893	0.87	1.54	0.11	0.05	2.2	0.02
10.56	0.456	2.98	147.83	202.37	0.892	0.65	1.17	0.10	0.05	2.0	0.04
10.58	0.475	3.19	147.99	202.73	0.892	0.67	1.17	0.10	0.05	2.0	0.03
10.6	0.517	3.19	148.14	203.08	0.891	0.62	1.02	0.10	0.05	1.9	0.04
10.62	0.536	3.4	148.31	203.44	0.890	0.63	1.02	0.10	0.05	2.0	0.04
10.64	0.494	8.94	148.47	203.8	0.890	1.81	3.08	0.14	0.05	2.9	0.01
10.66	0.468	18.51	148.64	204.16	0.889	3.96	7.02	0.26	0.05	5.2	0.00
10.68	0.479	20.84	148.81	204.53	0.889	4.35	7.59	0.28	0.05	5.7	0.00
10.7	0.639	17.87	148.99	204.91	0.888	2.80	4.12	0.19	0.05	3.8	0.00
10.72	1.027	23.5	149.19	205.3	0.888	2.29	2.86	0.16	0.05	3.2	0.00
10.74	1.247	27.15	149.38	205.69	0.887	2.18	2.61	0.15	0.05	3.1	0.01
10.76	1.567	30.65	149.58	206.09	0.887	1.96	2.25	0.14	0.05	2.9	0.01
10.78	2.228	37.8	149.80	206.5	0.886	1.70	1.87	0.13	0.05	2.7	0.01
10.8	2.44	47.9	150.00	206.9	0.886	1.96	2.15	0.15	0.05	3.0	0.01
10.82	2.293	47.34	150.21	207.3	0.885	2.06	2.27	0.15	0.05	3.1	0.01
10.84	1.901	39.91	150.42	207.71	0.885	2.10	2.36	0.15	0.05	3.1	0.01
10.86	1.388	19.57	150.61	208.1	0.884	1.41	1.66	0.12	0.05	2.4	0.02
10.88	0.954	22.1	150.82	208.5	0.884	2.32	2.96	0.16	0.05	3.2	0.00
10.9	0.665	33.74	151.01	208.89	0.883	5.07	7.40	0.33	0.05	6.7	0.00
10.92	1.08	35.42	151.20	209.28	0.882	3.28	4.07	0.21	0.05	4.3	0.00
10.94	1.814	31.36	151.40	209.67	0.882	1.73	1.95	0.13	0.05	2.7	0.01
10.96	1.426	29.25	151.59	210.06	0.881	2.05	2.41	0.15	0.05	3.0	0.01
10.98	1.331	37.66	151.80	210.46	0.881	2.83	3.36	0.19	0.05	3.8	0.00
11	0.966	35.28	151.99	210.85	0.880	3.65	4.67	0.24	0.05	4.8	0.00
11.02	1.183	29.95	152.17	211.23	0.880	2.53	3.08	0.17	0.05	3.5	0.00
11.04	1.259	21.4	152.37	211.62	0.879	1.70	2.04	0.13	0.05	2.7	0.01
11.06	0.905	20	152.54	211.99	0.879	2.21	2.89	0.16	0.05	3.2	0.00
11.08	0.589	19.57	152.73	212.37	0.878	3.32	5.20	0.22	0.05	4.4	0.00
11.1	0.532	20.56	152.91	212.75	0.878	3.86	6.44	0.25	0.05	5.1	0.00
11.12	0.627	21.82	153.09	213.13	0.877	3.48	5.27	0.23	0.05	4.6	0.00
11.14	0.962	21.68	153.29	213.52	0.877	2.25	2.90	0.16	0.05	3.2	0.00
11.16	1.414	29.39	153.47	213.9	0.876	2.08	2.45	0.15	0.05	3.0	0.01
11.18	1.502	32.9	153.66	214.29	0.875	2.19	2.55	0.16	0.05	3.2	0.00
11.2	1.418	37.52	153.87	214.69	0.875	2.65	3.12	0.18	0.05	3.6	0.00
11.22	1.38	40.05	154.06	215.08	0.874	2.90	3.44	0.19	0.05	4.0	0.00
11.24	1.194	36.4	154.26	215.47	0.874	3.05	3.72	0.20	0.05	4.1	0.00
11.26	1.236	38.64	154.46	215.87	0.873	3.13	3.79	0.21	0.05	4.2	0.00
11.28	1.449	45.65	154.65	216.26	0.873	3.15	3.70	0.21	0.05	4.3	0.00
11.3	1.38	40.75	154.85	216.65	0.872	2.95	3.50	0.20	0.05	4.0	0.00

11.32	1.373	39.07	155.04	217.04	0.872	2.85	3.38	0.19	0.05	3.9	0.00
11.34	1.297	32.48	155.23	217.43	0.871	2.50	3.01	0.17	0.05	3.5	0.00
11.36	1.03	26.73	155.42	217.81	0.871	2.60	3.29	0.18	0.05	3.6	0.00
11.38	0.772	24.91	155.61	218.2	0.870	3.23	4.50	0.21	0.05	4.3	0.00
11.4	0.722	17.02	155.79	218.57	0.870	2.36	3.38	0.17	0.05	3.4	0.00
11.42	0.703	19.57	155.97	218.95	0.869	2.78	4.04	0.19	0.05	3.9	0.00
11.44	0.688	22.66	156.15	219.33	0.869	3.29	4.83	0.22	0.05	4.4	0.00
11.46	0.916	29.67	156.35	219.72	0.868	3.24	4.26	0.21	0.05	4.4	0.00
11.48	1.3	28.83	156.53	220.1	0.867	2.22	2.67	0.16	0.05	3.2	0.00
11.5	1.346	27.85	156.73	220.49	0.867	2.07	2.47	0.15	0.05	3.1	0.01
11.52	1.125	29.67	156.92	220.88	0.866	2.64	3.28	0.18	0.05	3.7	0.00
11.54	1.133	29.25	157.12	221.28	0.866	2.58	3.21	0.18	0.05	3.6	0.00
11.56	1.422	26.03	157.33	221.68	0.865	1.83	2.17	0.14	0.05	2.9	0.01
11.58	2.235	27.15	157.53	222.08	0.865	1.21	1.35	0.12	0.05	2.4	0.02
11.6	2.413	34.72	157.74	222.49	0.864	1.44	1.59	0.13	0.05	2.6	0.01
11.62	2.347	43.13	157.95	222.89	0.864	1.84	2.03	0.14	0.05	2.9	0.01
11.64	2.154	33.6	158.16	223.3	0.863	1.56	1.74	0.13	0.05	2.7	0.01
11.66	1.715	33.32	158.37	223.7	0.863	1.94	2.23	0.15	0.05	3.0	0.01
11.68	1.338	32.9	158.58	224.11	0.862	2.46	2.95	0.17	0.05	3.5	0.00
11.7	1.285	32.2	158.79	224.52	0.862	2.51	3.04	0.18	0.05	3.6	0.00
11.72	1.882	32.48	159.01	224.93	0.861	1.73	1.96	0.14	0.05	2.8	0.01
11.74	2.617	33.04	159.22	225.34	0.861	1.26	1.38	0.12	0.05	2.5	0.01
11.76	3.011	32.48	159.44	225.76	0.860	1.08	1.17	0.12	0.05	2.4	0.02
11.78	3.443	35.42	159.67	226.18	0.859	1.03	1.10	0.12	0.05	2.4	0.02
11.8	3.76	35.42	159.90	226.61	0.859	0.94	1.00	0.12	0.05	2.4	0.02
11.82	3.972	33.46	160.10	227	0.858	0.84	0.89	0.12	0.05	2.4	0.02
11.84	3.957	31.92	160.30	227.4	0.858	0.81	0.86	0.12	0.05	2.4	0.02
11.86	3.795	23.93	160.50	227.8	0.857	0.63	0.67	0.11	0.05	2.2	0.02
11.88	3.656	26.45	160.71	228.2	0.857	0.72	0.77	0.11	0.05	2.2	0.02
11.9	3.466	36.68	160.94	228.63	0.856	1.06	1.13	0.12	0.05	2.5	0.01
11.92	3.25	46.92	161.16	229.05	0.856	1.44	1.55	0.14	0.05	2.8	0.01
11.94	2.876	40.05	161.38	229.46	0.855	1.39	1.51	0.13	0.05	2.6	0.01
11.96	2.436	41.03	161.60	229.88	0.855	1.68	1.86	0.14	0.05	2.8	0.01
11.98	2.019	45.51	161.82	230.29	0.854	2.25	2.54	0.17	0.05	3.4	0.00
12	1.673	43.55	162.03	230.7	0.854	2.60	3.02	0.18	0.05	3.8	0.00
12.02	1.863	43.55	162.24	231.11	0.853	2.34	2.67	0.17	0.05	3.5	0.00
12.04	2.239	42.29	162.45	231.51	0.853	1.89	2.11	0.15	0.05	3.0	0.01
12.06	1.973	39.21	162.66	231.92	0.852	1.99	2.25	0.15	0.05	3.1	0.01
12.08	2.112	37.38	162.89	232.34	0.851	1.77	1.99	0.14	0.05	2.9	0.01
12.1	2.776	41.31	163.10	232.75	0.851	1.49	1.62	0.13	0.05	2.7	0.01
12.12	3.15	42.01	163.32	233.17	0.850	1.33	1.44	0.13	0.05	2.7	0.01
12.14	3.304	38.79	163.55	233.59	0.850	1.17	1.26	0.12	0.05	2.5	0.01
12.16	3.212	38.08	163.77	234.01	0.849	1.19	1.28	0.12	0.05	2.5	0.01
12.18	3.05	36.4	163.99	234.43	0.849	1.19	1.29	0.12	0.05	2.5	0.01
12.2	3.046	37.52	164.23	234.86	0.848	1.23	1.33	0.13	0.05	2.6	0.01
12.22	3.185	38.5	164.45	235.28	0.848	1.21	1.31	0.13	0.05	2.6	0.01
12.24	3.181	41.03	164.68	235.7	0.847	1.29	1.39	0.13	0.05	2.6	0.01
12.26	3.115	41.73	164.90	236.12	0.847	1.34	1.45	0.13	0.05	2.7	0.01
12.28	3.084	42.01	165.12	236.54	0.846	1.36	1.48	0.13	0.05	2.7	0.01
12.3	2.868	42.01	165.35	236.96	0.846	1.46	1.60	0.13	0.05	2.7	0.01
12.32	2.753	41.17	165.57	237.38	0.845	1.50	1.64	0.13	0.05	2.8	0.01
12.34	2.965	39.77	165.79	237.8	0.845	1.34	1.46	0.13	0.05	2.7	0.01
12.36	3.274	39.77	166.03	238.23	0.844	1.21	1.31	0.13	0.05	2.6	0.01
12.38	3.683	40.75	166.25	238.65	0.843	1.11	1.18	0.13	0.05	2.6	0.01
12.4	4.103	40.89	166.49	239.08	0.843	1.00	1.06	0.13	0.05	2.6	0.01
12.42	4.555	41.17	166.72	239.51	0.842	0.90	0.95	0.13	0.05	2.6	0.01
12.44	4.948	39.35	166.93	239.92	0.842	0.80	0.84	0.13	0.05	2.6	0.01
12.46	4.898	39.91	167.14	240.32	0.841	0.81	0.86	0.13	0.05	2.6	0.01
12.48	4.551	48.32	167.38	240.76	0.841	1.06	1.12	0.13	0.05	2.8	0.01
12.5	4.192	54.63	167.62	241.19	0.840	1.30	1.38	0.14	0.05	2.9	0.01
12.52	3.748	45.23	167.84	241.61	0.840	1.21	1.29	0.13	0.05	2.7	0.01
12.54	3.1	44.39	168.06	242.03	0.839	1.43	1.55	0.14	0.05	2.8	0.01
12.56	2.425	44.25	168.30	242.46	0.839	1.82	2.03	0.15	0.05	3.1	0.01
12.58	2.27	42.71	168.52	242.88	0.838	1.88	2.11	0.15	0.05	3.1	0.01
12.6	2.864	42.01	168.74	243.3	0.838	1.47	1.60	0.14	0.05	2.8	0.01
12.62	3.829	44.67	168.97	243.72	0.837	1.17	1.25	0.13	0.05	2.7	0.01
12.64	3.903	47.48	169.19	244.14	0.837	1.22	1.30	0.13	0.05	2.8	0.01
12.66	3.779	47.34	169.43	244.57	0.836	1.25	1.34	0.13	0.05	2.8	0.01
12.68	3.459	46.21	169.65	244.99	0.835	1.34	1.44	0.14	0.05	2.8	0.01
12.7	3.092	43.41	169.88	245.42	0.835	1.40	1.52	0.14	0.05	2.8	0.01
12.72	2.942	39.07	170.11	245.84	0.834	1.33	1.45	0.13	0.05	2.7	0.01
12.74	2.945	35.84	170.33	246.26	0.834	1.22	1.33	0.13	0.05	2.6	0.01
12.76	3.123	36.54	170.55	246.68	0.833	1.17	1.27	0.13	0.05	2.6	0.01
12.78	3.312	41.59	170.78	247.1	0.833	1.26	1.36	0.13	0.05	2.7	0.01
12.8	3.32	41.31	171.00	247.52	0.832	1.24	1.34	0.13	0.05	2.7	0.01
12.82	3.1	40.33	171.23	247.94	0.832	1.30	1.41	0.13	0.05	2.7	0.01
12.84	2.656	38.93	171.45	248.36	0.831	1.47	1.62	0.14	0.05	2.8	0.01
12.86	2.579	26.59	171.67	248.78	0.831	1.03	1.14	0.12	0.05	2.4	0.02
12.88	2.93	27.99	171.90	249.2	0.830	0.96	1.04	0.12	0.05	2.4	0.02
12.9	3.416	29.25	172.13	249.63	0.830	0.86	0.92	0.12	0.05	2.4	0.02
12.92	3.702	31.21	172.35	250.05	0.829	0.84	0.90	0.12	0.05	2.4	0.01
12.94	3.991	31.64	172.56	250.45	0.829	0.79	0.85	0.12	0.05	2.5	0.01
12.96	4.223	35.14	172.77	250.86	0.828	0.83	0.88	0.12	0.05	2.5	0.01
12.98	4.431	39.77	172.98	251.26	0.827	0.90	0.95	0.13	0.05	2.6	0.01

13	4.616	44.11	173.21	251.69	0.827	0.96	1.01	0.13	0.05	2.7	0.01
13.02	4.713	49.44	173.45	252.13	0.826	1.05	1.11	0.14	0.05	2.8	0.01
13.04	4.454	50.7	173.69	252.56	0.826	1.14	1.21	0.14	0.05	2.9	0.01
13.06	4.049	49.16	173.92	252.99	0.825	1.21	1.30	0.14	0.05	2.8	0.01
13.08	3.71	45.37	174.16	253.42	0.825	1.22	1.31	0.13	0.05	2.8	0.01
13.1	3.679	41.87	174.39	253.85	0.824	1.14	1.22	0.13	0.05	2.7	0.01
13.12	3.702	39.07	174.61	254.27	0.824	1.06	1.13	0.13	0.05	2.6	0.01
13.14	3.802	37.94	174.83	254.68	0.823	1.00	1.07	0.13	0.05	2.6	0.01
13.16	4.146	37.38	175.03	255.08	0.823	0.90	0.96	0.13	0.05	2.6	0.01
13.18	4.601	38.08	175.24	255.49	0.822	0.83	0.88	0.13	0.05	2.6	0.01
13.2	4.89	37.38	175.45	255.89	0.822	0.76	0.81	0.13	0.05	2.7	0.01
13.22	4.979	37.52	175.66	256.3	0.821	0.75	0.79	0.13	0.05	2.7	0.01
13.24	5.103	37.66	175.88	256.71	0.820	0.74	0.78	0.13	0.05	2.7	0.01
13.26	5.292	38.22	176.09	257.12	0.820	0.72	0.76	0.13	0.05	2.7	0.01
13.28	5.373	35.84	176.30	257.53	0.819	0.67	0.70	0.13	0.05	2.7	0.01
13.3	5.334	33.32	176.52	257.94	0.819	0.62	0.66	0.13	0.05	2.7	0.01
13.32	5.215	31.5	176.73	258.35	0.818	0.60	0.64	0.13	0.05	2.6	0.01
13.34	4.921	35.84	176.94	258.76	0.818	0.73	0.77	0.13	0.05	2.7	0.01
13.36	4.562	45.23	177.18	259.19	0.817	0.99	1.05	0.13	0.05	2.8	0.01
13.38	4.188	48.74	177.41	259.62	0.817	1.16	1.24	0.14	0.05	2.9	0.01
13.4	3.771	46.92	177.65	260.05	0.816	1.24	1.34	0.14	0.05	2.8	0.01
13.42	3.216	47.9	177.87	260.47	0.816	1.49	1.62	0.14	0.05	3.0	0.01
13.44	2.861	47.76	178.10	260.9	0.815	1.67	1.84	0.15	0.05	3.1	0.01
13.46	3.046	44.39	178.34	261.33	0.815	1.46	1.59	0.14	0.05	2.9	0.01
13.48	4.161	42.29	178.57	261.76	0.814	1.02	1.08	0.13	0.05	2.7	0.01
13.5	4.574	41.03	178.81	262.19	0.814	0.90	0.95	0.13	0.05	2.7	0.01
13.52	4.69	37.8	179.01	262.59	0.813	0.81	0.85	0.13	0.05	2.7	0.01
13.54	4.829	39.63	179.22	263	0.812	0.82	0.87	0.13	0.05	2.7	0.01
13.56	4.937	41.31	179.44	263.41	0.812	0.84	0.88	0.13	0.05	2.8	0.01
13.58	5.033	42.29	179.64	263.81	0.811	0.84	0.89	0.13	0.05	2.8	0.01
13.6	4.956	42.57	179.85	264.22	0.811	0.86	0.91	0.13	0.05	2.8	0.01
13.62	4.709	42.43	180.07	264.63	0.810	0.90	0.95	0.13	0.05	2.8	0.01
13.64	4.393	40.19	180.27	265.03	0.810	0.91	0.97	0.13	0.05	2.7	0.01
13.66	4.076	36.68	180.49	265.44	0.809	0.90	0.96	0.13	0.05	2.6	0.01
13.68	3.833	34.58	180.69	265.84	0.809	0.90	0.97	0.12	0.05	2.6	0.01
13.7	3.702	32.34	180.92	266.27	0.808	0.87	0.94	0.12	0.05	2.5	0.01
13.72	3.652	31.78	181.15	266.69	0.808	0.87	0.94	0.12	0.05	2.5	0.01
13.74	3.69	33.32	181.38	267.12	0.807	0.90	0.97	0.12	0.05	2.6	0.01
13.76	3.825	35.56	181.61	267.55	0.807	0.93	1.00	0.13	0.05	2.6	0.01
13.78	4.045	40.47	181.85	267.98	0.806	1.00	1.07	0.13	0.05	2.7	0.01
13.8	4.304	42.71	182.08	268.41	0.806	0.99	1.06	0.13	0.05	2.8	0.01
13.82	4.412	41.87	182.30	268.82	0.805	0.95	1.01	0.13	0.05	2.8	0.01
13.84	4.651	42.85	182.50	269.22	0.804	0.92	0.98	0.13	0.05	2.8	0.01
13.86	5.045	29.67	182.71	269.63	0.804	0.59	0.62	0.13	0.05	2.6	0.01
13.88	5.442	31.21	182.93	270.04	0.803	0.57	0.60	0.13	0.05	2.7	0.01
13.9	5.751	38.36	183.14	270.45	0.803	0.67	0.70	0.14	0.05	2.9	0.01
13.92	5.782	45.51	183.35	270.86	0.802	0.79	0.83	0.14	0.05	3.0	0.01
13.94	5.415	58.83	183.60	271.3	0.802	1.09	1.14	0.15	0.05	3.2	0.00
13.96	4.836	55.61	183.83	271.73	0.801	1.15	1.22	0.15	0.05	3.1	0.01
13.98	3.906	56.03	184.08	272.17	0.801	1.43	1.54	0.15	0.05	3.1	0.00
14	3.555	57.43	184.31	272.6	0.800	1.62	1.75	0.16	0.05	3.3	0.00
14.02	3.034	52.94	184.53	273.02	0.800	1.74	1.92	0.16	0.05	3.3	0.00
14.04	3.393	49.58	184.77	273.45	0.799	1.46	1.59	0.15	0.05	3.1	0.01
14.06	4.007	42.71	185.00	273.88	0.799	1.07	1.14	0.13	0.05	2.8	0.01
14.08	4.011	38.93	185.23	274.3	0.798	0.97	1.04	0.13	0.05	2.7	0.01
14.1	3.93	38.22	185.46	274.73	0.798	0.97	1.05	0.13	0.05	2.7	0.01
14.12	3.767	43.69	185.69	275.16	0.797	1.16	1.25	0.14	0.05	2.9	0.01
14.14	3.733	48.6	185.92	275.58	0.796	1.30	1.41	0.14	0.05	3.0	0.01
14.16	3.59	41.31	186.14	276	0.796	1.15	1.25	0.13	0.05	2.8	0.01
14.18	3.239	38.93	186.37	276.43	0.795	1.20	1.31	0.13	0.05	2.8	0.01
14.2	2.783	39.21	186.60	276.85	0.795	1.41	1.56	0.14	0.05	2.9	0.01
14.22	2.479	38.93	186.82	277.27	0.794	1.57	1.77	0.15	0.05	3.1	0.01
14.24	2.803	38.79	187.05	277.69	0.794	1.38	1.54	0.14	0.05	2.9	0.01
14.26	3.779	37.24	187.28	278.12	0.793	0.99	1.06	0.13	0.05	2.7	0.01
14.28	4.161	41.31	187.51	278.55	0.793	0.99	1.06	0.13	0.05	2.8	0.01
14.3	4.489	43.13	187.75	278.98	0.792	0.96	1.02	0.14	0.05	2.9	0.01
14.32	4.825	49.58	187.98	279.41	0.792	1.03	1.09	0.14	0.05	3.0	0.01
14.34	4.871	45.37	188.22	279.85	0.791	0.93	0.99	0.14	0.05	2.9	0.01
14.36	4.84	42.99	188.43	280.25	0.791	0.89	0.94	0.14	0.05	2.9	0.01
14.38	4.725	43.97	188.67	280.69	0.790	0.93	0.99	0.14	0.05	2.9	0.01
14.4	4.439	64.86	188.91	281.12	0.790	1.46	1.56	0.16	0.05	3.4	0.00
14.42	4.142	67.94	189.14	281.55	0.789	1.64	1.76	0.17	0.05	3.5	0.00
14.44	4.026	69.07	189.37	281.98	0.788	1.72	1.84	0.17	0.05	3.6	0.00
14.46	4.014	78.18	189.61	282.41	0.788	1.95	2.10	0.18	0.05	3.9	0.00
14.48	4.404	80.84	189.84	282.84	0.787	1.84	1.96	0.18	0.05	3.8	0.00
14.5	3.656	71.59	190.08	283.27	0.787	1.96	2.12	0.18	0.05	3.8	0.00
14.52	4.138	76.92	190.31	283.7	0.786	1.86	2.00	0.18	0.05	3.8	0.00
14.54	3.883	64.86	190.54	284.13	0.786	1.67	1.80	0.17	0.05	3.5	0.00
14.56	4.03	62.34	190.78	284.56	0.785	1.55	1.66	0.16	0.05	3.4	0.00
14.58	3.968	54.21	191.00	284.98	0.785	1.37	1.47	0.15	0.05	3.2	0.00
14.6	3.636	52.1	191.23	285.41	0.784	1.43	1.55	0.15	0.05	3.2	0.00
14.62	3.629	57.57	191.46	285.83	0.784	1.59	1.72	0.16	0.05	3.4	0.00
14.64	3.571	60.09	191.69	286.26	0.783	1.68	1.83	0.16	0.05	3.5	0.00
14.66	3.312	54.07	191.92	286.68	0.783	1.63	1.79	0.16	0.05	3.3	0.00

14.68	2.783	52.1	192.13	287.09	0.782	1.87	2.09	0.17	0.05	3.5	0.00
14.7	2.151	43.97	192.34	287.5	0.782	2.04	2.36	0.17	0.05	3.7	0.00
14.72	1.456	40.33	192.56	287.91	0.781	2.77	3.45	0.22	0.05	4.6	0.00
14.74	1.217	35.84	192.76	288.31	0.780	2.94	3.86	0.23	0.05	4.9	0.00
14.76	1.281	35.84	192.97	288.72	0.780	2.80	3.61	0.22	0.05	4.7	0.00
14.78	1.776	39.91	193.18	289.12	0.779	2.25	2.68	0.19	0.05	3.9	0.00
14.8	2.637	43.69	193.40	289.54	0.779	1.66	1.86	0.16	0.05	3.3	0.00
14.82	3.142	47.06	193.62	289.95	0.778	1.50	1.65	0.15	0.05	3.2	0.00
14.84	3.335	48.74	193.84	290.37	0.778	1.46	1.60	0.15	0.05	3.2	0.00
14.86	3.362	36.68	194.06	290.79	0.777	1.09	1.19	0.13	0.05	2.8	0.01
14.88	3.455	38.93	194.30	291.22	0.777	1.13	1.23	0.14	0.05	2.9	0.01
14.9	3.528	40.47	194.52	291.64	0.776	1.15	1.25	0.14	0.05	2.9	0.01
14.92	3.594	40.47	194.75	292.07	0.776	1.13	1.23	0.14	0.05	2.9	0.01
14.94	3.636	41.45	194.98	292.49	0.775	1.14	1.24	0.14	0.05	2.9	0.01
14.96	3.567	43.13	195.21	292.92	0.775	1.21	1.32	0.14	0.05	3.0	0.01
14.98	3.521	43.55	195.44	293.34	0.774	1.24	1.35	0.14	0.05	3.0	0.01
15	3.548	43.27	195.67	293.77	0.774	1.22	1.33	0.14	0.05	3.0	0.01
15.02	3.501	42.57	195.89	294.19	0.773	1.22	1.33	0.14	0.05	3.0	0.01
15.04	3.459	41.59	196.12	294.61	0.772	1.20	1.31	0.14	0.05	3.0	0.01
15.06	3.432	41.31	196.35	295.04	0.772	1.20	1.32	0.14	0.05	3.0	0.01
15.08	3.378	46.64	196.58	295.46	0.771	1.38	1.51	0.15	0.05	3.2	0.00
15.1	3.324	52.24	196.80	295.88	0.771	1.57	1.73	0.16	0.05	3.4	0.00
15.12	3.254	51.12	197.02	296.3	0.770	1.57	1.73	0.16	0.05	3.4	0.00
15.14	3.131	52.38	197.25	296.72	0.770	1.67	1.85	0.16	0.05	3.5	0.00
15.16	2.664	50.28	197.47	297.14	0.769	1.89	2.12	0.17	0.05	3.6	0.00
15.18	2.386	47.62	197.69	297.56	0.769	2.00	2.28	0.18	0.05	3.8	0.00
15.2	2.699	47.62	197.92	297.98	0.768	1.76	1.98	0.16	0.05	3.5	0.00
15.22	3.019	47.48	198.13	298.39	0.768	1.57	1.75	0.16	0.05	3.3	0.00
15.24	3.011	44.53	198.36	298.81	0.767	1.48	1.64	0.15	0.05	3.2	0.00
15.26	2.915	42.85	198.57	299.22	0.767	1.47	1.64	0.15	0.05	3.2	0.00
15.28	2.637	50.14	198.79	299.64	0.766	1.90	2.15	0.17	0.05	3.7	0.00
15.3	2.394	50.7	199.01	300.05	0.765	2.12	2.42	0.18	0.05	3.9	0.00
15.32	2.378	50.42	199.22	300.46	0.765	2.12	2.43	0.18	0.05	3.9	0.00
15.34	2.239	56.45	199.43	300.87	0.764	2.52	2.91	0.21	0.05	4.5	0.00
15.36	1.989	55.61	199.65	301.28	0.764	2.80	3.29	0.23	0.05	4.9	0.00
15.38	1.673	53.64	199.85	301.68	0.763	3.21	3.91	0.26	0.05	5.6	0.00
15.4	1.643	51.68	200.06	302.08	0.763	3.15	3.85	0.26	0.05	5.5	0.00
15.42	1.548	53.22	200.26	302.48	0.762	3.44	4.27	0.28	0.05	6.0	0.00
15.44	1.578	52.38	200.47	302.89	0.762	3.32	4.11	0.27	0.05	5.8	0.00
15.46	2.143	52.1	200.69	303.3	0.761	2.43	2.83	0.20	0.05	4.4	0.00
15.48	2.633	53.79	200.90	303.71	0.761	2.04	2.31	0.18	0.05	3.9	0.00
15.5	2.884	56.59	201.13	304.13	0.760	1.96	2.19	0.18	0.05	3.8	0.00
15.52	3.301	58.13	201.35	304.55	0.760	1.76	1.94	0.17	0.05	3.7	0.00
15.54	3.783	62.34	201.58	304.98	0.759	1.65	1.79	0.17	0.05	3.6	0.00
15.56	3.856	71.31	201.81	305.4	0.759	1.85	2.01	0.18	0.05	3.9	0.00
15.58	3.717	69.77	202.03	305.82	0.758	1.88	2.05	0.18	0.05	3.9	0.00
15.6	3.706	69.07	202.26	306.25	0.757	1.86	2.03	0.18	0.05	3.9	0.00
15.62	3.32	68.64	202.49	306.67	0.757	2.07	2.28	0.19	0.05	4.1	0.00
15.64	2.942	65.56	202.72	307.1	0.756	2.23	2.49	0.20	0.05	4.3	0.00
15.66	3.104	61.21	202.95	307.52	0.756	1.97	2.19	0.18	0.05	3.9	0.00
15.68	3.466	56.03	203.17	307.94	0.755	1.62	1.77	0.16	0.05	3.6	0.00
15.7	3.582	53.64	203.40	308.37	0.755	1.50	1.64	0.16	0.05	3.4	0.00
15.72	3.632	50.84	203.63	308.79	0.754	1.40	1.53	0.15	0.05	3.3	0.00
15.74	3.795	71.87	203.86	309.22	0.754	1.89	2.06	0.18	0.05	4.0	0.00
15.76	4.014	83.36	204.09	309.65	0.753	2.08	2.25	0.20	0.05	4.3	0.00
15.78	4.146	76.21	204.32	310.07	0.753	1.84	1.99	0.19	0.05	4.0	0.00
15.8	3.613	75.23	204.54	310.49	0.752	2.08	2.28	0.20	0.05	4.2	0.00
15.82	2.799	68.93	204.77	310.91	0.752	2.46	2.77	0.21	0.05	4.7	0.00
15.84	1.867	79.02	204.99	311.33	0.751	4.23	5.08	0.37	0.05	8.1	0.00
15.86	1.745	75.65	205.20	311.74	0.751	4.34	5.28	0.38	0.05	8.3	0.00
15.88	2.683	76.5	205.42	312.15	0.750	2.85	3.23	0.25	0.05	5.3	0.00
15.9	3.088	81.54	205.64	312.57	0.749	2.64	2.94	0.23	0.05	5.1	0.00
15.92	2.741	84.21	205.86	312.99	0.749	3.07	3.47	0.27	0.05	5.8	0.00
15.94	2.32	84.77	206.09	313.41	0.748	3.65	4.22	0.32	0.05	6.9	0.00
15.96	3.605	86.03	206.32	313.84	0.748	2.39	2.61	0.22	0.05	4.8	0.00
15.98	4.829	96.96	206.56	314.27	0.747	2.01	2.15	0.21	0.05	4.5	0.00
16	5.438	100.89	206.80	314.71	0.747	1.86	1.97	0.21	0.05	4.5	0.00
16.02	5.848	102.85	207.04	315.15	0.746	1.76	1.86	0.21	0.05	4.5	0.00
16.04	6.098	100.89	207.29	315.59	0.746	1.65	1.74	0.21	0.05	4.5	0.00
16.06	6.291	101.45	207.53	316.03	0.745	1.61	1.70	0.21	0.05	4.5	0.00
16.08	6.311	102.01	207.78	316.47	0.745	1.62	1.70	0.21	0.05	4.5	0.00
16.1	6.187	99.49	208.02	316.91	0.744	1.61	1.69	0.20	0.05	4.5	0.00
16.12	6.041	96.82	208.26	317.35	0.744	1.60	1.69	0.20	0.05	4.4	0.00
16.14	5.929	101.73	208.51	317.79	0.743	1.72	1.81	0.21	0.05	4.5	0.00
16.16	5.782	103.97	208.75	318.23	0.743	1.80	1.90	0.21	0.05	4.6	0.00
16.18	5.35	105.37	208.98	318.66	0.742	1.97	2.09	0.22	0.05	4.7	0.00
16.2	4.782	104.39	209.23	319.1	0.741	2.18	2.34	0.22	0.05	4.9	0.00
16.22	4.142	102.43	209.47	319.54	0.741	2.47	2.68	0.24	0.05	5.2	0.00
16.24	4.223	100.47	209.71	319.97	0.740	2.38	2.57	0.23	0.05	5.0	0.00
16.26	4.86	100.75	209.95	320.41	0.740	2.07	2.22	0.22	0.05	4.7	0.00
16.28	5.381	108.04	210.18	320.84	0.739	2.01	2.14	0.22	0.05	4.8	0.00
16.3	5.107	115.75	210.42	321.27	0.739	2.27	2.42	0.24	0.05	5.2	0.00
16.32	4.786	115.33	210.66	321.71	0.738	2.41	2.58	0.24	0.05	5.3	0.00
16.34	4.281	103.69	210.88	322.13	0.738	2.42	2.62	0.24	0.05	5.2	0.00

16.36	3.486	87.57	211.12	322.56	0.737	2.51	2.77	0.23	0.05	5.1	0.00
16.38	2.772	84.49	211.34	322.98	0.737	3.05	3.45	0.27	0.05	5.9	0.00
16.4	2.266	91.64	211.58	323.41	0.736	4.04	4.72	0.37	0.05	8.1	0.00
16.42	2.872	104.11	211.80	323.83	0.736	3.63	4.09	0.33	0.05	7.3	0.00
16.44	4.119	91.64	212.02	324.25	0.735	2.22	2.41	0.22	0.05	4.8	0.00
16.46	3.771	89.81	212.25	324.67	0.735	2.38	2.61	0.23	0.05	5.0	0.00
16.48	2.949	98.08	212.47	325.09	0.734	3.33	3.74	0.30	0.05	6.6	0.00
16.5	2.405	109.58	212.70	325.51	0.733	4.56	5.27	0.45	0.05	9.8	0.00
16.52	2.888	89.53	212.92	325.93	0.733	3.10	3.49	0.28	0.05	6.1	0.00
16.54	3.274	77.76	213.13	326.34	0.732	2.38	2.64	0.22	0.05	4.8	0.00
16.56	2.571	75.51	213.35	326.75	0.732	2.94	3.36	0.26	0.05	5.7	0.00
16.58	1.924	86.87	213.57	327.17	0.731	4.52	5.44	0.42	0.05	9.4	0.00
16.6	2.251	91.78	213.79	327.59	0.731	4.08	4.77	0.38	0.05	8.3	0.00
16.62	3.524	87.29	214.02	328.01	0.730	2.48	2.73	0.23	0.05	5.1	0.00
16.64	3.486	92.62	214.23	328.42	0.730	2.66	2.93	0.25	0.05	5.4	0.00
16.66	2.868	99.77	214.46	328.84	0.729	3.48	3.93	0.32	0.05	7.1	0.00
16.68	2.529	93.88	214.67	329.25	0.729	3.71	4.27	0.34	0.05	7.5	0.00
16.7	2.563	90.37	214.89	329.67	0.728	3.53	4.05	0.32	0.05	7.1	0.00
16.72	2.486	77.48	215.11	330.08	0.728	3.12	3.59	0.28	0.05	6.1	0.00
16.74	1.973	63.04	215.32	330.49	0.727	3.20	3.84	0.28	0.05	6.2	0.00
16.76	1.905	58.13	215.53	330.9	0.727	3.05	3.69	0.26	0.05	5.9	0.00
16.78	1.943	58.83	215.76	331.32	0.726	3.03	3.65	0.26	0.05	5.8	0.00
16.8	2.305	60.23	215.98	331.74	0.725	2.61	3.05	0.23	0.04	5.1	0.00
16.82	4.076	72.01	216.21	332.16	0.725	1.77	1.92	0.19	0.04	4.1	0.00
16.84	4.879	75.23	216.44	332.59	0.724	1.54	1.65	0.18	0.04	4.1	0.00
16.86	4.887	74.25	216.67	333.02	0.724	1.52	1.63	0.18	0.04	4.0	0.00
16.88	5.026	78.32	216.92	333.46	0.723	1.56	1.67	0.19	0.04	4.1	0.00
16.9	5.076	83.22	217.15	333.89	0.723	1.64	1.75	0.19	0.04	4.3	0.00
16.92	5.137	89.67	217.39	334.33	0.722	1.75	1.87	0.20	0.04	4.5	0.00
16.94	5.068	89.95	217.64	334.77	0.722	1.77	1.90	0.20	0.04	4.5	0.00
16.96	5.411	89.53	217.88	335.21	0.721	1.65	1.76	0.20	0.04	4.4	0.00
16.98	5.616	91.21	218.13	335.65	0.721	1.62	1.73	0.20	0.04	4.5	0.00
17	5.724	95.56	218.36	336.08	0.720	1.67	1.77	0.20	0.04	4.6	0.00
17.02	5.504	101.17	218.60	336.52	0.720	1.84	1.96	0.21	0.04	4.8	0.00
17.04	5.006	110.28	218.85	336.96	0.719	2.20	2.36	0.23	0.04	5.2	0.00
17.06	4.362	100.89	219.08	337.39	0.718	2.31	2.51	0.23	0.04	5.2	0.00
17.08	3.686	87.71	219.31	337.81	0.718	2.38	2.62	0.23	0.04	5.1	0.00
17.1	3.042	78.32	219.53	338.23	0.717	2.57	2.90	0.24	0.04	5.3	0.00
17.12	2.154	65.84	219.74	338.64	0.717	3.06	3.63	0.27	0.04	6.1	0.00
17.14	1.487	59.53	219.97	339.06	0.716	4.00	5.19	0.36	0.04	8.1	0.00
17.16	1.361	59.95	220.19	339.48	0.716	4.40	5.87	0.41	0.04	9.2	0.00
17.18	2.405	63.32	220.41	339.9	0.715	2.63	3.07	0.24	0.04	5.3	0.00
17.2	4.358	68.22	220.65	340.33	0.715	1.57	1.70	0.18	0.04	4.0	0.00
17.22	5.647	77.76	220.88	340.76	0.714	1.38	1.47	0.19	0.04	4.2	0.00
17.24	5.767	89.39	221.13	341.2	0.714	1.55	1.65	0.20	0.04	4.5	0.00
17.26	5.867	87.15	221.37	341.64	0.713	1.49	1.58	0.20	0.04	4.4	0.00
17.28	6.056	84.07	221.61	342.08	0.713	1.39	1.47	0.19	0.04	4.3	0.00
17.3	6.187	81.68	221.86	342.52	0.712	1.32	1.40	0.19	0.04	4.3	0.00
17.32	6.141	82.38	222.10	342.96	0.712	1.34	1.42	0.19	0.04	4.3	0.00
17.34	5.932	86.59	222.34	343.4	0.711	1.46	1.55	0.20	0.04	4.4	0.00
17.36	5.709	90.37	222.59	343.84	0.710	1.58	1.68	0.20	0.04	4.5	0.00
17.38	5.396	92.76	222.83	344.28	0.710	1.72	1.84	0.21	0.04	4.6	0.00
17.4	5.033	95.56	223.07	344.71	0.709	1.90	2.04	0.21	0.04	4.8	0.00
17.42	4.821	96.54	223.31	345.15	0.709	2.00	2.16	0.22	0.04	4.9	0.00
17.44	4.786	94.02	223.54	345.58	0.708	1.96	2.12	0.21	0.04	4.8	0.00
17.46	4.721	94.86	223.79	346.02	0.708	2.01	2.17	0.22	0.04	4.9	0.00
17.48	4.725	96.68	224.02	346.45	0.707	2.05	2.21	0.22	0.04	5.0	0.00
17.5	4.381	94.86	224.26	346.88	0.707	2.17	2.35	0.22	0.04	5.1	0.00
17.52	4.076	88.69	224.49	347.31	0.706	2.18	2.38	0.22	0.04	5.0	0.00
17.54	4.057	85.89	224.72	347.74	0.706	2.12	2.32	0.22	0.04	4.9	0.00
17.56	3.648	84.91	224.95	348.16	0.705	2.33	2.57	0.23	0.04	5.2	0.00
17.58	3.019	75.09	225.17	348.58	0.705	2.49	2.81	0.23	0.04	5.3	0.00
17.6	2.467	70.33	225.39	349	0.704	2.85	3.32	0.26	0.04	5.9	0.00
17.62	2.455	78.46	225.62	349.42	0.704	3.20	3.73	0.29	0.04	6.7	0.00
17.64	3.111	82.94	225.85	349.85	0.703	2.67	3.00	0.25	0.04	5.7	0.00
17.66	3.791	78.04	226.08	350.27	0.702	2.06	2.27	0.21	0.04	4.8	0.00
17.68	3.849	78.18	226.30	350.69	0.702	2.03	2.23	0.21	0.04	4.7	0.00
17.7	3.301	77.9	226.52	351.11	0.701	2.36	2.64	0.23	0.04	5.2	0.00
17.72	3.123	75.93	226.76	351.54	0.701	2.43	2.74	0.23	0.04	5.3	0.00
17.74	3.428	76.36	226.99	351.97	0.700	2.23	2.48	0.22	0.04	5.0	0.00
17.76	4.339	73.97	227.22	352.4	0.700	1.70	1.86	0.19	0.04	4.4	0.00
17.78	4.863	76.36	227.46	352.83	0.699	1.57	1.69	0.19	0.04	4.3	0.00
17.8	5.014	89.25	227.69	353.26	0.699	1.78	1.91	0.21	0.04	4.7	0.00
17.82	4.86	92.62	227.93	353.69	0.698	1.91	2.06	0.21	0.04	4.9	0.00
17.84	4.234	87.71	228.16	354.12	0.698	2.07	2.26	0.22	0.04	5.0	0.00
17.86	3.428	64.16	228.38	354.54	0.697	1.87	2.09	0.19	0.04	4.4	0.00
17.88	2.498	62.9	228.60	354.95	0.697	2.52	2.94	0.24	0.04	5.4	0.00
17.9	1.859	57.85	228.81	355.36	0.696	3.11	3.85	0.28	0.04	6.5	0.00
17.92	1.331	48.74	229.01	355.76	0.696	3.66	5.00	0.34	0.04	7.8	0.00
17.94	1.232	41.73	229.22	356.16	0.695	3.39	4.76	0.32	0.04	7.2	0.00
17.96	1.262	36.12	229.42	356.56	0.694	2.86	3.99	0.27	0.04	6.1	0.00
17.98	1.281	40.61	229.63	356.96	0.694	3.17	4.39	0.29	0.04	6.8	0.00
18	1.532	43.69	229.83	357.36	0.693	2.85	3.72	0.26	0.04	6.0	0.00
18.02	2.475	42.99	230.04	357.77	0.693	1.74	2.03	0.18	0.04	4.1	0.00

18.04	3.119	62.9	230.27	358.19	0.692	2.02	2.28	0.20	0.04	4.7	0.00
18.06	3.59	76.64	230.49	358.61	0.692	2.13	2.37	0.22	0.04	5.0	0.00
18.08	3.987	85.61	230.72	359.03	0.691	2.15	2.36	0.22	0.04	5.1	0.00
18.1	3.837	83.22	230.95	359.46	0.691	2.17	2.39	0.22	0.04	5.1	0.00
18.12	3.258	81.26	231.18	359.89	0.690	2.49	2.80	0.24	0.04	5.6	0.00
18.14	3.594	80.84	231.42	360.32	0.690	2.25	2.50	0.23	0.04	5.2	0.00
18.16	4.601	84.77	231.64	360.74	0.689	1.84	2.00	0.21	0.04	4.8	0.00
18.18	4.578	84.49	231.87	361.17	0.689	1.85	2.00	0.21	0.04	4.8	0.00
18.2	4.261	85.19	232.11	361.6	0.688	2.00	2.18	0.21	0.04	5.0	0.00
18.22	3.849	87.99	232.34	362.03	0.688	2.29	2.52	0.23	0.04	5.4	0.00
18.24	3.212	86.73	232.58	362.46	0.687	2.70	3.04	0.26	0.04	6.1	0.00
18.26	3.192	91.21	232.80	362.88	0.686	2.86	3.22	0.28	0.04	6.4	0.00
18.28	3.787	90.79	233.03	363.31	0.686	2.40	2.65	0.24	0.04	5.6	0.00
18.3	4.427	92.62	233.27	363.74	0.685	2.09	2.28	0.23	0.04	5.2	0.00
18.32	4.532	92.2	233.50	364.17	0.685	2.03	2.21	0.22	0.04	5.2	0.00
18.34	4.466	90.23	233.73	364.6	0.684	2.02	2.20	0.22	0.04	5.1	0.00
18.36	4.57	89.11	233.97	365.03	0.684	1.95	2.12	0.22	0.04	5.0	0.00
18.38	4.609	86.87	234.21	365.47	0.683	1.88	2.05	0.21	0.04	4.9	0.00
18.4	4.389	87.99	234.45	365.9	0.683	2.00	2.19	0.22	0.04	5.1	0.00
18.42	4.373	87.01	234.68	366.33	0.682	1.99	2.17	0.22	0.04	5.1	0.00
18.44	4.798	84.63	234.92	366.77	0.682	1.76	1.91	0.21	0.04	4.8	0.00
18.46	5.215	80	235.16	367.2	0.681	1.53	1.65	0.20	0.04	4.6	0.00
18.48	5.3	82.24	235.40	367.64	0.681	1.55	1.67	0.20	0.04	4.6	0.00
18.5	5.323	98.22	235.64	368.07	0.680	1.85	1.98	0.22	0.04	5.1	0.00
18.52	5.064	95.28	235.88	368.51	0.680	1.88	2.03	0.22	0.04	5.1	0.00
18.54	4.385	90.93	236.11	368.94	0.679	2.07	2.26	0.22	0.04	5.3	0.00
18.56	3.544	88.27	236.35	369.37	0.678	2.49	2.78	0.25	0.04	5.8	0.00
18.58	2.957	87.15	236.57	369.79	0.678	2.95	3.37	0.29	0.04	6.7	0.00
18.6	2.88	84.77	236.80	370.22	0.677	2.94	3.38	0.29	0.04	6.7	0.00
18.62	3.486	88.27	237.03	370.64	0.677	2.53	2.83	0.25	0.04	5.9	0.00
18.64	3.493	85.75	237.26	371.07	0.676	2.45	2.75	0.25	0.04	5.8	0.00
18.66	3.899	89.25	237.50	371.5	0.676	2.29	2.53	0.24	0.04	5.6	0.00
18.68	4.69	85.19	237.73	371.93	0.675	1.82	1.97	0.21	0.04	4.9	0.00
18.7	4.995	89.81	237.96	372.36	0.675	1.80	1.94	0.21	0.04	5.0	0.00
18.72	5.381	88.55	238.21	372.8	0.674	1.65	1.77	0.21	0.04	4.9	0.00
18.74	5.269	91.78	238.44	373.23	0.674	1.74	1.87	0.21	0.04	5.0	0.00
18.76	4.736	91.78	238.68	373.67	0.673	1.94	2.10	0.22	0.04	5.2	0.00
18.78	4.192	84.91	238.92	374.1	0.673	2.03	2.22	0.22	0.04	5.2	0.00
18.8	4.478	84.07	239.16	374.54	0.672	1.88	2.05	0.21	0.04	5.0	0.00
18.82	5.215	84.35	239.40	374.97	0.672	1.62	1.74	0.20	0.04	4.8	0.00
18.84	5.535	70.05	239.64	375.41	0.671	1.27	1.36	0.19	0.04	4.4	0.00
18.86	5.52	72.57	239.88	375.85	0.670	1.31	1.41	0.19	0.04	4.4	0.00
18.88	5.539	73.83	240.13	376.29	0.670	1.33	1.43	0.19	0.04	4.5	0.00
18.9	5.508	75.51	240.37	376.73	0.669	1.37	1.47	0.19	0.04	4.5	0.00
18.92	5.392	73.69	240.60	377.16	0.669	1.37	1.47	0.19	0.04	4.5	0.00
18.94	5.242	74.81	240.85	377.6	0.668	1.43	1.54	0.19	0.04	4.5	0.00
18.96	5.11	81.12	241.09	378.04	0.668	1.59	1.71	0.20	0.04	4.8	0.00
18.98	4.867	87.99	241.33	378.47	0.667	1.81	1.96	0.21	0.04	5.1	0.00
19	4.331	89.95	241.56	378.9	0.667	2.08	2.28	0.23	0.04	5.4	0.00
19.02	3.528	76.64	241.78	379.32	0.666	2.17	2.43	0.23	0.04	5.4	0.00
19.04	2.834	66.68	242.01	379.74	0.666	2.35	2.72	0.24	0.04	5.6	0.00
19.06	2.282	58.55	242.23	380.16	0.665	2.57	3.08	0.25	0.04	5.9	0.00
19.08	2.1	51.68	242.45	380.57	0.665	2.46	3.01	0.24	0.04	5.7	0.00
19.1	1.844	69.21	242.66	380.98	0.664	3.75	4.73	0.37	0.04	8.8	0.00
19.12	1.817	78.18	242.88	381.4	0.663	4.30	5.45	0.44	0.04	10.6	0.00
19.14	3.432	85.89	243.11	381.82	0.663	2.50	2.82	0.25	0.04	6.1	0.00
19.16	4.439	90.23	243.34	382.25	0.662	2.03	2.22	0.23	0.04	5.4	0.00
19.18	4.3	85.05	243.57	382.68	0.662	1.98	2.17	0.22	0.04	5.3	0.00
19.2	4.62	85.33	243.81	383.11	0.661	1.85	2.01	0.22	0.04	5.1	0.00
19.22	4.62	81.96	244.04	383.54	0.661	1.77	1.93	0.21	0.04	5.0	0.00
19.24	4.605	83.79	244.28	383.97	0.660	1.82	1.99	0.21	0.04	5.1	0.00
19.26	4.559	81.26	244.51	384.4	0.660	1.78	1.95	0.21	0.04	5.0	0.00
19.28	4.512	76.07	244.75	384.84	0.659	1.69	1.84	0.20	0.04	4.8	0.00
19.3	4.47	78.04	244.99	385.27	0.659	1.75	1.91	0.21	0.04	4.9	0.00
19.32	4.597	79.58	245.22	385.7	0.658	1.73	1.89	0.21	0.04	5.0	0.00
19.34	4.454	80.14	245.45	386.13	0.658	1.80	1.97	0.21	0.04	5.0	0.00
19.36	4.277	79.16	245.69	386.56	0.657	1.85	2.03	0.21	0.04	5.1	0.00
19.38	4.038	81.4	245.92	386.99	0.657	2.02	2.23	0.22	0.04	5.3	0.00
19.4	4.238	81.82	246.17	387.43	0.656	1.93	2.12	0.22	0.04	5.2	0.00
19.42	4.408	83.22	246.40	387.86	0.655	1.89	2.07	0.22	0.04	5.2	0.00
19.44	4.393	81.96	246.63	388.29	0.655	1.87	2.05	0.22	0.04	5.2	0.00
19.46	4.35	84.77	246.87	388.72	0.654	1.95	2.14	0.22	0.04	5.3	0.00
19.48	4.381	81.82	247.10	389.15	0.654	1.87	2.05	0.22	0.04	5.2	0.00
19.5	4.389	81.96	247.34	389.58	0.653	1.87	2.05	0.22	0.04	5.2	0.00
19.52	4.408	80.56	247.57	390.01	0.653	1.83	2.00	0.21	0.04	5.1	0.00
19.54	4.404	83.08	247.81	390.45	0.652	1.89	2.07	0.22	0.04	5.3	0.00
19.56	4.508	89.39	248.05	390.88	0.652	1.98	2.17	0.23	0.04	5.5	0.00
19.58	4.532	92.9	248.28	391.31	0.651	2.05	2.24	0.23	0.04	5.6	0.00
19.6	4.516	93.88	248.51	391.74	0.651	2.08	2.28	0.24	0.04	5.7	0.00
19.62	4.759	85.33	248.76	392.18	0.650	1.79	1.95	0.22	0.04	5.2	0.00
19.64	5.176	85.47	249.00	392.62	0.650	1.65	1.79	0.21	0.04	5.1	0.00
19.66	5.562	81.68	249.24	393.05	0.649	1.47	1.58	0.20	0.04	4.9	0.00
19.68	5.489	77.34	249.48	393.49	0.649	1.41	1.52	0.20	0.04	4.8	0.00
19.7	5.319	75.79	249.72	393.93	0.648	1.42	1.54	0.20	0.04	4.8	0.00

19.72	5.056	74.95	249.96	394.36	0.647	1.48	1.61	0.20	0.04	4.8	0.00
19.74	4.929	78.32	250.20	394.8	0.647	1.59	1.73	0.20	0.04	5.0	0.00
19.76	4.786	76.36	250.44	395.24	0.646	1.60	1.74	0.20	0.04	4.9	0.00
19.78	4.705	65.14	250.68	395.67	0.646	1.38	1.51	0.19	0.04	4.6	0.00
19.8	4.69	67.38	250.91	396.1	0.645	1.44	1.57	0.19	0.04	4.6	0.00
19.82	4.782	70.89	251.16	396.54	0.645	1.48	1.62	0.20	0.04	4.8	0.00
19.84	4.91	72.29	251.39	396.97	0.644	1.47	1.60	0.20	0.04	4.8	0.00
19.86	4.96	70.47	251.63	397.41	0.644	1.42	1.54	0.19	0.04	4.7	0.00
19.88	5.01	71.59	251.87	397.84	0.643	1.43	1.55	0.20	0.04	4.8	0.00
19.9	4.898	74.25	252.11	398.28	0.643	1.52	1.65	0.20	0.04	4.9	0.00
19.92	4.674	77.2	252.34	398.71	0.642	1.65	1.81	0.21	0.04	5.0	0.00
19.94	4.35	78.04	252.58	399.14	0.642	1.79	1.98	0.21	0.04	5.2	0.00
19.96	3.949	76.36	252.81	399.57	0.641	1.93	2.15	0.22	0.04	5.4	0.00
19.98	3.837	81.26	253.05	400	0.641	2.12	2.36	0.23	0.04	5.7	0.00
20	3.71	82.24	253.27	400.42	0.640	2.22	2.48	0.24	0.04	5.9	0.00
20.02	3.493	79.72	253.49	400.84	0.639	2.28	2.58	0.24	0.04	6.0	0.00
20.04	3.092	76.21	253.72	401.26	0.639	2.46	2.83	0.26	0.04	6.3	0.00
20.06	2.44	63.04	253.94	401.68	0.638	2.58	3.09	0.26	0.04	6.5	0.00
20.08	2.135	67.52	254.16	402.09	0.638	3.16	3.90	0.32	0.04	7.9	0.00
20.1	2.363	55.19	254.38	402.51	0.637	2.34	2.82	0.24	0.04	5.9	0.00
20.12	2.915	56.45	254.59	402.92	0.637	1.94	2.25	0.21	0.04	5.2	0.00
20.14	2.633	64.72	254.83	403.35	0.636	2.46	2.90	0.25	0.04	6.2	0.00
20.16	3.331	80.56	255.05	403.77	0.636	2.42	2.75	0.26	0.04	6.3	0.00
20.18	4.91	86.31	255.28	404.2	0.635	1.76	1.92	0.22	0.04	5.4	0.00
20.2	4.705	83.22	255.51	404.62	0.635	1.77	1.94	0.22	0.04	5.4	0.00
20.22	4.072	88.55	255.74	405.05	0.634	2.17	2.41	0.24	0.04	6.0	0.00
20.24	3.575	84.63	255.99	405.49	0.634	2.37	2.67	0.25	0.04	6.3	0.00
20.26	4.018	82.66	256.22	405.92	0.633	2.06	2.29	0.23	0.04	5.7	0.00
20.28	5.141	87.43	256.45	406.35	0.633	1.70	1.85	0.22	0.04	5.4	0.00
20.3	5.238	94.16	256.69	406.78	0.632	1.80	1.95	0.23	0.04	5.6	0.00
20.32	4.856	86.17	256.92	407.21	0.631	1.77	1.94	0.22	0.04	5.5	0.00
20.34	4.173	83.08	257.15	407.64	0.631	1.99	2.21	0.23	0.04	5.7	0.00
20.36	3.613	72.29	257.39	408.07	0.630	2.00	2.26	0.22	0.04	5.6	0.00
20.38	3.285	78.18	257.62	408.5	0.630	2.38	2.72	0.25	0.04	6.3	0.00
20.4	4.088	79.72	257.86	408.93	0.629	1.95	2.17	0.23	0.04	5.6	0.00
20.42	4.539	81.4	258.08	409.35	0.629	1.79	1.97	0.22	0.04	5.4	0.00
20.44	4.014	77.62	258.31	409.78	0.628	1.93	2.15	0.22	0.04	5.6	0.00
20.46	3.227	78.04	258.54	410.2	0.628	2.42	2.77	0.26	0.04	6.4	0.00
20.48	3.019	70.19	258.77	410.63	0.627	2.32	2.69	0.25	0.04	6.2	0.00
20.5	3.073	67.94	259.00	411.05	0.627	2.21	2.55	0.24	0.04	5.9	0.00
20.52	3.312	61.78	259.22	411.47	0.626	1.87	2.13	0.21	0.04	5.3	0.00
20.54	3.165	70.05	259.44	411.89	0.626	2.21	2.54	0.24	0.04	6.0	0.00
20.56	3.656	82.38	259.67	412.31	0.625	2.25	2.54	0.25	0.04	6.2	0.00
20.58	3.876	79.3	259.89	412.73	0.625	2.05	2.29	0.23	0.04	5.8	0.00
20.6	3.239	84.77	260.11	413.15	0.624	2.62	3.00	0.28	0.04	7.0	0.00
20.62	2.409	80.84	260.33	413.56	0.623	3.36	4.05	0.35	0.04	8.8	0.00
20.64	2.12	76.92	260.55	413.98	0.623	3.63	4.51	0.39	0.04	9.6	0.00
20.66	1.932	69.63	260.76	414.38	0.622	3.60	4.59	0.38	0.04	9.6	0.00
20.68	1.939	54.07	260.96	414.78	0.622	2.79	3.55	0.29	0.04	7.3	0.00
20.7	1.875	48.74	261.17	415.19	0.621	2.60	3.34	0.27	0.04	6.8	0.00
20.72	1.464	45.09	261.39	415.6	0.621	3.08	4.30	0.33	0.04	8.2	0.00
20.74	1.779	50.28	261.61	416.02	0.620	2.83	3.69	0.30	0.04	7.4	0.00
20.76	3.281	54.91	261.82	416.43	0.620	1.67	1.92	0.20	0.04	5.0	0.00
20.78	4.616	63.74	262.05	416.85	0.619	1.38	1.52	0.19	0.04	4.8	0.00
20.8	4.389	72.71	262.28	417.28	0.619	1.66	1.83	0.21	0.04	5.3	0.00
20.82	3.845	77.62	262.51	417.7	0.618	2.02	2.26	0.23	0.04	5.8	0.00
20.84	3.131	79.86	262.73	418.12	0.618	2.55	2.94	0.27	0.04	6.9	0.00
20.86	2.841	81.96	262.96	418.55	0.617	2.88	3.38	0.31	0.04	7.7	0.00
20.88	2.791	81.68	263.19	418.97	0.617	2.93	3.44	0.31	0.04	7.8	0.00
20.9	2.942	79.58	263.41	419.39	0.616	2.70	3.15	0.29	0.04	7.3	0.00
20.92	3.277	71.87	263.62	419.8	0.615	2.19	2.52	0.24	0.04	6.1	0.00
20.94	3.54	71.17	263.85	420.22	0.615	2.01	2.28	0.23	0.04	5.8	0.00
20.96	3.42	74.39	264.07	420.64	0.614	2.18	2.48	0.24	0.04	6.1	0.00
20.98	2.764	68.22	264.30	421.06	0.614	2.47	2.91	0.26	0.04	6.7	0.00
21	2.467	66.4	264.52	421.48	0.613	2.69	3.25	0.28	0.04	7.2	0.00
21.02	2.425	56.31	264.73	421.89	0.613	2.32	2.81	0.25	0.04	6.3	0.00
21.04	2.826	53.36	264.96	422.31	0.612	1.89	2.22	0.22	0.04	5.5	0.00
21.06	2.899	66.4	265.17	422.72	0.612	2.29	2.68	0.25	0.04	6.3	0.00
21.08	3.065	61.5	265.39	423.13	0.611	2.01	2.33	0.23	0.04	5.8	0.00
21.1	2.59	57.29	265.60	423.54	0.611	2.21	2.64	0.24	0.04	6.2	0.00
21.12	1.981	59.81	265.81	423.95	0.610	3.02	3.84	0.32	0.04	8.1	0.00
21.14	1.567	60.79	266.04	424.37	0.610	3.88	5.32	0.43	0.04	10.9	0.00
21.16	2.193	63.46	266.25	424.78	0.609	2.89	3.59	0.31	0.04	7.8	0.00
21.18	3.181	61.78	266.46	425.19	0.608	1.94	2.24	0.22	0.04	5.7	0.00
21.2	3.158	57.43	266.68	425.6	0.608	1.82	2.10	0.21	0.04	5.5	0.00
21.22	2.621	64.16	266.89	426.01	0.607	2.45	2.92	0.26	0.04	6.8	0.00
21.24	2.004	79.72	267.12	426.43	0.607	3.98	5.05	0.44	0.04	11.3	0.00
21.26	2.425	82.94	267.34	426.85	0.606	3.42	4.15	0.37	0.04	9.5	0.00
21.28	3.663	76.64	267.55	427.26	0.606	2.09	2.37	0.24	0.04	6.2	0.00
21.3	3.571	69.35	267.78	427.68	0.605	1.94	2.21	0.23	0.04	5.8	0.00
21.32	3.15	73.13	268.01	428.11	0.605	2.32	2.69	0.26	0.04	6.6	0.00
21.34	3.355	69.77	268.24	428.54	0.604	2.08	2.38	0.24	0.04	6.1	0.00
21.36	4.153	70.33	268.48	428.97	0.604	1.69	1.89	0.21	0.04	5.5	0.00
21.38	5.064	73.83	268.71	429.4	0.603	1.46	1.59	0.21	0.04	5.3	0.00

21.4	5.431	77.06	268.96	429.84	0.603	1.42	1.54	0.21	0.04	5.4	0.00
21.42	5.55	80.56	269.19	430.27	0.602	1.45	1.57	0.21	0.04	5.5	0.00
21.44	5.547	80.42	269.43	430.71	0.602	1.45	1.57	0.21	0.04	5.5	0.00
21.46	5.685	81.68	269.68	431.15	0.601	1.44	1.55	0.21	0.04	5.5	0.00
21.48	5.74	85.47	269.92	431.59	0.600	1.49	1.61	0.22	0.04	5.7	0.00
21.5	5.543	90.65	270.17	432.03	0.600	1.64	1.77	0.23	0.04	5.9	0.00
21.52	5.269	98.93	270.40	432.46	0.599	1.88	2.05	0.24	0.04	6.3	0.00
21.54	4.84	103.69	270.64	432.9	0.599	2.14	2.35	0.26	0.04	6.8	0.00
21.56	4.223	108.32	270.87	433.32	0.598	2.57	2.86	0.30	0.04	7.7	0.00
21.58	3.2	96.4	271.10	433.75	0.598	3.01	3.48	0.33	0.04	8.6	0.00
21.6	2.648	86.73	271.32	434.17	0.597	3.28	3.92	0.36	0.04	9.3	0.00
21.62	2.255	76.36	271.55	434.59	0.597	3.39	4.19	0.37	0.04	9.6	0.00
21.64	2.313	70.05	271.77	435.01	0.596	3.03	3.73	0.33	0.04	8.5	0.00
21.66	2.745	67.66	272.00	435.43	0.596	2.46	2.93	0.27	0.04	7.0	0.00
21.68	4.447	73.83	272.23	435.86	0.595	1.66	1.84	0.22	0.04	5.6	0.00
21.7	4.995	77.9	272.46	436.29	0.595	1.56	1.71	0.22	0.04	5.6	0.00
21.72	4.952	81.96	272.70	436.72	0.594	1.66	1.82	0.22	0.04	5.8	0.00
21.74	4.813	83.64	272.93	437.15	0.594	1.74	1.91	0.23	0.04	5.9	0.00
21.76	4.505	81.54	273.16	437.58	0.593	1.81	2.00	0.23	0.04	6.0	0.00
21.78	4.296	79.86	273.40	438.01	0.592	1.86	2.07	0.23	0.04	6.0	0.00
21.8	4.15	89.67	273.63	438.44	0.592	2.16	2.42	0.26	0.04	6.7	0.00
21.82	4.373	97.38	273.87	438.87	0.591	2.23	2.48	0.27	0.04	6.9	0.00
21.84	3.987	94.02	274.09	439.29	0.591	2.36	2.65	0.27	0.04	7.2	0.00
21.86	3.204	88.41	274.31	439.71	0.590	2.76	3.20	0.31	0.04	8.0	0.00
21.88	2.401	80	274.54	440.13	0.590	3.33	4.08	0.37	0.04	9.7	0.00
21.9	2.151	63.46	274.75	440.54	0.589	2.95	3.71	0.32	0.04	8.5	0.00
21.92	2.073	51.68	274.97	440.96	0.589	2.49	3.17	0.28	0.04	7.3	0.00
21.94	2.521	51.4	275.19	441.37	0.588	2.04	2.47	0.24	0.04	6.2	0.00
21.96	3.023	49.44	275.40	441.78	0.588	1.64	1.92	0.21	0.04	5.4	0.00
21.98	3.092	50.7	275.62	442.19	0.587	1.64	1.91	0.21	0.04	5.4	0.00
22	2.621	49.16	275.83	442.6	0.587	1.88	2.26	0.22	0.04	5.9	0.00
22.02	1.996	42.43	276.04	443.01	0.586	2.13	2.73	0.24	0.04	6.4	0.00
22.04	1.54	36.4	276.25	443.41	0.586	2.36	3.32	0.27	0.04	7.2	0.00
22.06	1.399	30.93	276.44	443.8	0.585	2.21	3.24	0.26	0.04	6.9	0.00
22.08	1.422	23.64	276.65	444.2	0.584	1.66	2.42	0.22	0.04	5.7	0.00
22.1	1.35	19.57	276.84	444.59	0.584	1.45	2.16	0.20	0.04	5.3	0.00
22.12	1.335	22.52	277.02	444.97	0.583	1.69	2.53	0.22	0.04	5.8	0.00
22.14	1.316	22.38	277.22	445.36	0.583	1.70	2.57	0.22	0.04	5.9	0.00
22.16	1.354	24.07	277.42	445.76	0.582	1.78	2.65	0.23	0.04	6.0	0.00
22.18	1.395	27.99	277.61	446.15	0.582	2.01	2.95	0.25	0.04	6.5	0.00
22.2	1.582	28.97	277.82	446.55	0.581	1.83	2.55	0.23	0.04	6.0	0.00
22.22	1.882	32.48	278.01	446.94	0.581	1.73	2.26	0.21	0.04	5.7	0.00
22.24	2.174	35.14	278.22	447.34	0.580	1.62	2.04	0.20	0.04	5.4	0.00
22.26	1.89	38.5	278.42	447.74	0.580	2.04	2.67	0.24	0.04	6.4	0.00
22.28	1.498	54.07	278.63	448.15	0.579	3.61	5.15	0.42	0.04	11.1	0.00
22.3	1.722	49.16	278.84	448.55	0.579	2.85	3.86	0.32	0.04	8.6	0.00
22.32	2.459	45.93	279.04	448.95	0.578	1.87	2.29	0.22	0.04	6.0	0.00
22.34	2.733	54.63	279.25	449.36	0.578	2.00	2.39	0.24	0.04	6.3	0.00
22.36	2.123	59.95	279.46	449.76	0.577	2.82	3.58	0.32	0.04	8.4	0.00
22.38	1.734	62.76	279.67	450.17	0.576	3.62	4.89	0.42	0.04	11.1	0.00
22.4	1.894	56.03	279.88	450.57	0.576	2.96	3.88	0.33	0.04	8.9	0.00
22.42	2.162	45.79	280.09	450.98	0.575	2.12	2.68	0.25	0.04	6.6	0.00
22.44	1.981	47.9	280.30	451.39	0.575	2.42	3.13	0.28	0.04	7.4	0.00
22.46	2.147	60.79	280.52	451.8	0.574	2.83	3.59	0.32	0.04	8.5	0.00
22.48	2.814	54.49	280.73	452.21	0.574	1.94	2.31	0.23	0.04	6.2	0.00
22.5	2.899	54.21	280.94	452.61	0.573	1.87	2.22	0.23	0.04	6.1	0.00
22.52	2.479	52.1	281.15	453.02	0.573	2.10	2.57	0.25	0.04	6.6	0.00
22.54	2.027	48.04	281.36	453.43	0.572	2.37	3.05	0.27	0.04	7.3	0.00
22.56	1.738	43.55	281.57	453.83	0.572	2.51	3.39	0.29	0.04	7.7	0.00
22.58	1.814	41.03	281.78	454.24	0.571	2.26	3.02	0.26	0.04	7.1	0.00
22.6	2.046	36.12	281.98	454.64	0.571	1.77	2.27	0.22	0.04	5.9	0.00
22.62	1.806	29.39	282.19	455.04	0.570	1.63	2.18	0.21	0.04	5.7	0.00
22.64	1.665	31.21	282.38	455.43	0.570	1.87	2.58	0.23	0.04	6.3	0.00
22.66	1.734	28.27	282.59	455.83	0.569	1.63	2.21	0.21	0.04	5.7	0.00
22.68	1.726	23.22	282.79	456.23	0.568	1.35	1.83	0.19	0.04	5.2	0.00
22.7	1.521	22.94	282.98	456.62	0.568	1.51	2.16	0.21	0.04	5.6	0.00
22.72	1.418	27.01	283.18	457.01	0.567	1.90	2.81	0.24	0.04	6.5	0.00
22.74	1.475	25.61	283.38	457.41	0.567	1.74	2.52	0.23	0.04	6.1	0.00
22.76	1.441	18.94	283.57	457.8	0.566	1.31	1.93	0.19	0.04	5.3	0.00
22.78	1.468	21.96	283.77	458.19	0.566	1.50	2.17	0.21	0.04	5.6	0.00
22.8	1.605	27.85	283.96	458.58	0.565	1.74	2.43	0.22	0.04	6.1	0.00
22.82	1.65	29.11	284.16	458.97	0.565	1.76	2.44	0.23	0.04	6.1	0.00
22.84	1.471	31.36	284.36	459.37	0.564	2.13	3.10	0.26	0.04	7.1	0.00
22.86	1.331	31.07	284.55	459.76	0.564	2.33	3.57	0.29	0.04	7.8	0.00
22.88	1.384	30.65	284.75	460.15	0.563	2.21	3.32	0.27	0.04	7.4	0.00
22.9	1.624	38.08	284.95	460.55	0.563	2.34	3.27	0.28	0.04	7.6	0.00
22.92	1.673	44.39	285.14	460.94	0.562	2.65	3.66	0.31	0.04	8.4	0.00
22.94	1.696	41.45	285.35	461.34	0.562	2.44	3.36	0.29	0.04	7.8	0.00
22.96	1.726	37.1	285.54	461.73	0.561	2.15	2.93	0.26	0.04	7.1	0.00
22.98	1.76	30.65	285.75	462.13	0.560	1.74	2.36	0.22	0.04	6.1	0.00
23	1.863	28.83	285.95	462.53	0.560	1.55	2.06	0.21	0.04	5.7	0.00
23.02	1.84	27.57	286.15	462.93	0.560	1.50	2.00	0.20	0.04	5.6	0.00
23.04	1.726	25.33	286.35	463.32	0.560	1.47	2.01	0.20	0.04	5.6	0.00
23.06	1.57	22.66	286.55	463.72	0.560	1.44	2.05	0.20	0.04	5.6	0.00

23.08	1.445	20	286.75	464.11	0.559	1.38	2.04	0.20	0.04	5.5	0.00
23.1	1.449	19.57	286.94	464.5	0.559	1.35	1.99	0.20	0.04	5.5	0.00
23.12	1.433	18.72	287.13	464.89	0.559	1.31	1.93	0.20	0.04	5.4	0.00
23.14	1.35	20	287.33	465.28	0.559	1.48	2.26	0.21	0.04	5.8	0.00
23.16	1.251	20.84	287.52	465.67	0.559	1.67	2.65	0.23	0.04	6.3	0.00
23.18	1.224	21.54	287.70	466.05	0.559	1.76	2.84	0.24	0.04	6.6	0.00
23.2	1.274	22.94	287.90	466.44	0.558	1.80	2.84	0.24	0.04	6.6	0.00
23.22	1.319	24.07	288.09	466.83	0.558	1.82	2.82	0.24	0.04	6.7	0.00
23.24	1.357	25.47	288.28	467.21	0.558	1.88	2.86	0.25	0.04	6.8	0.00
23.26	1.395	29.11	288.47	467.6	0.558	2.09	3.14	0.26	0.04	7.2	0.00
23.28	1.483	23.79	288.67	468	0.558	1.60	2.34	0.22	0.04	6.0	0.00
23.3	1.548	16.81	288.87	468.39	0.558	1.09	1.56	0.18	0.04	4.9	0.00
23.32	1.673	18.72	289.06	468.78	0.557	1.12	1.55	0.18	0.04	5.0	0.00
23.34	1.772	18.72	289.26	469.18	0.557	1.06	1.44	0.18	0.04	4.8	0.00
23.36	1.719	19.79	289.46	469.57	0.557	1.15	1.58	0.18	0.04	5.0	0.00
23.38	1.414	21.4	289.65	469.96	0.557	1.51	2.27	0.22	0.04	5.9	0.00
23.4	1.266	21.4	289.85	470.35	0.557	1.69	2.69	0.24	0.04	6.4	0.00
23.42	1.274	20.28	290.04	470.74	0.557	1.59	2.52	0.23	0.04	6.2	0.00
23.44	1.274	20.56	290.23	471.13	0.556	1.61	2.56	0.23	0.04	6.3	0.00
23.46	1.281	21.82	290.42	471.51	0.556	1.70	2.70	0.24	0.04	6.5	0.00
23.48	1.369	16.17	290.61	471.9	0.556	1.18	1.80	0.19	0.04	5.3	0.00
23.5	1.441	18.94	290.81	472.29	0.556	1.31	1.96	0.20	0.04	5.5	0.00
23.52	1.468	19.57	291.00	472.68	0.556	1.33	1.97	0.20	0.04	5.5	0.00
23.54	1.51	20	291.19	473.07	0.556	1.32	1.93	0.20	0.04	5.5	0.00
23.56	1.407	19.36	291.39	473.46	0.556	1.38	2.07	0.21	0.04	5.7	0.00
23.58	1.319	20	291.58	473.85	0.555	1.52	2.37	0.22	0.04	6.0	0.00
23.6	1.346	18.3	291.77	474.24	0.555	1.36	2.10	0.21	0.04	5.7	0.00
23.62	1.342	17.45	291.96	474.62	0.555	1.30	2.01	0.20	0.04	5.6	0.00
23.64	1.361	19.79	292.15	475.01	0.555	1.45	2.23	0.21	0.04	5.9	0.00
23.66	1.369	20.98	292.35	475.4	0.555	1.53	2.35	0.22	0.04	6.1	0.00
23.68	1.361	21.96	292.54	475.79	0.555	1.61	2.48	0.23	0.04	6.3	0.00
23.7	1.327	22.24	292.72	476.17	0.554	1.68	2.61	0.23	0.04	6.4	0.00
23.72	1.327	22.38	292.92	476.56	0.554	1.69	2.63	0.24	0.04	6.5	0.00
23.74	1.312	21.54	293.11	476.95	0.554	1.64	2.58	0.23	0.04	6.4	0.00
23.76	1.327	21.26	293.29	477.33	0.554	1.60	2.50	0.23	0.04	6.3	0.00
23.78	1.357	22.1	293.49	477.72	0.554	1.63	2.51	0.23	0.04	6.3	0.00
23.8	1.346	21.82	293.68	478.11	0.554	1.62	2.51	0.23	0.04	6.3	0.00
23.82	1.323	21.4	293.87	478.49	0.553	1.62	2.53	0.23	0.04	6.3	0.00
23.84	1.312	21.68	294.06	478.88	0.553	1.65	2.60	0.23	0.04	6.4	0.00
23.86	1.312	16.17	294.25	479.27	0.553	1.23	1.94	0.20	0.04	5.5	0.00
23.88	1.312	20	294.44	479.65	0.553	1.52	2.40	0.22	0.04	6.2	0.00
23.9	1.316	20.7	294.63	480.04	0.553	1.57	2.48	0.23	0.04	6.3	0.00
23.92	1.342	23.93	294.82	480.43	0.553	1.78	2.78	0.25	0.04	6.8	0.00
23.94	1.38	24.35	295.02	480.82	0.552	1.76	2.71	0.24	0.04	6.7	0.00
23.96	1.593	25.47	295.21	481.21	0.552	1.60	2.29	0.22	0.04	6.1	0.00
23.98	1.544	25.61	295.41	481.6	0.552	1.66	2.41	0.23	0.04	6.3	0.00
24	1.487	24.91	295.60	481.99	0.552	1.68	2.48	0.23	0.04	6.4	0.00
24.02	1.479	24.49	295.79	482.38	0.552	1.66	2.46	0.23	0.04	6.4	0.00
24.04	1.395	23.79	295.99	482.77	0.552	1.71	2.61	0.24	0.04	6.6	0.00
24.06	1.376	22.8	296.18	483.16	0.552	1.66	2.55	0.23	0.04	6.5	0.00
24.08	1.388	21.68	296.38	483.55	0.551	1.56	2.40	0.23	0.04	6.2	0.00
24.1	1.384	20.7	296.57	483.94	0.551	1.50	2.30	0.22	0.04	6.1	0.00
24.12	1.411	21.4	296.76	484.33	0.551	1.52	2.31	0.22	0.04	6.1	0.00
24.14	1.411	20.56	296.95	484.71	0.551	1.46	2.22	0.22	0.04	6.0	0.00
24.16	1.422	20.98	297.14	485.1	0.551	1.48	2.24	0.22	0.04	6.0	0.00
24.18	1.433	22.24	297.33	485.49	0.551	1.55	2.35	0.22	0.04	6.2	0.00
24.2	1.433	23.08	297.53	485.88	0.550	1.61	2.44	0.23	0.04	6.3	0.00
24.22	1.422	21.82	297.72	486.27	0.550	1.53	2.33	0.22	0.04	6.2	0.00
24.24	1.395	21.54	297.92	486.66	0.550	1.54	2.37	0.23	0.04	6.2	0.00
24.26	1.43	21.54	298.11	487.05	0.550	1.51	2.28	0.22	0.04	6.1	0.00
24.28	1.502	21.4	298.30	487.44	0.550	1.42	2.11	0.21	0.04	5.9	0.00
24.3	1.506	23.22	298.50	487.83	0.550	1.54	2.28	0.22	0.04	6.2	0.00
24.32	1.433	24.49	298.69	488.22	0.549	1.71	2.59	0.24	0.04	6.6	0.00
24.34	1.392	22.66	298.88	488.61	0.549	1.63	2.51	0.23	0.04	6.5	0.00
24.36	1.399	23.08	299.08	489	0.549	1.65	2.54	0.24	0.04	6.5	0.00
24.38	1.483	23.5	299.27	489.39	0.549	1.58	2.37	0.23	0.04	6.3	0.00
24.4	1.544	21.82	299.47	489.78	0.549	1.41	2.07	0.21	0.04	5.9	0.00
24.42	1.54	22.24	299.67	490.18	0.549	1.44	2.12	0.22	0.04	5.9	0.00
24.44	1.513	22.52	299.86	490.57	0.548	1.49	2.20	0.22	0.04	6.1	0.00
24.46	1.54	22.38	300.06	490.96	0.548	1.45	2.13	0.22	0.04	6.0	0.00
24.48	1.529	22.1	300.25	491.35	0.548	1.45	2.13	0.22	0.04	6.0	0.00
24.5	1.456	22.1	300.45	491.74	0.548	1.52	2.29	0.23	0.04	6.2	0.00
24.52	1.445	21.82	300.64	492.13	0.548	1.51	2.29	0.23	0.04	6.2	0.00
24.54	1.433	22.38	300.83	492.52	0.548	1.56	2.38	0.23	0.04	6.4	0.00
24.56	1.456	22.94	301.03	492.91	0.548	1.58	2.38	0.23	0.04	6.4	0.00
24.58	1.475	22.24	301.22	493.3	0.547	1.51	2.27	0.22	0.04	6.2	0.00
24.6	1.487	23.36	301.41	493.69	0.547	1.57	2.35	0.23	0.04	6.3	0.00
24.62	1.506	24.63	301.62	494.09	0.547	1.64	2.43	0.23	0.04	6.5	0.00
24.64	1.559	21.96	301.81	494.48	0.547	1.41	2.06	0.21	0.04	5.9	0.00
24.66	1.578	23.5	302.01	494.87	0.547	1.49	2.17	0.22	0.04	6.1	0.00
24.68	1.593	24.07	302.20	495.26	0.547	1.51	2.19	0.22	0.04	6.1	0.00
24.7	1.616	23.5	302.40	495.66	0.546	1.45	2.10	0.22	0.04	6.0	0.00
24.72	1.601	24.07	302.60	496.05	0.546	1.50	2.18	0.22	0.04	6.1	0.00
24.74	1.502	24.77	302.79	496.44	0.546	1.65	2.46	0.24	0.04	6.5	0.00

24.76	1.49	26.59	302.98	496.83	0.546	1.78	2.68	0.25	0.04	6.9	0.00
24.78	1.532	24.63	303.19	497.23	0.546	1.61	2.38	0.23	0.04	6.4	0.00
24.8	1.563	24.49	303.38	497.62	0.546	1.57	2.30	0.23	0.04	6.3	0.00
24.82	1.574	26.31	303.58	498.01	0.545	1.67	2.45	0.24	0.04	6.6	0.00
24.84	1.555	27.43	303.77	498.4	0.545	1.76	2.60	0.25	0.04	6.8	0.00
24.86	1.525	28.13	303.97	498.8	0.545	1.84	2.74	0.25	0.04	7.0	0.00
24.88	1.483	28.27	304.17	499.19	0.545	1.91	2.87	0.26	0.04	7.2	0.00
24.9	1.529	42.57	304.36	499.58	0.545	2.78	4.14	0.35	0.04	9.8	0.00
24.92	1.548		304.55	499.97	0.545	0.00	0.06	0.12	0.04	3.4	0.00
24.94	1.586		304.75	500.36	0.544	0.00	0.06	0.12	0.04	3.4	0.00
24.96	1.627		304.94	500.75	0.544	0.00	0.06	0.12	0.04	3.4	0.00
24.98	1.631		305.14	501.14	0.544	0.00	0.06	0.12	0.04	3.4	0.00
25	1.897		305.33	501.53	0.544	0.00	0.06	0.12	0.04	3.4	0.00
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Spreadsheet Template for Calculating CRR, CSR, Factor of Safety (FS), and Probability of Liquefaction (P_L) based on CPT Measurements

The method implemented in this spreadsheet is applicable to evaluating liquefaction potentail of sandy and silty soils.
For soils above groundwater table, no liquefaction is implied, which is implemented by assigning CSR = 0.01.
Refer to Juang et al. (2001) for details.
By using this speadsheet, the user agrees to assume full risk/responsibility in interpreting the results.
Spreasheet prepared by H. Yuan and C.H. Juang - May 2002

Note: All input data are marked in yellow.

Enter earthquake data: a_{max}, M_w and water table depth

a_{max} (peak horizontal ground acceleration) (g)	0.11
M_w (earthquake magnitude)	6
Calculated MSF (magnitude scaling factor) =	1.77
Water Table Depth (m)	0

CPT 108

Input Data					Intermediate parameters			Results of the Analysis			
Depth (m)	q_c(Mpa)	f_s (kPa)	σ'_v (kPa)	σ_v (kPa)	r_d	R_f (%)	F(%)	CRR	CSR	F_S	P_L
0.02	0.179	25.89	0.21	0.41	1.000	14.46	14.50	0.44	0.08	5.7	0.00
0.04	1.118	39.07	0.44	0.83	1.000	3.49	3.50	0.18	0.08	2.4	0.02
0.06	6.195	69.35	0.66	1.25	1.000	1.12	1.12	0.38	0.08	4.9	0.00
0.08	8.244	51.54	0.89	1.67	0.999	0.63	0.63	0.50	0.08	6.5	0.00
0.1	9.398	51.68	1.12	2.1	0.999	0.55	0.55	0.76	0.08	10.0	0.00
0.12	9.857	41.17	1.35	2.53	0.999	0.42	0.42	0.90	0.08	11.9	0.00
0.14	11.464	50.28	1.59	2.96	0.999	0.44	0.44	1.00	0.08	13.3	0.00
0.16	12.135	68.22	1.83	3.4	0.999	0.56	0.56	1.00	0.07	13.3	0.00
0.18	12.004	69.35	2.06	3.83	0.999	0.58	0.58	1.00	0.07	13.4	0.00
0.2	10.813	87.71	2.31	4.27	0.998	0.81	0.81	1.00	0.07	13.4	0.00
0.22	11.121	83.93	2.54	4.7	0.998	0.75	0.76	1.00	0.07	13.4	0.00
0.24	10.331	110.14	2.79	5.14	0.998	1.07	1.07	1.00	0.07	13.4	0.00
0.26	11.437	101.59	3.03	5.58	0.998	0.89	0.89	1.00	0.07	13.5	0.00
0.28	12.123	110.7	3.27	6.02	0.998	0.91	0.91	1.00	0.07	13.5	0.00
0.3	13.626	136.78	3.51	6.45	0.998	1.00	1.00	1.00	0.07	13.5	0.00
0.32	13.592	142.1	3.75	6.89	0.998	1.05	1.05	1.00	0.07	13.5	0.00
0.34	13.125	144.21	3.99	7.33	0.997	1.10	1.10	1.00	0.07	13.5	0.00
0.36	12.027	160.47	4.24	7.77	0.997	1.33	1.34	1.00	0.07	13.5	0.00
0.38	13.541	70.75	4.48	8.21	0.997	0.52	0.52	1.00	0.07	13.6	0.00
0.4	14.212	77.2	4.73	8.65	0.997	0.54	0.54	1.00	0.07	13.6	0.00
0.42	15.95	131.31	4.97	9.09	0.997	0.82	0.82	1.00	0.07	13.6	0.00
0.44	18.158	132.85	5.21	9.53	0.997	0.73	0.73	1.00	0.07	13.6	0.00
0.46	18.809	163.27	5.46	9.97	0.996	0.87	0.87	1.00	0.07	13.6	0.00
0.48	19.306	199.3	5.70	10.41	0.996	1.03	1.03	1.00	0.07	13.6	0.00
0.5	18.782	253.13	5.95	10.85	0.996	1.35	1.35	1.00	0.07	13.6	0.00
0.52	18.663	196.22	6.19	11.29	0.996	1.05	1.05	1.00	0.07	13.6	0.00
0.54	17.21	158.93	6.43	11.73	0.996	0.92	0.92	1.00	0.07	13.6	0.00
0.56	15.969	165.09	6.68	12.17	0.996	1.03	1.03	1.00	0.07	13.6	0.00
0.58	16.343	145.89	6.92	12.61	0.996	0.89	0.89	1.00	0.07	13.6	0.00
0.6	15.684	160.89	7.16	13.05	0.995	1.03	1.03	1.00	0.07	13.7	0.00
0.62	15.279	229.41	7.41	13.49	0.995	1.50	1.50	1.00	0.07	13.7	0.00
0.64	17.503	122.34	7.65	13.93	0.995	0.70	0.70	1.00	0.07	13.7	0.00
0.66	13.067	139.3	7.90	14.37	0.995	1.07	1.07	1.00	0.07	13.7	0.00
0.68	13.437	155	8.14	14.81	0.995	1.15	1.15	1.00	0.07	13.7	0.00
0.7	12.582	162.85	8.38	15.25	0.995	1.29	1.30	1.00	0.07	13.7	0.00
0.72	12.008	138.04	8.63	15.69	0.994	1.15	1.15	1.00	0.07	13.7	0.00
0.74	11.881	123.04	8.87	16.13	0.994	1.04	1.04	1.00	0.07	13.7	0.00
0.76	10.948	106.64	9.10	16.56	0.994	0.97	0.98	1.00	0.07	13.7	0.00
0.78	10.52	95.28	9.35	17	0.994	0.91	0.91	1.00	0.07	13.7	0.00
0.8	9.938	76.78	9.58	17.43	0.994	0.77	0.77	0.92	0.07	12.6	0.00
0.82	9.124	72.85	9.82	17.86	0.994	0.80	0.80	0.72	0.07	9.8	0.00
0.84	8.287	66.54	10.05	18.29	0.994	0.80	0.80	0.57	0.07	7.8	0.00
0.86	8.63	69.21	10.27	18.71	0.993	0.80	0.80	0.63	0.07	8.6	0.00
0.88	9.109	39.77	10.51	19.14	0.993	0.44	0.44	0.68	0.07	9.3	0.00
0.9	8.101	55.47	10.73	19.56	0.993	0.68	0.69	0.49	0.07	6.7	0.00
0.92	7.468	79.58	10.95	19.98	0.993	1.07	1.07	0.54	0.07	7.4	0.00
0.94	6.21	78.04	11.18	20.4	0.993	1.26	1.26	0.41	0.07	5.5	0.00
0.96	5.655	105.37	11.40	20.82	0.993	1.86	1.87	0.44	0.07	6.0	0.00
0.98	5.311	102.85	11.61	21.22	0.993	1.94	1.94	0.40	0.07	5.5	0.00
1	3.775	90.23	11.82	21.63	0.992	2.39	2.40	0.28	0.07	3.8	0.00
1.02	2.695	69.35	12.01	22.02	0.992	2.57	2.59	0.21	0.07	2.9	0.01
1.04	2.077	59.11	12.21	22.41	0.992	2.85	2.88	0.19	0.07	2.6	0.01
1.06	1.133	50	12.39	22.79	0.992	4.41	4.50	0.26	0.07	3.5	0.00
1.08	0.996	45.37	12.60	23.19	0.992	4.56	4.66	0.25	0.07	3.4	0.00
1.1	1.042	34.3	12.79	23.58	0.992	3.29	3.37	0.17	0.07	2.3	0.02
1.12	0.951	31.92	12.98	23.97	0.991	3.36	3.44	0.17	0.07	2.3	0.02
1.14	0.677	29.11	13.17	24.35	0.991	4.30	4.46	0.21	0.07	2.8	0.01
1.16	0.696	28.55	13.36	24.74	0.991	4.10	4.25	0.20	0.07	2.7	0.01
1.18	0.772	24.35	13.54	25.12	0.991	3.15	3.26	0.15	0.07	2.1	0.03
1.2	0.76	24.49	13.72	25.49	0.991	3.22	3.33	0.16	0.07	2.1	0.03
1.22	0.719	24.35	13.90	25.87	0.991	3.39	3.51	0.16	0.07	2.2	0.02

1.24	0.677	19.79	14.09	26.25	0.991	2.92	3.04	0.14	0.07	1.9	0.05
1.26	0.631	18.09	14.27	26.63	0.990	2.87	2.99	0.14	0.07	1.8	0.05
1.28	0.582	18.51	14.44	27	0.990	3.18	3.34	0.15	0.07	2.0	0.04
1.3	0.559	19.15	14.63	27.38	0.990	3.43	3.60	0.16	0.07	2.1	0.03
1.32	0.559	17.87	14.80	27.75	0.990	3.20	3.36	0.15	0.07	2.0	0.04
1.34	0.563	16.17	14.97	28.12	0.990	2.87	3.02	0.13	0.08	1.8	0.06
1.36	0.498	15.53	15.15	28.49	0.990	3.12	3.31	0.14	0.08	1.9	0.05
1.38	0.464	15.53	15.32	28.86	0.989	3.35	3.57	0.15	0.08	2.0	0.04
1.4	0.46	14.47	15.49	29.22	0.989	3.15	3.36	0.14	0.08	1.9	0.05
1.42	0.46	13.62	15.66	29.59	0.989	2.96	3.16	0.13	0.08	1.8	0.06
1.44	0.449	12.55	15.83	29.96	0.989	2.80	2.99	0.13	0.08	1.7	0.07
1.46	0.452	12.34	16.00	30.32	0.989	2.73	2.93	0.13	0.08	1.7	0.08
1.48	0.426	10.85	16.16	30.68	0.989	2.55	2.74	0.12	0.08	1.6	0.10
1.5	0.395	13.62	16.34	31.05	0.989	3.45	3.74	0.15	0.08	2.0	0.04
1.52	0.388	12.55	16.50	31.41	0.988	3.23	3.52	0.14	0.08	1.9	0.05
1.54	0.392	19.79	16.67	31.78	0.988	5.05	5.49	0.22	0.08	2.9	0.01
1.56	0.395	18.72	16.85	32.15	0.988	4.74	5.16	0.20	0.08	2.7	0.01
1.58	0.548	16.6	17.01	32.51	0.988	3.03	3.22	0.14	0.08	1.8	0.05
1.6	0.673	15.32	17.18	32.88	0.988	2.28	2.39	0.12	0.08	1.5	0.11
1.62	0.525	14.47	17.36	33.25	0.988	2.76	2.94	0.13	0.08	1.7	0.07
1.64	0.376	22.94	17.54	33.63	0.987	6.10	6.70	0.27	0.08	3.6	0.00
1.66	0.441	26.45	17.73	34.01	0.987	6.00	6.50	0.28	0.08	3.7	0.00
1.68	0.837	21.82	17.90	34.38	0.987	2.61	2.72	0.13	0.08	1.7	0.07
1.7	1.042	23.08	18.08	34.76	0.987	2.21	2.29	0.12	0.08	1.6	0.09
1.72	0.795	25.33	18.26	35.13	0.987	3.19	3.33	0.16	0.08	2.1	0.03
1.74	0.536	25.05	18.44	35.51	0.987	4.67	5.01	0.22	0.08	2.9	0.01
1.76	0.422	21.96	18.61	35.88	0.987	5.20	5.69	0.23	0.08	3.0	0.01
1.78	0.529	19.15	18.79	36.25	0.986	3.62	3.89	0.17	0.08	2.2	0.03
1.8	0.468	15.32	18.96	36.62	0.986	3.27	3.55	0.15	0.08	1.9	0.04
1.82	0.354	15.74	19.13	36.98	0.986	4.45	4.96	0.19	0.08	2.4	0.02
1.84	0.342	12.55	19.29	37.34	0.986	3.67	4.12	0.16	0.08	2.0	0.03
1.86	0.403	12.55	19.45	37.7	0.986	3.11	3.44	0.14	0.08	1.8	0.05
1.88	0.38	5.53	19.63	38.07	0.986	1.46	1.62	0.09	0.08	1.2	0.30
1.9	0.384	8.51	19.79	38.43	0.985	2.22	2.46	0.11	0.08	1.4	0.14
1.92	0.445	10.85	19.95	38.79	0.985	2.44	2.67	0.12	0.08	1.5	0.11
1.94	0.445	14.89	20.13	39.16	0.985	3.35	3.67	0.15	0.08	1.9	0.04
1.96	0.369	15.11	20.30	39.53	0.985	4.09	4.59	0.18	0.08	2.3	0.02
1.98	0.726	14.89	20.48	39.9	0.985	2.05	2.17	0.11	0.08	1.4	0.15
2	0.7	12.77	20.65	40.27	0.985	1.82	1.94	0.10	0.08	1.3	0.19
2.02	0.551	13.19	20.82	40.64	0.985	2.39	2.58	0.12	0.08	1.5	0.11
2.04	0.376	12.55	21.00	41.01	0.984	3.34	3.75	0.15	0.08	1.9	0.04
2.06	0.361	7.02	21.16	41.37	0.984	1.94	2.20	0.10	0.08	1.3	0.19
2.08	0.399	5.32	21.33	41.73	0.984	1.33	1.49	0.09	0.08	1.1	0.34
2.1	0.392	4.89	21.49	42.09	0.984	1.25	1.40	0.08	0.08	1.1	0.37
2.12	0.342	5.11	21.66	42.46	0.984	1.49	1.71	0.09	0.08	1.2	0.30
2.14	0.308	5.11	21.84	42.83	0.984	1.66	1.93	0.09	0.08	1.2	0.26
2.16	0.487	13.62	22.01	43.2	0.983	2.80	3.07	0.13	0.08	1.7	0.07
2.18	0.973	17.66	22.19	43.58	0.983	1.82	1.90	0.11	0.08	1.4	0.17
2.2	1.076	17.45	22.38	43.96	0.983	1.62	1.69	0.10	0.08	1.3	0.20
2.22	0.753	16.17	22.55	44.33	0.983	2.15	2.28	0.11	0.08	1.5	0.13
2.24	0.578	16.17	22.74	44.71	0.983	2.80	3.03	0.14	0.08	1.7	0.07
2.26	0.35	12.34	22.90	45.07	0.983	3.53	4.05	0.15	0.08	2.0	0.04
2.28	0.27	10.64	23.07	45.44	0.983	3.94	4.74	0.16	0.08	2.1	0.03
2.3	0.259	4.47	23.23	45.79	0.982	1.73	2.10	0.10	0.08	1.2	0.24
2.32	0.278	4.26	23.38	46.14	0.982	1.53	1.84	0.09	0.08	1.2	0.29
2.34	0.293	4.26	23.54	46.5	0.982	1.45	1.73	0.09	0.08	1.2	0.31
2.36	0.316	4.47	23.70	46.85	0.982	1.41	1.66	0.09	0.08	1.1	0.32
2.38	0.338	4.26	23.85	47.2	0.982	1.26	1.46	0.09	0.08	1.1	0.36
2.4	0.297	4.26	24.03	47.57	0.982	1.43	1.71	0.09	0.08	1.1	0.31
2.42	0.262	4.26	24.18	47.92	0.981	1.63	1.99	0.09	0.08	1.2	0.26
2.44	0.346	4.26	24.34	48.28	0.981	1.23	1.43	0.08	0.08	1.1	0.37
2.46	1.061	10.64	24.51	48.64	0.981	1.00	1.05	0.08	0.08	1.1	0.39
2.48	2.062	21.54	24.71	49.04	0.981	1.04	1.07	0.11	0.08	1.3	0.18
2.5	1.924	27.85	24.91	49.43	0.981	1.45	1.49	0.12	0.08	1.5	0.13
2.52	1.483	34.44	25.11	49.83	0.981	2.32	2.40	0.14	0.08	1.8	0.06
2.54	1.019	33.18	25.30	50.22	0.981	3.26	3.42	0.17	0.08	2.2	0.02
2.56	0.707	29.53	25.50	50.61	0.980	4.18	4.50	0.21	0.08	2.7	0.01
2.58	0.574	25.33	25.67	50.98	0.980	4.41	4.84	0.22	0.08	2.7	0.01
2.6	0.475	21.82	25.84	51.35	0.980	4.59	5.15	0.22	0.08	2.7	0.01
2.62	0.323	16.81	26.02	51.72	0.980	5.20	6.20	0.23	0.08	2.9	0.01
2.64	0.285	8.72	26.17	52.07	0.980	3.06	3.74	0.14	0.08	1.7	0.06
2.66	0.289	2.98	26.34	52.43	0.980	1.03	1.26	0.08	0.08	1.0	0.43
2.68	0.297	3.4	26.49	52.78	0.979	1.14	1.39	0.08	0.08	1.1	0.39
2.7	0.281	2.77	26.64	53.13	0.979	0.99	1.22	0.08	0.08	1.0	0.45
2.72	0.278	2.77	26.80	53.48	0.979	1.00	1.23	0.08	0.08	1.0	0.44
2.74	0.293	3.62	26.96	53.84	0.979	1.24	1.51	0.09	0.08	1.1	0.37
2.76	0.338	2.77	27.11	54.19	0.979	0.82	0.98	0.08	0.08	1.0	0.51
2.78	0.369	3.19	27.27	54.54	0.979	0.86	1.01	0.08	0.08	1.0	0.50
2.8	0.354	7.23	27.43	54.9	0.979	2.04	2.42	0.11	0.08	1.4	0.17
2.82	0.278	6.17	27.60	55.26	0.978	2.22	2.77	0.11	0.08	1.4	0.15
2.84	0.312	4.47	27.76	55.62	0.978	1.43	1.74	0.09	0.08	1.1	0.31
2.86	0.407	2.13	27.91	55.97	0.978	0.52	0.61	0.07	0.08	0.9	0.62
2.88	0.46	2.34	28.08	56.33	0.978	0.51	0.58	0.07	0.08	0.9	0.63
2.9	0.319	5.96	28.25	56.7	0.978	1.87	2.27	0.10	0.08	1.3	0.21

2.92	0.331	7.23	28.42	57.07	0.978	2.18	2.64	0.11	0.08	1.4	0.15
2.94	0.582	8.51	28.61	57.45	0.978	1.46	1.62	0.09	0.08	1.2	0.30
2.96	1.11	11.91	28.79	57.83	0.977	1.07	1.13	0.09	0.08	1.1	0.38
2.98	1.015	17.45	28.98	58.21	0.977	1.72	1.82	0.10	0.08	1.3	0.20
3	0.92	26.17	29.17	58.6	0.977	2.84	3.04	0.15	0.08	1.9	0.05
3.02	1.053	25.19	29.36	58.99	0.977	2.39	2.53	0.13	0.08	1.6	0.08
3.04	1.103	23.64	29.55	59.37	0.977	2.14	2.27	0.12	0.08	1.5	0.11
3.06	0.909	22.8	29.73	59.75	0.977	2.51	2.68	0.13	0.08	1.7	0.08
3.08	0.673	19.36	29.93	60.14	0.976	2.88	3.16	0.14	0.08	1.8	0.06
3.1	0.536	16.6	30.11	60.52	0.976	3.10	3.49	0.15	0.08	1.9	0.05
3.12	0.772	20.14	30.30	60.91	0.976	2.61	2.83	0.13	0.08	1.7	0.08
3.14	1.023	25.75	30.49	61.29	0.976	2.52	2.68	0.13	0.08	1.7	0.07
3.16	1.099	24.35	30.67	61.67	0.976	2.22	2.35	0.12	0.08	1.5	0.10
3.18	1.053	23.64	30.85	62.05	0.976	2.25	2.39	0.12	0.08	1.6	0.10
3.2	0.76	22.8	31.04	62.43	0.976	3.00	3.27	0.15	0.08	1.9	0.05
3.22	0.559	23.93	31.22	62.81	0.975	4.28	4.82	0.21	0.08	2.6	0.01
3.24	0.414	19.36	31.41	63.19	0.975	4.68	5.52	0.21	0.08	2.7	0.01
3.26	0.559	17.02	31.58	63.56	0.975	3.04	3.44	0.15	0.08	1.8	0.05
3.28	0.7	19.15	31.76	63.94	0.975	2.74	3.01	0.14	0.08	1.7	0.07
3.3	0.62	20.28	31.95	64.32	0.975	3.27	3.65	0.16	0.08	2.0	0.04
3.32	0.863	22.38	32.14	64.71	0.975	2.59	2.80	0.13	0.08	1.7	0.07
3.34	1.297	23.93	32.33	65.1	0.974	1.85	1.94	0.11	0.08	1.4	0.15
3.36	1.251	27.15	32.54	65.5	0.974	2.17	2.29	0.12	0.08	1.6	0.10
3.38	1.479	28.97	32.73	65.89	0.974	1.96	2.05	0.12	0.08	1.5	0.12
3.4	1.753	28.83	32.94	66.29	0.974	1.64	1.71	0.11	0.08	1.4	0.14
3.42	1.43	32.76	33.13	66.68	0.974	2.29	2.40	0.13	0.08	1.7	0.08
3.44	1.08	31.36	33.32	67.07	0.974	2.90	3.10	0.15	0.08	1.9	0.04
3.46	0.909	28.41	33.52	67.46	0.974	3.13	3.38	0.16	0.08	2.0	0.03
3.48	0.871	25.61	33.70	67.84	0.973	2.94	3.19	0.15	0.08	1.9	0.05
3.5	0.654	20.28	33.89	68.22	0.973	3.10	3.46	0.15	0.08	1.9	0.04
3.52	0.449	14.89	34.06	68.59	0.973	3.32	3.91	0.15	0.08	2.0	0.04
3.54	0.316	8.94	34.22	68.95	0.973	2.83	3.62	0.13	0.08	1.7	0.07
3.56	0.319	7.45	34.39	69.31	0.973	2.34	2.98	0.12	0.08	1.5	0.12
3.58	0.312	2.55	34.55	69.67	0.973	0.82	1.05	0.08	0.08	1.0	0.49
3.6	0.3	4.04	34.72	70.04	0.972	1.35	1.76	0.09	0.08	1.1	0.32
3.62	0.308	4.68	34.89	70.4	0.972	1.52	1.97	0.09	0.08	1.2	0.27
3.64	0.715	7.66	35.06	70.77	0.972	1.07	1.19	0.08	0.08	1.0	0.42
3.66	1.833	9.57	35.24	71.14	0.972	0.52	0.54	0.08	0.08	1.0	0.44
3.68	2.232	11.28	35.42	71.52	0.972	0.51	0.52	0.09	0.08	1.1	0.37
3.7	2.452	12.77	35.61	71.91	0.972	0.52	0.54	0.09	0.08	1.1	0.32
3.72	2.56	15.74	35.80	72.29	0.972	0.61	0.63	0.09	0.08	1.2	0.27
3.74	2.463	22.8	35.99	72.68	0.971	0.93	0.95	0.10	0.08	1.3	0.21
3.76	2.235	32.9	36.17	73.06	0.971	1.47	1.52	0.12	0.08	1.5	0.13
3.78	1.863	28.97	36.38	73.46	0.971	1.56	1.62	0.11	0.08	1.4	0.16
3.8	1.304	22.66	36.58	73.86	0.971	1.74	1.84	0.11	0.08	1.4	0.18
3.82	0.863	20.42	36.79	74.26	0.971	2.37	2.59	0.12	0.08	1.6	0.10
3.84	0.65	17.23	36.99	74.66	0.971	2.65	2.99	0.13	0.08	1.7	0.07
3.86	0.665	4.89	37.16	75.03	0.970	0.74	0.83	0.07	0.08	0.9	0.54
3.88	1.76	13.83	37.36	75.42	0.970	0.79	0.82	0.08	0.08	1.1	0.38
3.9	2.181	22.1	37.56	75.82	0.970	1.01	1.05	0.10	0.08	1.2	0.24
3.92	1.837	23.64	37.76	76.22	0.970	1.29	1.34	0.10	0.08	1.3	0.22
3.94	1.365	22.24	37.96	76.61	0.970	1.63	1.73	0.10	0.08	1.3	0.19
3.96	0.981	22.1	38.15	77	0.970	2.25	2.44	0.12	0.08	1.5	0.11
3.98	0.726	17.66	38.35	77.39	0.970	2.43	2.72	0.13	0.08	1.6	0.09
4	0.548	10.85	38.53	77.77	0.969	1.98	2.31	0.11	0.08	1.4	0.17
4.02	0.494	11.06	38.70	78.14	0.969	2.24	2.66	0.12	0.08	1.5	0.13
4.04	0.471	4.89	38.87	78.5	0.969	1.04	1.25	0.08	0.08	1.0	0.42
4.06	0.388	4.47	39.04	78.87	0.969	1.15	1.45	0.09	0.08	1.1	0.37
4.08	0.388	9.15	39.22	79.24	0.969	2.36	2.96	0.12	0.08	1.5	0.11
4.1	0.529	5.53	39.38	79.6	0.969	1.05	1.23	0.08	0.08	1.0	0.42
4.12	0.643	6.17	39.55	79.97	0.968	0.96	1.10	0.08	0.08	1.0	0.45
4.14	0.646	7.23	39.74	80.35	0.968	1.12	1.28	0.08	0.08	1.1	0.39
4.16	0.506	10.85	39.92	80.73	0.968	2.14	2.55	0.11	0.08	1.4	0.14
4.18	0.715	21.68	40.10	81.11	0.968	3.03	3.42	0.15	0.08	1.9	0.04
4.2	1.395	24.21	40.30	81.5	0.968	1.74	1.84	0.11	0.08	1.4	0.17
4.22	1.365	21.54	40.48	81.88	0.968	1.58	1.68	0.10	0.08	1.3	0.21
4.24	1.095	20	40.68	82.27	0.968	1.83	1.97	0.11	0.08	1.4	0.17
4.26	0.821	18.94	40.86	82.65	0.967	2.31	2.57	0.12	0.08	1.5	0.10
4.28	0.532	16.17	41.04	83.03	0.967	3.04	3.60	0.15	0.08	1.9	0.05
4.3	0.414	18.94	41.22	83.4	0.967	4.57	5.73	0.21	0.08	2.7	0.01
4.32	0.411	8.51	41.39	83.77	0.967	2.07	2.60	0.11	0.08	1.4	0.15
4.34	0.452	4.47	41.55	84.13	0.967	0.99	1.22	0.08	0.08	1.0	0.43
4.36	0.479	7.23	41.74	84.51	0.967	1.51	1.83	0.10	0.08	1.2	0.27
4.38	0.494	16.81	41.92	84.89	0.966	3.40	4.11	0.16	0.08	2.0	0.03
4.4	0.901	22.52	42.11	85.27	0.966	2.50	2.76	0.13	0.08	1.7	0.08
4.42	1.395	21.96	42.29	85.65	0.966	1.57	1.68	0.10	0.08	1.3	0.21
4.44	1.042	15.11	42.47	86.03	0.966	1.45	1.58	0.09	0.08	1.2	0.27
4.46	0.745	14.68	42.66	86.41	0.966	1.97	2.23	0.11	0.08	1.4	0.16
4.48	0.487	10.21	42.83	86.78	0.966	2.10	2.55	0.11	0.08	1.4	0.14
4.5	0.335	20.84	43.02	87.16	0.966	6.22	8.41	0.29	0.08	3.7	0.00
4.52	0.403	18.3	43.19	87.53	0.965	4.54	5.80	0.21	0.08	2.7	0.01
4.54	0.787	11.06	43.36	87.9	0.965	1.41	1.58	0.09	0.08	1.2	0.29
4.56	1.004	10.64	43.55	88.28	0.965	1.06	1.16	0.08	0.08	1.1	0.40
4.58	0.719	12.55	43.74	88.67	0.965	1.75	1.99	0.10	0.08	1.3	0.21

4.6	0.525	13.62	43.93	89.06	0.965	2.59	3.12	0.13	0.08	1.7	0.08
4.62	1.156	15.53	44.13	89.45	0.965	1.34	1.46	0.09	0.08	1.2	0.29
4.64	2.031	17.66	44.33	89.85	0.965	0.87	0.91	0.09	0.08	1.1	0.33
4.66	2.031	20.14	44.54	90.25	0.964	0.99	1.04	0.09	0.08	1.2	0.29
4.68	1.726	29.95	44.74	90.65	0.964	1.74	1.83	0.11	0.08	1.4	0.15
4.7	1.392	28.41	44.94	91.05	0.964	2.04	2.18	0.12	0.08	1.5	0.12
4.72	1.16	26.17	45.14	91.44	0.964	2.26	2.45	0.12	0.08	1.6	0.10
4.74	0.939	23.64	45.32	91.82	0.964	2.52	2.79	0.13	0.08	1.7	0.07
4.76	0.7	20.28	45.50	92.2	0.964	2.90	3.34	0.15	0.08	1.8	0.05
4.78	0.414	8.72	45.69	92.58	0.963	2.11	2.71	0.11	0.08	1.5	0.13
4.8	0.338	6.38	45.85	92.94	0.963	1.89	2.60	0.11	0.08	1.4	0.17
4.82	0.384	1.7	46.02	93.3	0.963	0.44	0.58	0.07	0.08	0.9	0.61
4.84	0.35	2.13	46.19	93.67	0.963	0.61	0.83	0.07	0.08	0.9	0.54
4.86	0.35	7.45	46.37	94.05	0.963	2.13	2.91	0.12	0.08	1.5	0.13
4.88	0.798	12.98	46.55	94.42	0.963	1.63	1.84	0.10	0.08	1.3	0.23
4.9	1.24	12.34	46.72	94.79	0.963	1.00	1.08	0.08	0.08	1.1	0.40
4.92	0.932	11.49	46.90	95.17	0.962	1.23	1.37	0.09	0.08	1.1	0.34
4.94	0.646	11.91	47.08	95.54	0.962	1.84	2.16	0.11	0.08	1.3	0.18
4.96	0.376	8.3	47.25	95.91	0.962	2.21	2.96	0.12	0.08	1.5	0.12
4.98	0.323	6.6	47.43	96.28	0.962	2.04	2.91	0.11	0.08	1.4	0.14
5	0.297	2.13	47.59	96.64	0.962	0.72	1.06	0.08	0.08	1.0	0.48
5.02	0.304	5.32	47.76	97.01	0.962	1.75	2.57	0.11	0.08	1.3	0.18
5.04	0.418	9.15	47.95	97.39	0.961	2.19	2.85	0.12	0.08	1.5	0.12
5.06	0.901	13.83	48.14	97.78	0.961	1.53	1.72	0.10	0.08	1.2	0.25
5.08	1.601	17.66	48.35	98.18	0.961	1.10	1.18	0.09	0.08	1.1	0.32
5.1	1.768	19.36	48.55	98.58	0.961	1.10	1.16	0.09	0.08	1.2	0.30
5.12	2.147	21.68	48.75	98.98	0.961	1.01	1.06	0.09	0.08	1.2	0.28
5.14	2.417	24.63	48.97	99.39	0.961	1.02	1.06	0.10	0.08	1.2	0.24
5.16	2.359	33.18	49.18	99.8	0.961	1.41	1.47	0.11	0.08	1.4	0.16
5.18	2.054	36.82	49.38	100.2	0.960	1.79	1.88	0.12	0.08	1.5	0.11
5.2	1.548	29.25	49.60	100.61	0.960	1.89	2.02	0.12	0.08	1.5	0.13
5.22	1.106	23.36	49.79	101	0.960	2.11	2.32	0.12	0.08	1.5	0.12
5.24	0.749	17.87	49.99	101.39	0.960	2.39	2.76	0.13	0.08	1.6	0.09
5.26	0.479	16.6	50.18	101.78	0.960	3.47	4.40	0.17	0.08	2.1	0.03
5.28	0.65	17.66	50.37	102.17	0.960	2.72	3.22	0.14	0.08	1.8	0.06
5.3	1.51	18.72	50.57	102.56	0.959	1.24	1.33	0.09	0.08	1.2	0.29
5.32	1.73	27.85	50.76	102.95	0.959	1.61	1.71	0.11	0.08	1.4	0.17
5.34	1.494	26.73	50.96	103.35	0.959	1.79	1.92	0.11	0.08	1.4	0.15
5.36	1.342	23.36	51.16	103.74	0.959	1.74	1.89	0.11	0.08	1.4	0.17
5.38	1.072	21.4	51.35	104.13	0.959	2.00	2.21	0.11	0.08	1.5	0.13
5.4	0.73	20.42	51.56	104.53	0.959	2.80	3.26	0.14	0.08	1.8	0.05
5.42	0.707	21.96	51.75	104.92	0.959	3.11	3.65	0.16	0.08	2.0	0.04
5.44	1.46	31.5	51.94	105.31	0.958	2.16	2.33	0.12	0.08	1.6	0.09
5.46	1.852	28.69	52.14	105.7	0.958	1.55	1.64	0.11	0.08	1.4	0.17
5.48	1.468	23.64	52.33	106.09	0.958	1.61	1.74	0.10	0.08	1.3	0.19
5.5	1.038	21.4	52.53	106.48	0.958	2.06	2.30	0.12	0.08	1.5	0.12
5.52	0.722	20.42	52.73	106.88	0.958	2.83	3.32	0.14	0.08	1.8	0.05
5.54	0.551	23.36	52.92	107.27	0.958	4.24	5.26	0.21	0.08	2.7	0.01
5.56	1.095	29.95	53.11	107.65	0.957	2.74	3.03	0.15	0.08	1.9	0.05
5.58	1.616	24.49	53.30	108.04	0.957	1.52	1.62	0.10	0.08	1.3	0.20
5.6	1.259	20.7	53.48	108.42	0.957	1.64	1.80	0.10	0.08	1.3	0.19
5.62	0.901	17.66	53.68	108.81	0.957	1.96	2.23	0.11	0.08	1.4	0.14
5.64	0.635	20.7	53.86	109.19	0.957	3.26	3.94	0.16	0.08	2.1	0.03
5.66	0.392	20.98	54.05	109.57	0.957	5.35	7.43	0.26	0.08	3.3	0.00
5.68	0.544	22.38	54.23	109.95	0.957	4.11	5.16	0.20	0.08	2.6	0.01
5.7	0.981	19.79	54.41	110.33	0.956	2.02	2.27	0.11	0.08	1.5	0.13
5.72	1.152	18.72	54.61	110.72	0.956	1.63	1.80	0.10	0.08	1.3	0.20
5.74	1.038	25.47	54.79	111.1	0.956	2.45	2.75	0.13	0.08	1.7	0.07
5.76	1.099	23.08	54.98	111.49	0.956	2.10	2.34	0.12	0.08	1.5	0.11
5.78	1.213	23.64	55.19	111.89	0.956	1.95	2.15	0.11	0.08	1.5	0.13
5.8	1.285	29.39	55.38	112.28	0.956	2.29	2.51	0.13	0.08	1.6	0.08
5.82	1.217	26.73	55.59	112.68	0.955	2.20	2.42	0.12	0.08	1.6	0.10
5.84	1.513	23.5	55.78	113.07	0.955	1.55	1.68	0.10	0.08	1.3	0.20
5.86	1.426	17.45	55.97	113.46	0.955	1.22	1.33	0.09	0.08	1.2	0.29
5.88	1.125	24.49	56.18	113.86	0.955	2.18	2.42	0.12	0.08	1.6	0.10
5.9	1.103	23.22	56.37	114.25	0.955	2.11	2.35	0.12	0.08	1.5	0.11
5.92	1.373	21.68	56.56	114.64	0.955	1.58	1.72	0.10	0.08	1.3	0.20
5.94	1.087	19.15	56.76	115.03	0.955	1.76	1.97	0.11	0.08	1.4	0.17
5.96	0.84	17.02	56.95	115.42	0.954	2.03	2.35	0.11	0.08	1.5	0.13
5.98	0.886	20.56	57.16	115.82	0.954	2.32	2.67	0.13	0.08	1.6	0.09
6	1.529	27.85	57.35	116.21	0.954	1.82	1.97	0.11	0.08	1.4	0.14
6.02	1.856	25.61	57.55	116.61	0.954	1.38	1.47	0.10	0.08	1.3	0.21
6.04	1.688	23.64	57.76	117.01	0.954	1.40	1.50	0.10	0.08	1.3	0.22
6.06	1.407	23.08	57.95	117.4	0.954	1.64	1.79	0.10	0.08	1.3	0.18
6.08	1.038	22.8	58.16	117.8	0.953	2.20	2.48	0.12	0.08	1.6	0.10
6.1	1.087	27.29	58.36	118.2	0.953	2.51	2.82	0.14	0.08	1.7	0.06
6.12	1.624	29.95	58.55	118.59	0.953	1.84	1.99	0.11	0.08	1.5	0.13
6.14	1.608	29.95	58.76	118.99	0.953	1.86	2.01	0.11	0.08	1.5	0.13
6.16	1.281	23.64	58.95	119.38	0.953	1.85	2.04	0.11	0.08	1.4	0.14
6.18	1.011	21.82	59.13	119.76	0.953	2.16	2.45	0.12	0.08	1.6	0.10
6.2	0.76	22.8	59.33	120.15	0.953	3.00	3.56	0.15	0.08	2.0	0.04
6.22	0.563	15.53	59.50	120.52	0.952	2.76	3.51	0.14	0.08	1.8	0.05
6.24	0.449	8.09	59.69	120.9	0.952	1.80	2.47	0.11	0.08	1.4	0.15
6.26	0.574	17.87	59.86	121.27	0.952	3.11	3.95	0.16	0.08	2.0	0.03

6.28	0.631	21.4	60.03	121.64	0.952	3.39	4.20	0.17	0.08	2.2	0.02
6.3	0.677	18.94	60.22	122.02	0.952	2.80	3.41	0.15	0.08	1.9	0.05
6.32	0.985	18.3	60.39	122.39	0.952	1.86	2.12	0.11	0.08	1.4	0.15
6.34	0.802	13.83	60.56	122.76	0.951	1.72	2.04	0.11	0.08	1.4	0.18
6.36	0.502	13.62	60.75	123.14	0.951	2.71	3.59	0.14	0.08	1.8	0.05
6.38	0.403	16.81	60.93	123.52	0.951	4.17	6.01	0.21	0.08	2.6	0.01
6.4	0.536	15.32	61.14	123.92	0.951	2.86	3.72	0.15	0.08	1.9	0.04
6.42	1.285	14.04	61.34	124.32	0.951	1.09	1.21	0.09	0.08	1.1	0.34
6.44	2.397	18.51	61.54	124.72	0.951	0.77	0.81	0.09	0.08	1.1	0.32
6.46	2.741	22.66	61.76	125.13	0.951	0.83	0.87	0.09	0.08	1.2	0.26
6.48	2.795	28.97	61.97	125.54	0.950	1.04	1.09	0.10	0.08	1.3	0.20
6.5	2.579	30.37	62.19	125.95	0.950	1.18	1.24	0.10	0.08	1.3	0.19
6.52	2.158	38.64	62.40	126.36	0.950	1.79	1.90	0.12	0.08	1.5	0.11
6.54	1.624	35.98	62.61	126.77	0.950	2.22	2.40	0.13	0.08	1.7	0.08
6.56	1.365	32.9	62.81	127.16	0.950	2.41	2.66	0.14	0.08	1.7	0.06
6.58	1.103	31.5	63.01	127.56	0.950	2.86	3.23	0.15	0.08	2.0	0.04
6.6	0.871	28.97	63.19	127.94	0.950	3.33	3.90	0.17	0.08	2.2	0.02
6.62	0.605	29.81	63.38	128.32	0.949	4.93	6.25	0.26	0.08	3.3	0.00
6.64	0.605	24.35	63.56	128.7	0.949	4.02	5.11	0.21	0.08	2.6	0.01
6.66	0.738	18.51	63.74	129.07	0.949	2.51	3.04	0.14	0.08	1.7	0.06
6.68	0.627	12.98	63.92	129.45	0.949	2.07	2.61	0.12	0.08	1.5	0.11
6.7	0.692	18.3	64.10	129.83	0.949	2.64	3.26	0.14	0.08	1.8	0.05
6.72	0.612	22.8	64.29	130.21	0.949	3.73	4.73	0.19	0.08	2.4	0.01
6.74	1.224	26.17	64.48	130.6	0.948	2.14	2.39	0.12	0.08	1.6	0.09
6.76	1.506	23.5	64.66	130.98	0.948	1.56	1.71	0.10	0.08	1.3	0.19
6.78	1.046	20.14	64.85	131.36	0.948	1.93	2.20	0.11	0.08	1.5	0.13
6.8	0.76	20.56	65.03	131.74	0.948	2.71	3.27	0.14	0.08	1.9	0.05
6.82	0.46	16.81	65.21	132.11	0.948	3.65	5.13	0.19	0.08	2.4	0.02
6.84	0.388	12.77	65.38	132.48	0.948	3.29	5.00	0.17	0.08	2.2	0.02
6.86	0.35	2.34	65.54	132.84	0.948	0.67	1.08	0.08	0.08	1.0	0.43
6.88	0.357	2.55	65.73	133.22	0.947	0.71	1.14	0.08	0.08	1.0	0.41
6.9	0.403	2.77	65.91	133.6	0.947	0.69	1.03	0.08	0.08	1.0	0.44
6.92	0.856	4.47	66.10	133.99	0.947	0.52	0.62	0.07	0.08	0.9	0.55
6.94	1.966	10	66.31	134.39	0.947	0.51	0.55	0.08	0.08	1.0	0.46
6.96	2.332	20.28	66.51	134.79	0.947	0.87	0.92	0.09	0.08	1.2	0.30
6.98	2.255	32.76	66.73	135.2	0.947	1.45	1.55	0.11	0.08	1.4	0.16
7	2.015	35.7	66.93	135.6	0.946	1.77	1.90	0.12	0.08	1.5	0.12
7.02	1.582	28.69	67.13	136	0.946	1.81	1.98	0.11	0.08	1.5	0.13
7.04	1.167	23.79	67.33	136.39	0.946	2.04	2.31	0.12	0.08	1.5	0.11
7.06	0.905	19.36	67.53	136.79	0.946	2.14	2.52	0.12	0.08	1.6	0.10
7.08	0.563	18.09	67.73	137.18	0.946	3.21	4.25	0.17	0.08	2.2	0.03
7.1	0.696	23.5	67.92	137.57	0.946	3.38	4.21	0.18	0.08	2.3	0.02
7.12	1.654	28.27	68.11	137.96	0.946	1.71	1.86	0.11	0.08	1.4	0.14
7.14	1.947	23.64	68.31	138.35	0.945	1.21	1.31	0.10	0.08	1.2	0.24
7.16	1.449	22.24	68.50	138.74	0.945	1.53	1.70	0.10	0.08	1.3	0.19
7.18	1.057	22.8	68.70	139.14	0.945	2.16	2.48	0.12	0.08	1.6	0.09
7.2	0.787	31.07	68.90	139.53	0.945	3.95	4.80	0.21	0.08	2.7	0.01
7.22	0.894	24.35	69.09	139.92	0.945	2.72	3.23	0.15	0.08	1.9	0.04
7.24	1.312	20	69.29	140.31	0.945	1.52	1.71	0.10	0.08	1.3	0.19
7.26	1.365	17.23	69.48	140.7	0.944	1.26	1.41	0.09	0.08	1.2	0.26
7.28	1.057	20.14	69.68	141.1	0.944	1.91	2.20	0.11	0.08	1.5	0.12
7.3	1.289	23.5	69.90	141.51	0.944	1.82	2.05	0.11	0.08	1.5	0.13
7.32	2.293	28.69	70.10	141.91	0.944	1.25	1.33	0.10	0.08	1.3	0.20
7.34	2.575	26.31	70.31	142.32	0.944	1.02	1.08	0.10	0.08	1.3	0.23
7.36	2.313	27.15	70.53	142.73	0.944	1.17	1.25	0.10	0.08	1.3	0.21
7.38	1.916	27.71	70.74	143.14	0.944	1.45	1.56	0.10	0.08	1.3	0.18
7.4	1.829	31.78	70.96	143.55	0.943	1.74	1.89	0.11	0.08	1.5	0.13
7.42	2.096	38.64	71.16	143.95	0.943	1.84	1.98	0.12	0.08	1.6	0.10
7.44	2.347	33.74	71.37	144.36	0.943	1.44	1.53	0.11	0.08	1.4	0.15
7.46	2.019	29.39	71.58	144.76	0.943	1.46	1.57	0.11	0.08	1.4	0.17
7.48	1.544	28.55	71.79	145.17	0.943	1.85	2.04	0.12	0.08	1.5	0.12
7.5	1.266	32.62	72.00	145.57	0.943	2.58	2.91	0.14	0.08	1.9	0.05
7.52	1.411	30.51	72.20	145.97	0.942	2.16	2.41	0.13	0.08	1.7	0.08
7.54	2.023	29.25	72.41	146.38	0.942	1.45	1.56	0.10	0.08	1.4	0.17
7.56	1.867	27.99	72.62	146.78	0.942	1.50	1.63	0.11	0.08	1.4	0.17
7.58	1.662	33.04	72.82	147.18	0.942	1.99	2.18	0.12	0.08	1.6	0.09
7.6	1.749	38.36	73.03	147.59	0.942	2.19	2.40	0.13	0.08	1.7	0.07
7.62	1.954	39.63	73.23	147.98	0.942	2.03	2.19	0.13	0.08	1.7	0.08
7.64	1.574	31.92	73.43	148.38	0.942	2.03	2.24	0.12	0.08	1.6	0.09
7.66	1.129	21.26	73.63	148.77	0.941	1.88	2.17	0.11	0.08	1.5	0.12
7.68	0.852	18.72	73.82	149.16	0.941	2.20	2.66	0.13	0.08	1.6	0.08
7.7	0.567	21.4	74.01	149.55	0.941	3.77	5.13	0.20	0.08	2.6	0.01
7.72	0.703	29.39	74.21	149.94	0.941	4.18	5.31	0.22	0.08	2.9	0.01
7.74	1.525	26.73	74.40	150.33	0.941	1.75	1.94	0.11	0.08	1.5	0.13
7.76	1.772	27.43	74.59	150.72	0.941	1.55	1.69	0.11	0.08	1.4	0.16
7.78	1.346	30.65	74.79	151.11	0.940	2.28	2.57	0.13	0.08	1.7	0.07
7.8	0.977	32.06	74.98	151.5	0.940	3.28	3.88	0.18	0.08	2.3	0.02
7.82	0.768	25.89	75.18	151.89	0.940	3.37	4.20	0.18	0.08	2.4	0.02
7.84	0.89	21.4	75.36	152.27	0.940	2.40	2.90	0.14	0.08	1.8	0.06
7.86	1.004	17.45	75.54	152.65	0.940	1.74	2.05	0.11	0.08	1.4	0.14
7.88	0.795	22.66	75.73	153.03	0.940	2.85	3.53	0.16	0.08	2.0	0.03
7.9	0.658	22.8	75.91	153.41	0.940	3.47	4.52	0.18	0.08	2.4	0.02
7.92	0.806	21.82	76.08	153.78	0.939	2.71	3.35	0.15	0.08	1.9	0.04
7.94	0.924	19.57	76.26	154.15	0.939	2.12	2.54	0.12	0.08	1.6	0.09

7.96	0.544	18.09	76.43	154.52	0.939	3.33	4.64	0.18	0.08	2.3	0.02
7.98	0.43	15.74	76.61	154.89	0.939	3.66	5.72	0.20	0.08	2.6	0.01
8	0.373	10.21	76.77	155.25	0.939	2.74	4.69	0.16	0.08	2.1	0.03
8.02	0.38	4.26	76.92	155.6	0.939	1.12	1.90	0.10	0.08	1.3	0.23
8.04	0.388	3.19	77.10	155.97	0.938	0.82	1.37	0.09	0.08	1.1	0.32
8.06	0.407	8.94	77.27	156.34	0.938	2.20	3.57	0.13	0.08	1.8	0.06
8.08	0.551	21.26	77.46	156.72	0.938	3.86	5.39	0.21	0.08	2.7	0.01
8.1	1.259	24.91	77.64	157.1	0.938	1.98	2.26	0.12	0.08	1.6	0.10
8.12	1.498	24.91	77.82	157.48	0.938	1.66	1.86	0.11	0.08	1.4	0.15
8.14	1.072	23.79	78.01	157.86	0.938	2.22	2.60	0.13	0.08	1.7	0.07
8.16	0.738	22.38	78.19	158.24	0.938	3.03	3.86	0.16	0.08	2.2	0.03
8.18	0.498	20	78.36	158.61	0.937	4.02	5.89	0.22	0.08	2.8	0.01
8.2	0.407	13.83	78.54	158.98	0.937	3.40	5.58	0.19	0.08	2.5	0.01
8.22	0.403	8.94	78.70	159.34	0.937	2.22	3.67	0.14	0.08	1.8	0.06
8.24	0.43	5.32	78.87	159.7	0.937	1.24	1.97	0.10	0.08	1.3	0.20
8.26	0.502	3.4	79.02	160.05	0.937	0.68	0.99	0.08	0.08	1.0	0.41
8.28	0.494	2.98	79.18	160.41	0.937	0.60	0.89	0.08	0.08	1.0	0.43
8.3	0.445	2.34	79.34	160.76	0.937	0.53	0.82	0.08	0.08	1.0	0.46
8.32	0.403	3.4	79.50	161.12	0.936	0.84	1.41	0.09	0.08	1.1	0.31
8.34	0.388	2.55	79.65	161.47	0.936	0.66	1.13	0.08	0.08	1.1	0.38
8.36	0.369	2.98	79.82	161.83	0.936	0.81	1.44	0.09	0.08	1.1	0.31
8.38	0.373	11.28	79.99	162.2	0.936	3.02	5.35	0.18	0.08	2.3	0.02
8.4	0.525	19.15	80.17	162.57	0.936	3.65	5.28	0.20	0.08	2.6	0.01
8.42	1.068	18.94	80.35	162.95	0.936	1.77	2.09	0.11	0.08	1.5	0.13
8.44	1.156	18.94	80.52	163.32	0.935	1.64	1.91	0.11	0.08	1.4	0.15
8.46	0.825	17.02	80.70	163.69	0.935	2.06	2.57	0.12	0.08	1.6	0.09
8.48	0.483	15.53	80.87	164.06	0.935	3.22	4.87	0.18	0.08	2.3	0.02
8.5	0.369	11.28	81.05	164.43	0.935	3.06	5.51	0.18	0.08	2.3	0.02
8.52	0.354	4.26	81.20	164.78	0.935	1.20	2.25	0.10	0.08	1.3	0.18
8.54	0.346	2.34	81.35	165.13	0.935	0.68	1.29	0.09	0.08	1.1	0.34
8.56	0.346	2.34	81.51	165.48	0.935	0.68	1.30	0.09	0.08	1.1	0.34
8.58	0.354	2.34	81.65	165.82	0.934	0.66	1.24	0.08	0.08	1.1	0.35
8.6	0.369	2.34	81.80	166.17	0.934	0.63	1.15	0.08	0.08	1.1	0.37
8.62	0.361	2.34	81.96	166.52	0.934	0.65	1.20	0.08	0.08	1.1	0.36
8.64	0.346	2.77	82.10	166.86	0.934	0.80	1.55	0.09	0.08	1.2	0.29
8.66	0.346	2.77	82.26	167.21	0.934	0.80	1.55	0.09	0.08	1.2	0.29
8.68	0.346	2.77	82.41	167.56	0.934	0.80	1.55	0.09	0.08	1.2	0.29
8.7	0.384	1.91	82.56	167.91	0.933	0.50	0.88	0.08	0.08	1.0	0.44
8.72	0.456	2.13	82.72	168.26	0.933	0.47	0.74	0.08	0.08	1.0	0.47
8.74	0.426	1.91	82.87	168.61	0.933	0.45	0.74	0.08	0.08	1.0	0.47
8.76	0.369	1.91	83.02	168.96	0.933	0.52	0.95	0.08	0.08	1.0	0.42
8.78	0.331	2.13	83.17	169.3	0.933	0.64	1.32	0.09	0.08	1.1	0.34
8.8	0.319	2.13	83.32	169.65	0.933	0.67	1.43	0.09	0.08	1.1	0.32
8.82	0.316	1.91	83.48	170	0.933	0.60	1.31	0.09	0.08	1.1	0.34
8.84	0.327	2.13	83.65	170.37	0.932	0.65	1.36	0.09	0.08	1.1	0.33
8.86	0.38	10.64	83.82	170.74	0.932	2.80	5.08	0.17	0.08	2.2	0.02
8.88	0.89	15.11	84.00	171.11	0.932	1.70	2.10	0.11	0.08	1.4	0.14
8.9	1.395	14.68	84.18	171.49	0.932	1.05	1.20	0.09	0.08	1.2	0.29
8.92	1.076	13.62	84.35	171.86	0.932	1.27	1.51	0.10	0.08	1.3	0.23
8.94	0.757	14.26	84.54	172.24	0.932	1.88	2.44	0.12	0.08	1.6	0.10
8.96	0.43	10.21	84.71	172.61	0.931	2.37	3.97	0.15	0.08	1.9	0.04
8.98	0.357	5.74	84.88	172.97	0.931	1.61	3.12	0.12	0.08	1.6	0.10
9	0.331	1.28	85.03	173.32	0.931	0.39	0.81	0.08	0.08	1.0	0.45
9.02	0.335	2.55	85.18	173.67	0.931	0.76	1.58	0.09	0.08	1.2	0.28
9.04	0.327	1.91	85.33	174.01	0.931	0.58	1.25	0.08	0.08	1.1	0.35
9.06	0.376	2.77	85.47	174.35	0.931	0.74	1.37	0.09	0.08	1.1	0.31
9.08	0.35	1.49	85.63	174.7	0.931	0.43	0.85	0.08	0.08	1.0	0.44
9.1	0.35	1.28	85.77	175.04	0.930	0.37	0.73	0.08	0.08	1.0	0.47
9.12	0.312	2.34	85.92	175.39	0.930	0.75	1.71	0.09	0.08	1.2	0.26
9.14	0.323	2.34	86.10	175.76	0.930	0.72	1.59	0.09	0.08	1.2	0.28
9.16	0.384	2.55	86.28	176.14	0.929	0.66	1.23	0.09	0.08	1.1	0.34
9.18	0.867	18.09	86.46	176.52	0.929	2.09	2.62	0.13	0.08	1.7	0.08
9.2	1.73	24.07	86.65	176.9	0.928	1.39	1.55	0.10	0.08	1.3	0.18
9.22	1.532	24.07	86.84	177.29	0.928	1.57	1.78	0.11	0.08	1.4	0.15
9.24	1.061	23.5	87.03	177.67	0.927	2.21	2.66	0.13	0.08	1.7	0.07
9.26	0.741	20.98	87.21	178.05	0.927	2.83	3.73	0.16	0.08	2.1	0.03
9.28	0.422	17.02	87.38	178.42	0.926	4.03	6.99	0.24	0.08	3.1	0.01
9.3	0.357	11.06	87.55	178.78	0.926	3.10	6.21	0.19	0.08	2.5	0.01
9.32	0.354	2.34	87.70	179.13	0.925	0.66	1.34	0.09	0.08	1.1	0.32
9.34	0.354	2.13	87.85	179.48	0.925	0.60	1.22	0.08	0.08	1.1	0.34
9.36	0.35	2.13	88.00	179.82	0.924	0.61	1.25	0.09	0.08	1.1	0.33
9.38	0.354	2.34	88.15	180.17	0.924	0.66	1.35	0.09	0.08	1.1	0.31
9.4	0.35	2.13	88.30	180.51	0.923	0.61	1.26	0.09	0.08	1.1	0.33
9.42	0.335	2.34	88.45	180.86	0.922	0.70	1.52	0.09	0.08	1.2	0.28
9.44	0.319	10.64	88.61	181.22	0.922	3.34	7.72	0.22	0.08	2.9	0.01
9.46	0.319	12.77	88.79	181.59	0.921	4.00	9.29	0.27	0.08	3.5	0.00
9.48	0.787	13.62	88.96	181.96	0.921	1.73	2.25	0.11	0.08	1.5	0.12
9.5	1.046	18.51	89.15	182.34	0.920	1.77	2.14	0.12	0.08	1.5	0.11
9.52	1.008	29.53	89.34	182.73	0.920	2.93	3.58	0.17	0.08	2.2	0.02
9.54	1.418	33.46	89.53	183.12	0.919	2.36	2.71	0.14	0.08	1.9	0.05
9.56	1.639	30.93	89.72	183.5	0.919	1.89	2.13	0.12	0.08	1.6	0.09
9.58	1.266	26.03	89.91	183.89	0.918	2.06	2.41	0.13	0.08	1.7	0.08
9.6	0.848	23.22	90.09	184.27	0.918	2.74	3.50	0.16	0.08	2.1	0.03
9.62	0.517	19.15	90.28	184.65	0.917	3.70	5.76	0.21	0.08	2.8	0.01

9.64	0.456	13.62	90.45	185.02	0.917	2.99	5.03	0.18	0.08	2.4	0.02
9.66	0.525	9.79	90.63	185.39	0.916	1.86	2.88	0.13	0.08	1.7	0.08
9.68	0.681	4.89	90.80	185.76	0.916	0.72	0.99	0.08	0.08	1.1	0.36
9.7	0.783	4.68	90.97	186.13	0.915	0.60	0.78	0.08	0.08	1.0	0.42
9.72	0.867	3.62	91.15	186.5	0.914	0.42	0.53	0.07	0.08	1.0	0.50
9.74	0.821	4.04	91.32	186.87	0.914	0.49	0.64	0.07	0.08	1.0	0.46
9.76	0.525	4.89	91.49	187.24	0.913	0.93	1.45	0.09	0.08	1.2	0.26
9.78	0.395	6.17	91.66	187.6	0.913	1.56	2.97	0.12	0.08	1.6	0.09
9.8	0.392	3.4	91.82	187.96	0.912	0.87	1.67	0.09	0.08	1.3	0.23
9.82	0.392	2.13	91.98	188.31	0.912	0.54	1.05	0.08	0.08	1.1	0.36
9.84	0.399	2.55	92.13	188.66	0.911	0.64	1.21	0.09	0.08	1.1	0.32
9.86	0.392	2.34	92.28	189.01	0.911	0.60	1.15	0.08	0.08	1.1	0.33
9.88	0.384	2.34	92.45	189.37	0.910	0.61	1.20	0.09	0.08	1.1	0.32
9.9	0.403	2.77	92.63	189.75	0.910	0.69	1.30	0.09	0.08	1.2	0.29
9.92	0.719	17.87	92.82	190.14	0.909	2.49	3.38	0.15	0.08	2.0	0.04
9.94	1.57	27.85	93.02	190.53	0.909	1.77	2.02	0.12	0.08	1.6	0.10
9.96	2.031	26.45	93.21	190.92	0.908	1.30	1.44	0.10	0.08	1.4	0.17
9.98	1.814	25.19	93.41	191.31	0.908	1.39	1.55	0.10	0.08	1.4	0.16
10	1.418	20.42	93.61	191.71	0.907	1.44	1.67	0.10	0.08	1.4	0.16
10.02	0.992	14.68	93.80	192.1	0.906	1.48	1.84	0.11	0.07	1.4	0.15
10.04	0.726	10	93.99	192.48	0.906	1.38	1.87	0.10	0.07	1.4	0.16
10.06	0.627	5.32	94.17	192.86	0.905	0.85	1.23	0.09	0.07	1.2	0.29
10.08	0.555	10	94.37	193.25	0.905	1.80	2.76	0.12	0.07	1.7	0.08
10.1	0.791	23.5	94.55	193.63	0.904	2.97	3.93	0.17	0.07	2.3	0.02
10.12	1.654	25.89	94.74	194.02	0.904	1.57	1.77	0.11	0.07	1.5	0.13
10.14	1.753	26.03	94.93	194.4	0.903	1.48	1.67	0.11	0.07	1.4	0.14
10.16	1.19	28.83	95.12	194.79	0.903	2.42	2.90	0.15	0.07	1.9	0.04
10.18	0.821	34.02	95.31	195.18	0.902	4.14	5.44	0.24	0.07	3.3	0.00
10.2	0.555	35.42	95.51	195.57	0.902	6.38	9.85	0.43	0.07	5.7	0.00
10.22	0.802	34.3	95.69	195.95	0.901	4.28	5.66	0.25	0.07	3.4	0.00
10.24	1.137	30.37	95.88	196.33	0.901	2.67	3.23	0.16	0.07	2.1	0.03
10.26	1.221	33.88	96.07	196.72	0.900	2.77	3.31	0.16	0.07	2.2	0.02
10.28	1.103	32.9	96.25	197.1	0.900	2.98	3.63	0.17	0.07	2.3	0.02
10.3	0.996	27.85	96.44	197.48	0.899	2.80	3.49	0.16	0.07	2.2	0.02
10.32	0.996	25.33	96.63	197.87	0.898	2.54	3.17	0.15	0.07	2.0	0.03
10.34	0.901	22.94	96.80	198.24	0.898	2.55	3.26	0.15	0.07	2.1	0.03
10.36	0.7	13.19	96.99	198.62	0.897	1.88	2.63	0.13	0.07	1.7	0.07
10.38	0.586	21.82	97.18	199.01	0.897	3.72	5.64	0.22	0.07	3.0	0.01
10.4	0.677	29.39	97.37	199.39	0.896	4.34	6.15	0.26	0.07	3.5	0.00
10.42	1.441	27.85	97.55	199.77	0.896	1.93	2.24	0.12	0.07	1.7	0.07
10.44	1.559	26.87	97.73	200.15	0.895	1.72	1.98	0.12	0.07	1.6	0.10
10.46	1.08	26.87	97.93	200.54	0.895	2.49	3.06	0.15	0.07	2.0	0.03
10.48	0.734	24.77	98.11	200.92	0.894	3.37	4.65	0.20	0.07	2.7	0.01
10.5	0.494	20.56	98.29	201.29	0.894	4.16	7.02	0.26	0.07	3.5	0.00
10.52	0.468	15.11	98.45	201.65	0.893	3.23	5.67	0.20	0.07	2.7	0.01
10.54	0.464	4.04	98.61	202.01	0.893	0.87	1.54	0.09	0.07	1.3	0.21
10.56	0.456	2.98	98.78	202.37	0.892	0.65	1.17	0.09	0.07	1.2	0.29
10.58	0.475	3.19	98.94	202.73	0.892	0.67	1.17	0.09	0.07	1.2	0.28
10.6	0.517	3.19	99.09	203.08	0.891	0.62	1.02	0.08	0.07	1.1	0.32
10.62	0.536	3.4	99.26	203.44	0.890	0.63	1.02	0.08	0.07	1.1	0.31
10.64	0.494	8.94	99.42	203.8	0.890	1.81	3.08	0.13	0.07	1.8	0.06
10.66	0.468	18.51	99.59	204.16	0.889	3.96	7.02	0.25	0.07	3.4	0.00
10.68	0.479	20.84	99.76	204.53	0.889	4.35	7.59	0.27	0.07	3.7	0.00
10.7	0.639	17.87	99.94	204.91	0.888	2.80	4.12	0.17	0.07	2.3	0.02
10.72	1.027	23.5	100.14	205.3	0.888	2.29	2.86	0.14	0.07	1.9	0.04
10.74	1.247	27.15	100.33	205.69	0.887	2.18	2.61	0.14	0.07	1.9	0.05
10.76	1.567	30.65	100.53	206.09	0.887	1.96	2.25	0.13	0.07	1.7	0.07
10.78	2.228	37.8	100.75	206.5	0.886	1.70	1.87	0.12	0.07	1.6	0.08
10.8	2.44	47.9	100.95	206.9	0.886	1.96	2.15	0.13	0.07	1.8	0.05
10.82	2.293	47.34	101.16	207.3	0.885	2.06	2.27	0.14	0.07	1.9	0.05
10.84	1.901	39.91	101.37	207.71	0.885	2.10	2.36	0.14	0.07	1.9	0.05
10.86	1.388	19.57	101.56	208.1	0.884	1.41	1.66	0.11	0.07	1.4	0.14
10.88	0.954	22.1	101.77	208.5	0.884	2.32	2.96	0.14	0.07	2.0	0.04
10.9	0.665	33.74	101.96	208.89	0.883	5.07	7.40	0.32	0.07	4.4	0.00
10.92	1.08	35.42	102.15	209.28	0.882	3.28	4.07	0.20	0.07	2.7	0.01
10.94	1.814	31.36	102.35	209.67	0.882	1.73	1.95	0.12	0.07	1.6	0.08
10.96	1.426	29.25	102.54	210.06	0.881	2.05	2.41	0.13	0.07	1.8	0.05
10.98	1.331	37.66	102.75	210.46	0.881	2.83	3.36	0.17	0.07	2.3	0.02
11	0.966	35.28	102.94	210.85	0.880	3.65	4.67	0.22	0.07	3.0	0.01
11.02	1.183	29.95	103.12	211.23	0.880	2.53	3.08	0.15	0.07	2.1	0.03
11.04	1.259	21.4	103.32	211.62	0.879	1.70	2.04	0.12	0.07	1.6	0.09
11.06	0.905	20	103.49	211.99	0.879	2.21	2.89	0.14	0.07	1.9	0.04
11.08	0.589	19.57	103.68	212.37	0.878	3.32	5.20	0.20	0.07	2.8	0.01
11.1	0.532	20.56	103.86	212.75	0.878	3.86	6.44	0.24	0.07	3.3	0.00
11.12	0.627	21.82	104.04	213.13	0.877	3.48	5.27	0.21	0.07	2.9	0.01
11.14	0.962	21.68	104.24	213.52	0.877	2.25	2.90	0.14	0.07	2.0	0.04
11.16	1.414	29.39	104.42	213.9	0.876	2.08	2.45	0.13	0.07	1.8	0.05
11.18	1.502	32.9	104.61	214.29	0.875	2.19	2.55	0.14	0.07	1.9	0.04
11.2	1.418	37.52	104.82	214.69	0.875	2.65	3.12	0.16	0.07	2.2	0.02
11.22	1.38	40.05	105.01	215.08	0.874	2.90	3.44	0.18	0.07	2.4	0.01
11.24	1.194	36.4	105.21	215.47	0.874	3.05	3.72	0.18	0.07	2.5	0.01
11.26	1.236	38.64	105.41	215.87	0.873	3.13	3.79	0.19	0.07	2.6	0.01
11.28	1.449	45.65	105.60	216.26	0.873	3.15	3.70	0.19	0.07	2.7	0.01
11.3	1.38	40.75	105.80	216.65	0.872	2.95	3.50	0.18	0.07	2.5	0.01

11.32	1.373	39.07	105.99	217.04	0.872	2.85	3.38	0.17	0.07	2.4	0.02
11.34	1.297	32.48	106.18	217.43	0.871	2.50	3.01	0.15	0.07	2.1	0.03
11.36	1.03	26.73	106.37	217.81	0.871	2.60	3.29	0.16	0.07	2.2	0.02
11.38	0.772	24.91	106.56	218.2	0.870	3.23	4.50	0.20	0.07	2.7	0.01
11.4	0.722	17.02	106.74	218.57	0.870	2.36	3.38	0.15	0.07	2.1	0.03
11.42	0.703	19.57	106.92	218.95	0.869	2.78	4.04	0.17	0.07	2.4	0.02
11.44	0.688	22.66	107.10	219.33	0.869	3.29	4.83	0.20	0.07	2.8	0.01
11.46	0.916	29.67	107.30	219.72	0.868	3.24	4.26	0.20	0.07	2.7	0.01
11.48	1.3	28.83	107.48	220.1	0.867	2.22	2.67	0.14	0.07	2.0	0.04
11.5	1.346	27.85	107.68	220.49	0.867	2.07	2.47	0.13	0.07	1.9	0.05
11.52	1.125	29.67	107.87	220.88	0.866	2.64	3.28	0.16	0.07	2.3	0.02
11.54	1.133	29.25	108.07	221.28	0.866	2.58	3.21	0.16	0.07	2.2	0.02
11.56	1.422	26.03	108.28	221.68	0.865	1.83	2.17	0.12	0.07	1.7	0.06
11.58	2.235	27.15	108.48	222.08	0.865	1.21	1.35	0.10	0.07	1.5	0.13
11.6	2.413	34.72	108.69	222.49	0.864	1.44	1.59	0.11	0.07	1.6	0.09
11.62	2.347	43.13	108.90	222.89	0.864	1.84	2.03	0.13	0.07	1.8	0.05
11.64	2.154	33.6	109.11	223.3	0.863	1.56	1.74	0.12	0.07	1.6	0.08
11.66	1.715	33.32	109.32	223.7	0.863	1.94	2.23	0.13	0.07	1.8	0.05
11.68	1.338	32.9	109.53	224.11	0.862	2.46	2.95	0.15	0.07	2.2	0.03
11.7	1.285	32.2	109.74	224.52	0.862	2.51	3.04	0.16	0.07	2.2	0.02
11.72	1.882	32.48	109.96	224.93	0.861	1.73	1.96	0.12	0.07	1.7	0.07
11.74	2.617	33.04	110.17	225.34	0.861	1.26	1.38	0.11	0.07	1.5	0.11
11.76	3.011	32.48	110.39	225.76	0.860	1.08	1.17	0.11	0.07	1.5	0.12
11.78	3.443	35.42	110.62	226.18	0.859	1.03	1.10	0.11	0.07	1.5	0.11
11.8	3.76	35.42	110.85	226.61	0.859	0.94	1.00	0.11	0.07	1.6	0.10
11.82	3.972	33.46	111.05	227	0.858	0.84	0.89	0.11	0.07	1.5	0.11
11.84	3.957	31.92	111.25	227.4	0.858	0.81	0.86	0.11	0.07	1.5	0.11
11.86	3.795	23.93	111.45	227.8	0.857	0.63	0.67	0.10	0.07	1.4	0.15
11.88	3.656	26.45	111.66	228.2	0.857	0.72	0.77	0.10	0.07	1.4	0.14
11.9	3.466	36.68	111.89	228.63	0.856	1.06	1.13	0.11	0.07	1.6	0.10
11.92	3.25	46.92	112.11	229.05	0.856	1.44	1.55	0.12	0.07	1.7	0.06
11.94	2.876	40.05	112.33	229.46	0.855	1.39	1.51	0.12	0.07	1.7	0.08
11.96	2.436	41.03	112.55	229.88	0.855	1.68	1.86	0.13	0.07	1.8	0.06
11.98	2.019	45.51	112.77	230.29	0.854	2.25	2.54	0.15	0.07	2.1	0.03
12	1.673	43.55	112.98	230.7	0.854	2.60	3.02	0.17	0.07	2.3	0.02
12.02	1.863	43.55	113.19	231.11	0.853	2.34	2.67	0.15	0.07	2.2	0.03
12.04	2.239	42.29	113.40	231.51	0.853	1.89	2.11	0.13	0.07	1.9	0.05
12.06	1.973	39.21	113.61	231.92	0.852	1.99	2.25	0.14	0.07	1.9	0.04
12.08	2.112	37.38	113.84	232.34	0.851	1.77	1.99	0.13	0.07	1.8	0.06
12.1	2.776	41.31	114.05	232.75	0.851	1.49	1.62	0.12	0.07	1.7	0.07
12.12	3.15	42.01	114.27	233.17	0.850	1.33	1.44	0.12	0.07	1.7	0.07
12.14	3.304	38.79	114.50	233.59	0.850	1.17	1.26	0.11	0.07	1.6	0.09
12.16	3.212	38.08	114.72	234.01	0.849	1.19	1.28	0.11	0.07	1.6	0.09
12.18	3.05	36.4	114.94	234.43	0.849	1.19	1.29	0.11	0.07	1.6	0.09
12.2	3.046	37.52	115.18	234.86	0.848	1.23	1.33	0.11	0.07	1.6	0.09
12.22	3.185	38.5	115.40	235.28	0.848	1.21	1.31	0.11	0.07	1.6	0.08
12.24	3.181	41.03	115.63	235.7	0.847	1.29	1.39	0.12	0.07	1.7	0.08
12.26	3.115	41.73	115.85	236.12	0.847	1.34	1.45	0.12	0.07	1.7	0.07
12.28	3.084	42.01	116.07	236.54	0.846	1.36	1.48	0.12	0.07	1.7	0.07
12.3	2.868	42.01	116.30	236.96	0.846	1.46	1.60	0.12	0.07	1.7	0.06
12.32	2.753	41.17	116.52	237.38	0.845	1.50	1.64	0.12	0.07	1.7	0.06
12.34	2.965	39.77	116.74	237.8	0.845	1.34	1.46	0.12	0.07	1.7	0.07
12.36	3.274	39.77	116.98	238.23	0.844	1.21	1.31	0.12	0.07	1.7	0.08
12.38	3.683	40.75	117.20	238.65	0.843	1.11	1.18	0.12	0.07	1.7	0.08
12.4	4.103	40.89	117.44	239.08	0.843	1.00	1.06	0.12	0.07	1.7	0.07
12.42	4.555	41.17	117.67	239.51	0.842	0.90	0.95	0.12	0.07	1.7	0.07
12.44	4.948	39.35	117.88	239.92	0.842	0.80	0.84	0.12	0.07	1.8	0.06
12.46	4.898	39.91	118.09	240.32	0.841	0.81	0.86	0.12	0.07	1.8	0.06
12.48	4.551	48.32	118.33	240.76	0.841	1.06	1.12	0.13	0.07	1.8	0.05
12.5	4.192	54.63	118.57	241.19	0.840	1.30	1.38	0.13	0.07	1.9	0.04
12.52	3.748	45.23	118.79	241.61	0.840	1.21	1.29	0.12	0.07	1.8	0.06
12.54	3.1	44.39	119.01	242.03	0.839	1.43	1.55	0.12	0.07	1.8	0.06
12.56	2.425	44.25	119.25	242.46	0.839	1.82	2.03	0.13	0.07	1.9	0.04
12.58	2.27	42.71	119.47	242.88	0.838	1.88	2.11	0.13	0.07	2.0	0.04
12.6	2.864	42.01	119.69	243.3	0.838	1.47	1.60	0.12	0.07	1.8	0.06
12.62	3.829	44.67	119.92	243.72	0.837	1.17	1.25	0.12	0.07	1.8	0.06
12.64	3.903	47.48	120.14	244.14	0.837	1.22	1.30	0.12	0.07	1.8	0.06
12.66	3.779	47.34	120.38	244.57	0.836	1.25	1.34	0.12	0.07	1.8	0.06
12.68	3.459	46.21	120.60	244.99	0.835	1.34	1.44	0.12	0.07	1.8	0.06
12.7	3.092	43.41	120.83	245.42	0.835	1.40	1.52	0.12	0.07	1.8	0.06
12.72	2.942	39.07	121.06	245.84	0.834	1.33	1.45	0.12	0.07	1.7	0.07
12.74	2.945	35.84	121.28	246.26	0.834	1.22	1.33	0.11	0.07	1.7	0.08
12.76	3.123	36.54	121.50	246.68	0.833	1.17	1.27	0.11	0.07	1.7	0.08
12.78	3.312	41.59	121.73	247.1	0.833	1.26	1.36	0.12	0.07	1.7	0.07
12.8	3.32	41.31	121.95	247.52	0.832	1.24	1.34	0.12	0.07	1.7	0.07
12.82	3.1	40.33	122.18	247.94	0.832	1.30	1.41	0.12	0.07	1.7	0.07
12.84	2.656	38.93	122.40	248.36	0.831	1.47	1.62	0.12	0.07	1.8	0.06
12.86	2.579	26.59	122.62	248.78	0.831	1.03	1.14	0.10	0.07	1.5	0.11
12.88	2.93	27.99	122.85	249.2	0.830	0.96	1.04	0.10	0.07	1.5	0.11
12.9	3.416	29.25	123.08	249.63	0.830	0.86	0.92	0.11	0.07	1.5	0.10
12.92	3.702	31.21	123.30	250.05	0.829	0.84	0.90	0.11	0.07	1.6	0.09
12.94	3.991	31.64	123.51	250.45	0.829	0.79	0.85	0.11	0.07	1.6	0.09
12.96	4.223	35.14	123.72	250.86	0.828	0.83	0.88	0.11	0.07	1.7	0.08
12.98	4.431	39.77	123.93	251.26	0.827	0.90	0.95	0.12	0.07	1.7	0.06

13	4.616	44.11	124.16	251.69	0.827	0.96	1.01	0.12	0.07	1.8	0.05
13.02	4.713	49.44	124.40	252.13	0.826	1.05	1.11	0.13	0.07	1.9	0.04
13.04	4.454	50.7	124.64	252.56	0.826	1.14	1.21	0.13	0.07	1.9	0.04
13.06	4.049	49.16	124.87	252.99	0.825	1.21	1.30	0.13	0.07	1.9	0.05
13.08	3.71	45.37	125.11	253.42	0.825	1.22	1.31	0.12	0.07	1.8	0.05
13.1	3.679	41.87	125.34	253.85	0.824	1.14	1.22	0.12	0.07	1.8	0.06
13.12	3.702	39.07	125.56	254.27	0.824	1.06	1.13	0.12	0.07	1.7	0.07
13.14	3.802	37.94	125.78	254.68	0.823	1.00	1.07	0.11	0.07	1.7	0.07
13.16	4.146	37.38	125.98	255.08	0.823	0.90	0.96	0.12	0.07	1.7	0.07
13.18	4.601	38.08	126.19	255.49	0.822	0.83	0.88	0.12	0.07	1.8	0.06
13.2	4.89	37.38	126.40	255.89	0.822	0.76	0.81	0.12	0.07	1.8	0.06
13.22	4.979	37.52	126.61	256.3	0.821	0.75	0.79	0.12	0.07	1.8	0.06
13.24	5.103	37.66	126.83	256.71	0.820	0.74	0.78	0.12	0.07	1.8	0.05
13.26	5.292	38.22	127.04	257.12	0.820	0.72	0.76	0.12	0.07	1.9	0.05
13.28	5.373	35.84	127.25	257.53	0.819	0.67	0.70	0.12	0.07	1.8	0.05
13.3	5.334	33.32	127.47	257.94	0.819	0.62	0.66	0.12	0.07	1.8	0.05
13.32	5.215	31.5	127.68	258.35	0.818	0.60	0.64	0.12	0.07	1.8	0.06
13.34	4.921	35.84	127.89	258.76	0.818	0.73	0.77	0.12	0.07	1.8	0.06
13.36	4.562	45.23	128.13	259.19	0.817	0.99	1.05	0.12	0.07	1.9	0.05
13.38	4.188	48.74	128.36	259.62	0.817	1.16	1.24	0.13	0.07	1.9	0.04
13.4	3.771	46.92	128.60	260.05	0.816	1.24	1.34	0.12	0.07	1.9	0.05
13.42	3.216	47.9	128.82	260.47	0.816	1.49	1.62	0.13	0.07	1.9	0.04
13.44	2.861	47.76	129.05	260.9	0.815	1.67	1.84	0.13	0.07	2.0	0.04
13.46	3.046	44.39	129.29	261.33	0.815	1.46	1.59	0.13	0.07	1.9	0.05
13.48	4.161	42.29	129.52	261.76	0.814	1.02	1.08	0.12	0.07	1.8	0.05
13.5	4.574	41.03	129.76	262.19	0.814	0.90	0.95	0.12	0.07	1.8	0.05
13.52	4.69	37.8	129.96	262.59	0.813	0.81	0.85	0.12	0.07	1.8	0.06
13.54	4.829	39.63	130.17	263	0.812	0.82	0.87	0.12	0.07	1.8	0.05
13.56	4.937	41.31	130.39	263.41	0.812	0.84	0.88	0.12	0.07	1.9	0.05
13.58	5.033	42.29	130.59	263.81	0.811	0.84	0.89	0.13	0.07	1.9	0.05
13.6	4.956	42.57	130.80	264.22	0.811	0.86	0.91	0.12	0.07	1.9	0.05
13.62	4.709	42.43	131.02	264.63	0.810	0.90	0.95	0.12	0.07	1.9	0.05
13.64	4.393	40.19	131.22	265.03	0.810	0.91	0.97	0.12	0.07	1.8	0.05
13.66	4.076	36.68	131.44	265.44	0.809	0.90	0.96	0.12	0.07	1.7	0.06
13.68	3.833	34.58	131.64	265.84	0.809	0.90	0.97	0.11	0.07	1.7	0.07
13.7	3.702	32.34	131.87	266.27	0.808	0.87	0.94	0.11	0.07	1.7	0.08
13.72	3.652	31.78	132.10	266.69	0.808	0.87	0.94	0.11	0.07	1.7	0.08
13.74	3.69	33.32	132.33	267.12	0.807	0.90	0.97	0.11	0.07	1.7	0.07
13.76	3.825	35.56	132.56	267.55	0.807	0.93	1.00	0.11	0.07	1.7	0.07
13.78	4.045	40.47	132.80	267.98	0.806	1.00	1.07	0.12	0.07	1.8	0.05
13.8	4.304	42.71	133.03	268.41	0.806	0.99	1.06	0.12	0.07	1.9	0.05
13.82	4.412	41.87	133.25	268.82	0.805	0.95	1.01	0.12	0.07	1.9	0.05
13.84	4.651	42.85	133.45	269.22	0.804	0.92	0.98	0.12	0.07	1.9	0.05
13.86	5.045	29.67	133.66	269.63	0.804	0.59	0.62	0.12	0.07	1.8	0.06
13.88	5.442	31.21	133.88	270.04	0.803	0.57	0.60	0.12	0.07	1.8	0.05
13.9	5.751	38.36	134.09	270.45	0.803	0.67	0.70	0.13	0.07	2.0	0.04
13.92	5.782	45.51	134.30	270.86	0.802	0.79	0.83	0.13	0.07	2.1	0.03
13.94	5.415	58.83	134.55	271.3	0.802	1.09	1.14	0.14	0.07	2.2	0.02
13.96	4.836	55.61	134.78	271.73	0.801	1.15	1.22	0.14	0.07	2.1	0.03
13.98	3.906	56.03	135.03	272.17	0.801	1.43	1.54	0.14	0.07	2.1	0.03
14	3.555	57.43	135.26	272.6	0.800	1.62	1.75	0.14	0.07	2.2	0.03
14.02	3.034	52.94	135.48	273.02	0.800	1.74	1.92	0.14	0.07	2.2	0.03
14.04	3.393	49.58	135.72	273.45	0.799	1.46	1.59	0.13	0.07	2.0	0.03
14.06	4.007	42.71	135.95	273.88	0.799	1.07	1.14	0.12	0.06	1.9	0.05
14.08	4.011	38.93	136.18	274.3	0.798	0.97	1.04	0.12	0.06	1.8	0.05
14.1	3.93	38.22	136.41	274.73	0.798	0.97	1.05	0.12	0.06	1.8	0.05
14.12	3.767	43.69	136.64	275.16	0.797	1.16	1.25	0.12	0.06	1.9	0.05
14.14	3.733	48.6	136.87	275.58	0.796	1.30	1.41	0.13	0.06	2.0	0.04
14.16	3.59	41.31	137.09	276	0.796	1.15	1.25	0.12	0.06	1.9	0.05
14.18	3.239	38.93	137.32	276.43	0.795	1.20	1.31	0.12	0.06	1.8	0.05
14.2	2.783	39.21	137.55	276.85	0.795	1.41	1.56	0.12	0.06	1.9	0.04
14.22	2.479	38.93	137.77	277.27	0.794	1.57	1.77	0.13	0.06	2.0	0.04
14.24	2.803	38.79	138.00	277.69	0.794	1.38	1.54	0.12	0.06	1.9	0.04
14.26	3.779	37.24	138.23	278.12	0.793	0.99	1.06	0.12	0.06	1.8	0.06
14.28	4.161	41.31	138.46	278.55	0.793	0.99	1.06	0.12	0.06	1.9	0.05
14.3	4.489	43.13	138.70	278.98	0.792	0.96	1.02	0.12	0.06	1.9	0.04
14.32	4.825	49.58	138.93	279.41	0.792	1.03	1.09	0.13	0.06	2.0	0.03
14.34	4.871	45.37	139.17	279.85	0.791	0.93	0.99	0.13	0.06	2.0	0.04
14.36	4.84	42.99	139.38	280.25	0.791	0.89	0.94	0.13	0.06	2.0	0.04
14.38	4.725	43.97	139.62	280.69	0.790	0.93	0.99	0.13	0.06	2.0	0.04
14.4	4.439	64.86	139.86	281.12	0.790	1.46	1.56	0.15	0.06	2.3	0.02
14.42	4.142	67.94	140.09	281.55	0.789	1.64	1.76	0.15	0.06	2.3	0.02
14.44	4.026	69.07	140.32	281.98	0.788	1.72	1.84	0.15	0.06	2.4	0.02
14.46	4.014	78.18	140.56	282.41	0.788	1.95	2.10	0.17	0.06	2.6	0.01
14.48	4.404	80.84	140.79	282.84	0.787	1.84	1.96	0.17	0.06	2.6	0.01
14.5	3.656	71.59	141.03	283.27	0.787	1.96	2.12	0.16	0.06	2.5	0.01
14.52	4.138	76.92	141.26	283.7	0.786	1.86	2.00	0.16	0.06	2.6	0.01
14.54	3.883	64.86	141.49	284.13	0.786	1.67	1.80	0.15	0.06	2.3	0.02
14.56	4.03	62.34	141.73	284.56	0.785	1.55	1.66	0.14	0.06	2.3	0.02
14.58	3.968	54.21	141.95	284.98	0.785	1.37	1.47	0.14	0.06	2.1	0.03
14.6	3.636	52.1	142.18	285.41	0.784	1.43	1.55	0.13	0.06	2.1	0.03
14.62	3.629	57.57	142.41	285.83	0.784	1.59	1.72	0.14	0.06	2.2	0.02
14.64	3.571	60.09	142.64	286.26	0.783	1.68	1.83	0.15	0.06	2.3	0.02
14.66	3.312	54.07	142.87	286.68	0.783	1.63	1.79	0.14	0.06	2.2	0.02

14.68	2.783	52.1	143.08	287.09	0.782	1.87	2.09	0.15	0.06	2.3	0.02
14.7	2.151	43.97	143.29	287.5	0.782	2.04	2.36	0.15	0.06	2.4	0.02
14.72	1.456	40.33	143.51	287.91	0.781	2.77	3.45	0.19	0.06	3.0	0.01
14.74	1.217	35.84	143.71	288.31	0.780	2.94	3.86	0.21	0.06	3.2	0.00
14.76	1.281	35.84	143.92	288.72	0.780	2.80	3.61	0.20	0.06	3.1	0.01
14.78	1.776	39.91	144.13	289.12	0.779	2.25	2.68	0.16	0.06	2.6	0.01
14.8	2.637	43.69	144.35	289.54	0.779	1.66	1.86	0.14	0.06	2.2	0.03
14.82	3.142	47.06	144.57	289.95	0.778	1.50	1.65	0.13	0.06	2.1	0.03
14.84	3.335	48.74	144.79	290.37	0.778	1.46	1.60	0.13	0.06	2.1	0.03
14.86	3.362	36.68	145.01	290.79	0.777	1.09	1.19	0.12	0.06	1.9	0.05
14.88	3.455	38.93	145.25	291.22	0.777	1.13	1.23	0.12	0.06	1.9	0.04
14.9	3.528	40.47	145.47	291.64	0.776	1.15	1.25	0.12	0.06	1.9	0.04
14.92	3.594	40.47	145.70	292.07	0.776	1.13	1.23	0.12	0.06	1.9	0.04
14.94	3.636	41.45	145.93	292.49	0.775	1.14	1.24	0.12	0.06	2.0	0.04
14.96	3.567	43.13	146.16	292.92	0.775	1.21	1.32	0.12	0.06	2.0	0.04
14.98	3.521	43.55	146.39	293.34	0.774	1.24	1.35	0.13	0.06	2.0	0.03
15	3.548	43.27	146.62	293.77	0.774	1.22	1.33	0.13	0.06	2.0	0.04
15.02	3.501	42.57	146.84	294.19	0.773	1.22	1.33	0.12	0.06	2.0	0.04
15.04	3.459	41.59	147.07	294.61	0.772	1.20	1.31	0.12	0.06	2.0	0.04
15.06	3.432	41.31	147.30	295.04	0.772	1.20	1.32	0.12	0.06	2.0	0.04
15.08	3.378	46.64	147.53	295.46	0.771	1.38	1.51	0.13	0.06	2.1	0.03
15.1	3.324	52.24	147.75	295.88	0.771	1.57	1.73	0.14	0.06	2.2	0.02
15.12	3.254	51.12	147.97	296.3	0.770	1.57	1.73	0.14	0.06	2.2	0.02
15.14	3.131	52.38	148.20	296.72	0.770	1.67	1.85	0.14	0.06	2.3	0.02
15.16	2.664	50.28	148.42	297.14	0.769	1.89	2.12	0.15	0.06	2.4	0.02
15.18	2.386	47.62	148.64	297.56	0.769	2.00	2.28	0.15	0.06	2.5	0.01
15.2	2.699	47.62	148.87	297.98	0.768	1.76	1.98	0.14	0.06	2.3	0.02
15.22	3.019	47.48	149.08	298.39	0.768	1.57	1.75	0.14	0.06	2.2	0.02
15.24	3.011	44.53	149.31	298.81	0.767	1.48	1.64	0.13	0.06	2.1	0.03
15.26	2.915	42.85	149.52	299.22	0.767	1.47	1.64	0.13	0.06	2.1	0.03
15.28	2.637	50.14	149.74	299.64	0.766	1.90	2.15	0.15	0.06	2.4	0.02
15.3	2.394	50.7	149.96	300.05	0.765	2.12	2.42	0.16	0.06	2.6	0.01
15.32	2.378	50.42	150.17	300.46	0.765	2.12	2.43	0.16	0.06	2.6	0.01
15.34	2.239	56.45	150.38	300.87	0.764	2.52	2.91	0.18	0.06	3.0	0.01
15.36	1.989	55.61	150.60	301.28	0.764	2.80	3.29	0.20	0.06	3.3	0.00
15.38	1.673	53.64	150.80	301.68	0.763	3.21	3.91	0.23	0.06	3.7	0.00
15.4	1.643	51.68	151.01	302.08	0.763	3.15	3.85	0.23	0.06	3.7	0.00
15.42	1.548	53.22	151.21	302.48	0.762	3.44	4.27	0.25	0.06	4.0	0.00
15.44	1.578	52.38	151.42	302.89	0.762	3.32	4.11	0.24	0.06	3.9	0.00
15.46	2.143	52.1	151.64	303.3	0.761	2.43	2.83	0.18	0.06	2.9	0.01
15.48	2.633	53.79	151.85	303.71	0.761	2.04	2.31	0.16	0.06	2.6	0.01
15.5	2.884	56.59	152.08	304.13	0.760	1.96	2.19	0.16	0.06	2.6	0.01
15.52	3.301	58.13	152.30	304.55	0.760	1.76	1.94	0.15	0.06	2.4	0.01
15.54	3.783	62.34	152.53	304.98	0.759	1.65	1.79	0.15	0.06	2.4	0.01
15.56	3.856	71.31	152.76	305.4	0.759	1.85	2.01	0.16	0.06	2.6	0.01
15.58	3.717	69.77	152.98	305.82	0.758	1.88	2.05	0.16	0.06	2.6	0.01
15.6	3.706	69.07	153.21	306.25	0.757	1.86	2.03	0.16	0.06	2.6	0.01
15.62	3.32	68.64	153.44	306.67	0.757	2.07	2.28	0.17	0.06	2.8	0.01
15.64	2.942	65.56	153.67	307.1	0.756	2.23	2.49	0.17	0.06	2.9	0.01
15.66	3.104	61.21	153.90	307.52	0.756	1.97	2.19	0.16	0.06	2.6	0.01
15.68	3.466	56.03	154.12	307.94	0.755	1.62	1.77	0.15	0.06	2.4	0.02
15.7	3.582	53.64	154.35	308.37	0.755	1.50	1.64	0.14	0.06	2.3	0.02
15.72	3.632	50.84	154.58	308.79	0.754	1.40	1.53	0.14	0.06	2.2	0.02
15.74	3.795	71.87	154.81	309.22	0.754	1.89	2.06	0.16	0.06	2.7	0.01
15.76	4.014	83.36	155.04	309.65	0.753	2.08	2.25	0.18	0.06	2.9	0.01
15.78	4.146	76.21	155.27	310.07	0.753	1.84	1.99	0.17	0.06	2.7	0.01
15.8	3.613	75.23	155.49	310.49	0.752	2.08	2.28	0.17	0.06	2.9	0.01
15.82	2.799	68.93	155.72	310.91	0.752	2.46	2.77	0.19	0.06	3.1	0.00
15.84	1.867	79.02	155.94	311.33	0.751	4.23	5.08	0.34	0.06	5.5	0.00
15.86	1.745	75.65	156.15	311.74	0.751	4.34	5.28	0.34	0.06	5.7	0.00
15.88	2.683	76.5	156.37	312.15	0.750	2.85	3.23	0.22	0.06	3.6	0.00
15.9	3.088	81.54	156.59	312.57	0.749	2.64	2.94	0.21	0.06	3.4	0.00
15.92	2.741	84.21	156.81	312.99	0.749	3.07	3.47	0.24	0.06	3.9	0.00
15.94	2.32	84.77	157.04	313.41	0.748	3.65	4.22	0.28	0.06	4.7	0.00
15.96	3.605	86.03	157.27	313.84	0.748	2.39	2.61	0.20	0.06	3.2	0.00
15.98	4.829	96.96	157.51	314.27	0.747	2.01	2.15	0.19	0.06	3.1	0.00
16	5.438	100.89	157.75	314.71	0.747	1.86	1.97	0.19	0.06	3.2	0.00
16.02	5.848	102.85	157.99	315.15	0.746	1.76	1.86	0.19	0.06	3.2	0.00
16.04	6.098	100.89	158.24	315.59	0.746	1.65	1.74	0.19	0.06	3.2	0.00
16.06	6.291	101.45	158.48	316.03	0.745	1.61	1.70	0.19	0.06	3.2	0.00
16.08	6.311	102.01	158.73	316.47	0.745	1.62	1.70	0.19	0.06	3.2	0.00
16.1	6.187	99.49	158.97	316.91	0.744	1.61	1.69	0.19	0.06	3.2	0.00
16.12	6.041	96.82	159.21	317.35	0.744	1.60	1.69	0.19	0.06	3.1	0.01
16.14	5.929	101.73	159.46	317.79	0.743	1.72	1.81	0.19	0.06	3.2	0.00
16.16	5.782	103.97	159.70	318.23	0.743	1.80	1.90	0.19	0.06	3.2	0.00
16.18	5.35	105.37	159.93	318.66	0.742	1.97	2.09	0.20	0.06	3.3	0.00
16.2	4.782	104.39	160.18	319.1	0.741	2.18	2.34	0.20	0.06	3.4	0.00
16.22	4.142	102.43	160.42	319.54	0.741	2.47	2.68	0.21	0.06	3.6	0.00
16.24	4.223	100.47	160.66	319.97	0.740	2.38	2.57	0.21	0.06	3.5	0.00
16.26	4.86	100.75	160.90	320.41	0.740	2.07	2.22	0.20	0.06	3.3	0.00
16.28	5.381	108.04	161.13	320.84	0.739	2.01	2.14	0.20	0.06	3.4	0.00
16.3	5.107	115.75	161.37	321.27	0.739	2.27	2.42	0.22	0.06	3.6	0.00
16.32	4.786	115.33	161.61	321.71	0.738	2.41	2.58	0.22	0.06	3.7	0.00
16.34	4.281	103.69	161.83	322.13	0.738	2.42	2.62	0.21	0.06	3.6	0.00

16.36	3.486	87.57	162.07	322.56	0.737	2.51	2.77	0.21	0.06	3.5	0.00
16.38	2.772	84.49	162.29	322.98	0.737	3.05	3.45	0.24	0.06	4.0	0.00
16.4	2.266	91.64	162.53	323.41	0.736	4.04	4.72	0.33	0.06	5.6	0.00
16.42	2.872	104.11	162.75	323.83	0.736	3.63	4.09	0.30	0.06	5.0	0.00
16.44	4.119	91.64	162.97	324.25	0.735	2.22	2.41	0.19	0.06	3.3	0.00
16.46	3.771	89.81	163.20	324.67	0.735	2.38	2.61	0.20	0.06	3.4	0.00
16.48	2.949	98.08	163.42	325.09	0.734	3.33	3.74	0.27	0.06	4.5	0.00
16.5	2.405	109.58	163.65	325.51	0.733	4.56	5.27	0.40	0.06	6.8	0.00
16.52	2.888	89.53	163.87	325.93	0.733	3.10	3.49	0.25	0.06	4.2	0.00
16.54	3.274	77.76	164.08	326.34	0.732	2.38	2.64	0.19	0.06	3.3	0.00
16.56	2.571	75.51	164.30	326.75	0.732	2.94	3.36	0.23	0.06	3.9	0.00
16.58	1.924	86.87	164.52	327.17	0.731	4.52	5.44	0.38	0.06	6.5	0.00
16.6	2.251	91.78	164.74	327.59	0.731	4.08	4.77	0.34	0.06	5.7	0.00
16.62	3.524	87.29	164.97	328.01	0.730	2.48	2.73	0.20	0.06	3.5	0.00
16.64	3.486	92.62	165.18	328.42	0.730	2.66	2.93	0.22	0.06	3.7	0.00
16.66	2.868	99.77	165.41	328.84	0.729	3.48	3.93	0.28	0.06	4.8	0.00
16.68	2.529	93.88	165.62	329.25	0.729	3.71	4.27	0.30	0.06	5.2	0.00
16.7	2.563	90.37	165.84	329.67	0.728	3.53	4.05	0.28	0.06	4.8	0.00
16.72	2.486	77.48	166.06	330.08	0.728	3.12	3.59	0.24	0.06	4.2	0.00
16.74	1.973	63.04	166.27	330.49	0.727	3.20	3.84	0.24	0.06	4.2	0.00
16.76	1.905	58.13	166.48	330.9	0.727	3.05	3.69	0.23	0.06	4.0	0.00
16.78	1.943	58.83	166.71	331.32	0.726	3.03	3.65	0.23	0.06	4.0	0.00
16.8	2.305	60.23	166.93	331.74	0.725	2.61	3.05	0.20	0.06	3.5	0.00
16.82	4.076	72.01	167.16	332.16	0.725	1.77	1.92	0.17	0.06	2.8	0.01
16.84	4.879	75.23	167.39	332.59	0.724	1.54	1.65	0.16	0.06	2.8	0.01
16.86	4.887	74.25	167.62	333.02	0.724	1.52	1.63	0.16	0.06	2.8	0.01
16.88	5.026	78.32	167.87	333.46	0.723	1.56	1.67	0.17	0.06	2.9	0.01
16.9	5.076	83.22	168.10	333.89	0.723	1.64	1.75	0.17	0.06	3.0	0.01
16.92	5.137	89.67	168.34	334.33	0.722	1.75	1.87	0.18	0.06	3.1	0.00
16.94	5.068	89.95	168.59	334.77	0.722	1.77	1.90	0.18	0.06	3.1	0.00
16.96	5.411	89.53	168.83	335.21	0.721	1.65	1.76	0.18	0.06	3.1	0.01
16.98	5.616	91.21	169.08	335.65	0.721	1.62	1.73	0.18	0.06	3.1	0.00
17	5.724	95.56	169.31	336.08	0.720	1.67	1.77	0.19	0.06	3.2	0.00
17.02	5.504	101.17	169.55	336.52	0.720	1.84	1.96	0.19	0.06	3.4	0.00
17.04	5.006	110.28	169.80	336.96	0.719	2.20	2.36	0.21	0.06	3.7	0.00
17.06	4.362	100.89	170.03	337.39	0.718	2.31	2.51	0.21	0.06	3.6	0.00
17.08	3.686	87.71	170.26	337.81	0.718	2.38	2.62	0.20	0.06	3.5	0.00
17.1	3.042	78.32	170.48	338.23	0.717	2.57	2.90	0.21	0.06	3.6	0.00
17.12	2.154	65.84	170.69	338.64	0.717	3.06	3.63	0.24	0.06	4.1	0.00
17.14	1.487	59.53	170.92	339.06	0.716	4.00	5.19	0.32	0.06	5.6	0.00
17.16	1.361	59.95	171.14	339.48	0.716	4.40	5.87	0.37	0.06	6.4	0.00
17.18	2.405	63.32	171.36	339.9	0.715	2.63	3.07	0.21	0.06	3.6	0.00
17.2	4.358	68.22	171.60	340.33	0.715	1.57	1.70	0.16	0.06	2.8	0.01
17.22	5.647	77.76	171.83	340.76	0.714	1.38	1.47	0.17	0.06	2.9	0.01
17.24	5.767	89.39	172.08	341.2	0.714	1.55	1.65	0.18	0.06	3.2	0.00
17.26	5.867	87.15	172.32	341.64	0.713	1.49	1.58	0.18	0.06	3.1	0.00
17.28	6.056	84.07	172.56	342.08	0.713	1.39	1.47	0.18	0.06	3.1	0.01
17.3	6.187	81.68	172.81	342.52	0.712	1.32	1.40	0.17	0.06	3.1	0.01
17.32	6.141	82.38	173.05	342.96	0.712	1.34	1.42	0.17	0.06	3.1	0.01
17.34	5.932	86.59	173.29	343.4	0.711	1.46	1.55	0.18	0.06	3.1	0.00
17.36	5.709	90.37	173.54	343.84	0.710	1.58	1.68	0.18	0.06	3.2	0.00
17.38	5.396	92.76	173.78	344.28	0.710	1.72	1.84	0.19	0.06	3.3	0.00
17.4	5.033	95.56	174.02	344.71	0.709	1.90	2.04	0.19	0.06	3.4	0.00
17.42	4.821	96.54	174.26	345.15	0.709	2.00	2.16	0.20	0.06	3.4	0.00
17.44	4.786	94.02	174.49	345.58	0.708	1.96	2.12	0.19	0.06	3.4	0.00
17.46	4.721	94.86	174.74	346.02	0.708	2.01	2.17	0.19	0.06	3.4	0.00
17.48	4.725	96.68	174.97	346.45	0.707	2.05	2.21	0.20	0.06	3.5	0.00
17.5	4.381	94.86	175.21	346.88	0.707	2.17	2.35	0.20	0.06	3.5	0.00
17.52	4.076	88.69	175.44	347.31	0.706	2.18	2.38	0.20	0.06	3.5	0.00
17.54	4.057	85.89	175.67	347.74	0.706	2.12	2.32	0.19	0.06	3.4	0.00
17.56	3.648	84.91	175.90	348.16	0.705	2.33	2.57	0.20	0.06	3.6	0.00
17.58	3.019	75.09	176.12	348.58	0.705	2.49	2.81	0.21	0.06	3.6	0.00
17.6	2.467	70.33	176.34	349	0.704	2.85	3.32	0.23	0.06	4.1	0.00
17.62	2.455	78.46	176.57	349.42	0.704	3.20	3.73	0.26	0.06	4.6	0.00
17.64	3.111	82.94	176.80	349.85	0.703	2.67	3.00	0.22	0.06	3.9	0.00
17.66	3.791	78.04	177.03	350.27	0.702	2.06	2.27	0.18	0.06	3.3	0.00
17.68	3.849	78.18	177.25	350.69	0.702	2.03	2.23	0.18	0.06	3.3	0.00
17.7	3.301	77.9	177.47	351.11	0.701	2.36	2.64	0.20	0.06	3.6	0.00
17.72	3.123	75.93	177.71	351.54	0.701	2.43	2.74	0.20	0.06	3.6	0.00
17.74	3.428	76.36	177.94	351.97	0.700	2.23	2.48	0.19	0.06	3.4	0.00
17.76	4.339	73.97	178.17	352.4	0.700	1.70	1.86	0.17	0.06	3.0	0.01
17.78	4.863	76.36	178.41	352.83	0.699	1.57	1.69	0.17	0.06	3.0	0.01
17.8	5.014	89.25	178.64	353.26	0.699	1.78	1.91	0.18	0.06	3.3	0.00
17.82	4.86	92.62	178.88	353.69	0.698	1.91	2.06	0.19	0.06	3.4	0.00
17.84	4.234	87.71	179.11	354.12	0.698	2.07	2.26	0.19	0.06	3.5	0.00
17.86	3.428	64.16	179.33	354.54	0.697	1.87	2.09	0.17	0.06	3.1	0.01
17.88	2.498	62.9	179.55	354.95	0.697	2.52	2.94	0.21	0.06	3.7	0.00
17.9	1.859	57.85	179.76	355.36	0.696	3.11	3.85	0.25	0.06	4.5	0.00
17.92	1.331	48.74	179.96	355.76	0.696	3.66	5.00	0.30	0.06	5.4	0.00
17.94	1.232	41.73	180.17	356.16	0.695	3.39	4.76	0.28	0.06	5.0	0.00
17.96	1.262	36.12	180.37	356.56	0.694	2.86	3.99	0.23	0.06	4.2	0.00
17.98	1.281	40.61	180.58	356.96	0.694	3.17	4.39	0.26	0.06	4.7	0.00
18	1.532	43.69	180.78	357.36	0.693	2.85	3.72	0.23	0.06	4.2	0.00
18.02	2.475	42.99	180.99	357.77	0.693	1.74	2.03	0.16	0.06	2.8	0.01

18.04	3.119	62.9	181.22	358.19	0.692	2.02	2.28	0.18	0.06	3.2	0.00
18.06	3.59	76.64	181.44	358.61	0.692	2.13	2.37	0.19	0.06	3.4	0.00
18.08	3.987	85.61	181.67	359.03	0.691	2.15	2.36	0.20	0.06	3.6	0.00
18.1	3.837	83.22	181.90	359.46	0.691	2.17	2.39	0.20	0.06	3.5	0.00
18.12	3.258	81.26	182.13	359.89	0.690	2.49	2.80	0.21	0.06	3.9	0.00
18.14	3.594	80.84	182.37	360.32	0.690	2.25	2.50	0.20	0.06	3.6	0.00
18.16	4.601	84.77	182.59	360.74	0.689	1.84	2.00	0.18	0.05	3.4	0.00
18.18	4.578	84.49	182.82	361.17	0.689	1.85	2.00	0.18	0.05	3.4	0.00
18.2	4.261	85.19	183.06	361.6	0.688	2.00	2.18	0.19	0.05	3.5	0.00
18.22	3.849	87.99	183.29	362.03	0.688	2.29	2.52	0.21	0.05	3.7	0.00
18.24	3.212	86.73	183.53	362.46	0.687	2.70	3.04	0.23	0.05	4.2	0.00
18.26	3.192	91.21	183.75	362.88	0.686	2.86	3.22	0.24	0.05	4.4	0.00
18.28	3.787	90.79	183.98	363.31	0.686	2.40	2.65	0.21	0.05	3.9	0.00
18.3	4.427	92.62	184.22	363.74	0.685	2.09	2.28	0.20	0.05	3.7	0.00
18.32	4.532	92.2	184.45	364.17	0.685	2.03	2.21	0.20	0.05	3.6	0.00
18.34	4.466	90.23	184.68	364.6	0.684	2.02	2.20	0.20	0.05	3.6	0.00
18.36	4.57	89.11	184.92	365.03	0.684	1.95	2.12	0.19	0.05	3.5	0.00
18.38	4.609	86.87	185.16	365.47	0.683	1.88	2.05	0.19	0.05	3.5	0.00
18.4	4.389	87.99	185.40	365.9	0.683	2.00	2.19	0.19	0.05	3.6	0.00
18.42	4.373	87.01	185.63	366.33	0.682	1.99	2.17	0.19	0.05	3.5	0.00
18.44	4.798	84.63	185.87	366.77	0.682	1.76	1.91	0.18	0.05	3.4	0.00
18.46	5.215	80	186.11	367.2	0.681	1.53	1.65	0.18	0.05	3.2	0.00
18.48	5.3	82.24	186.35	367.64	0.681	1.55	1.67	0.18	0.05	3.3	0.00
18.5	5.323	98.22	186.59	368.07	0.680	1.85	1.98	0.20	0.05	3.7	0.00
18.52	5.064	95.28	186.83	368.51	0.680	1.88	2.03	0.20	0.05	3.6	0.00
18.54	4.385	90.93	187.06	368.94	0.679	2.07	2.26	0.20	0.05	3.7	0.00
18.56	3.544	88.27	187.30	369.37	0.678	2.49	2.78	0.22	0.05	4.1	0.00
18.58	2.957	87.15	187.52	369.79	0.678	2.95	3.37	0.25	0.05	4.7	0.00
18.6	2.88	84.77	187.75	370.22	0.677	2.94	3.38	0.25	0.05	4.6	0.00
18.62	3.486	88.27	187.98	370.64	0.677	2.53	2.83	0.22	0.05	4.1	0.00
18.64	3.493	85.75	188.21	371.07	0.676	2.45	2.75	0.22	0.05	4.0	0.00
18.66	3.899	89.25	188.45	371.5	0.676	2.29	2.53	0.21	0.05	3.9	0.00
18.68	4.69	85.19	188.68	371.93	0.675	1.82	1.97	0.19	0.05	3.5	0.00
18.7	4.995	89.81	188.91	372.36	0.675	1.80	1.94	0.19	0.05	3.5	0.00
18.72	5.381	88.55	189.16	372.8	0.674	1.65	1.77	0.19	0.05	3.5	0.00
18.74	5.269	91.78	189.39	373.23	0.674	1.74	1.87	0.19	0.05	3.6	0.00
18.76	4.736	91.78	189.63	373.67	0.673	1.94	2.10	0.20	0.05	3.7	0.00
18.78	4.192	84.91	189.87	374.1	0.673	2.03	2.22	0.19	0.05	3.6	0.00
18.8	4.478	84.07	190.11	374.54	0.672	1.88	2.05	0.19	0.05	3.5	0.00
18.82	5.215	84.35	190.35	374.97	0.672	1.62	1.74	0.18	0.05	3.4	0.00
18.84	5.535	70.05	190.59	375.41	0.671	1.27	1.36	0.17	0.05	3.1	0.00
18.86	5.52	72.57	190.83	375.85	0.670	1.31	1.41	0.17	0.05	3.2	0.00
18.88	5.539	73.83	191.08	376.29	0.670	1.33	1.43	0.17	0.05	3.2	0.00
18.9	5.508	75.51	191.32	376.73	0.669	1.37	1.47	0.17	0.05	3.2	0.00
18.92	5.392	73.69	191.55	377.16	0.669	1.37	1.47	0.17	0.05	3.2	0.00
18.94	5.242	74.81	191.80	377.6	0.668	1.43	1.54	0.17	0.05	3.2	0.00
18.96	5.11	81.12	192.04	378.04	0.668	1.59	1.71	0.18	0.05	3.4	0.00
18.98	4.867	87.99	192.28	378.47	0.667	1.81	1.96	0.19	0.05	3.6	0.00
19	4.331	89.95	192.51	378.9	0.667	2.08	2.28	0.20	0.05	3.8	0.00
19.02	3.528	76.64	192.73	379.32	0.666	2.17	2.43	0.20	0.05	3.7	0.00
19.04	2.834	66.68	192.96	379.74	0.666	2.35	2.72	0.20	0.05	3.9	0.00
19.06	2.282	58.55	193.18	380.16	0.665	2.57	3.08	0.22	0.05	4.1	0.00
19.08	2.1	51.68	193.40	380.57	0.665	2.46	3.01	0.21	0.05	4.0	0.00
19.1	1.844	69.21	193.61	380.98	0.664	3.75	4.73	0.33	0.05	6.2	0.00
19.12	1.817	78.18	193.83	381.4	0.663	4.30	5.45	0.40	0.05	7.5	0.00
19.14	3.432	85.89	194.06	381.82	0.663	2.50	2.82	0.22	0.05	4.2	0.00
19.16	4.439	90.23	194.29	382.25	0.662	2.03	2.22	0.20	0.05	3.8	0.00
19.18	4.3	85.05	194.52	382.68	0.662	1.98	2.17	0.20	0.05	3.7	0.00
19.2	4.62	85.33	194.76	383.11	0.661	1.85	2.01	0.19	0.05	3.6	0.00
19.22	4.62	81.96	194.99	383.54	0.661	1.77	1.93	0.19	0.05	3.5	0.00
19.24	4.605	83.79	195.23	383.97	0.660	1.82	1.99	0.19	0.05	3.6	0.00
19.26	4.559	81.26	195.46	384.4	0.660	1.78	1.95	0.19	0.05	3.5	0.00
19.28	4.512	76.07	195.70	384.84	0.659	1.69	1.84	0.18	0.05	3.4	0.00
19.3	4.47	78.04	195.94	385.27	0.659	1.75	1.91	0.18	0.05	3.5	0.00
19.32	4.597	79.58	196.17	385.7	0.658	1.73	1.89	0.18	0.05	3.5	0.00
19.34	4.454	80.14	196.40	386.13	0.658	1.80	1.97	0.19	0.05	3.6	0.00
19.36	4.277	79.16	196.64	386.56	0.657	1.85	2.03	0.19	0.05	3.6	0.00
19.38	4.038	81.4	196.87	386.99	0.657	2.02	2.23	0.20	0.05	3.8	0.00
19.4	4.238	81.82	197.12	387.43	0.656	1.93	2.12	0.19	0.05	3.7	0.00
19.42	4.408	83.22	197.35	387.86	0.655	1.89	2.07	0.19	0.05	3.7	0.00
19.44	4.393	81.96	197.58	388.29	0.655	1.87	2.05	0.19	0.05	3.7	0.00
19.46	4.35	84.77	197.82	388.72	0.654	1.95	2.14	0.20	0.05	3.8	0.00
19.48	4.381	81.82	198.05	389.15	0.654	1.87	2.05	0.19	0.05	3.7	0.00
19.5	4.389	81.96	198.29	389.58	0.653	1.87	2.05	0.19	0.05	3.7	0.00
19.52	4.408	80.56	198.52	390.01	0.653	1.83	2.00	0.19	0.05	3.6	0.00
19.54	4.404	83.08	198.76	390.45	0.652	1.89	2.07	0.19	0.05	3.7	0.00
19.56	4.508	89.39	199.00	390.88	0.652	1.98	2.17	0.20	0.05	3.9	0.00
19.58	4.532	92.9	199.23	391.31	0.651	2.05	2.24	0.21	0.05	4.0	0.00
19.6	4.516	93.88	199.46	391.74	0.651	2.08	2.28	0.21	0.05	4.0	0.00
19.62	4.759	85.33	199.71	392.18	0.650	1.79	1.95	0.19	0.05	3.7	0.00
19.64	5.176	85.47	199.95	392.62	0.650	1.65	1.79	0.19	0.05	3.7	0.00
19.66	5.562	81.68	200.19	393.05	0.649	1.47	1.58	0.18	0.05	3.5	0.00
19.68	5.489	77.34	200.43	393.49	0.649	1.41	1.52	0.18	0.05	3.5	0.00
19.7	5.319	75.79	200.67	393.93	0.648	1.42	1.54	0.18	0.05	3.4	0.00

19.72	5.056	74.95	200.91	394.36	0.647	1.48	1.61	0.18	0.05	3.4	0.00
19.74	4.929	78.32	201.15	394.8	0.647	1.59	1.73	0.18	0.05	3.5	0.00
19.76	4.786	76.36	201.39	395.24	0.646	1.60	1.74	0.18	0.05	3.5	0.00
19.78	4.705	65.14	201.63	395.67	0.646	1.38	1.51	0.17	0.05	3.2	0.00
19.8	4.69	67.38	201.86	396.1	0.645	1.44	1.57	0.17	0.05	3.3	0.00
19.82	4.782	70.89	202.11	396.54	0.645	1.48	1.62	0.17	0.05	3.4	0.00
19.84	4.91	72.29	202.34	396.97	0.644	1.47	1.60	0.17	0.05	3.4	0.00
19.86	4.96	70.47	202.58	397.41	0.644	1.42	1.54	0.17	0.05	3.4	0.00
19.88	5.01	71.59	202.82	397.84	0.643	1.43	1.55	0.17	0.05	3.4	0.00
19.9	4.898	74.25	203.06	398.28	0.643	1.52	1.65	0.18	0.05	3.5	0.00
19.92	4.674	77.2	203.29	398.71	0.642	1.65	1.81	0.18	0.05	3.6	0.00
19.94	4.35	78.04	203.53	399.14	0.642	1.79	1.98	0.19	0.05	3.7	0.00
19.96	3.949	76.36	203.76	399.57	0.641	1.93	2.15	0.19	0.05	3.8	0.00
19.98	3.837	81.26	204.00	400	0.641	2.12	2.36	0.20	0.05	4.0	0.00
20	3.71	82.24	204.22	400.42	0.640	2.22	2.48	0.21	0.05	4.2	0.00
20.02	3.493	79.72	204.44	400.84	0.639	2.28	2.58	0.21	0.05	4.2	0.00
20.04	3.092	76.21	204.67	401.26	0.639	2.46	2.83	0.22	0.05	4.4	0.00
20.06	2.44	63.04	204.89	401.68	0.638	2.58	3.09	0.23	0.05	4.5	0.00
20.08	2.135	67.52	205.11	402.09	0.638	3.16	3.90	0.28	0.05	5.6	0.00
20.1	2.363	55.19	205.33	402.51	0.637	2.34	2.82	0.21	0.05	4.2	0.00
20.12	2.915	56.45	205.54	402.92	0.637	1.94	2.25	0.18	0.05	3.7	0.00
20.14	2.633	64.72	205.78	403.35	0.636	2.46	2.90	0.22	0.05	4.4	0.00
20.16	3.331	80.56	206.00	403.77	0.636	2.42	2.75	0.22	0.05	4.4	0.00
20.18	4.91	86.31	206.23	404.2	0.635	1.76	1.92	0.19	0.05	3.9	0.00
20.2	4.705	83.22	206.46	404.62	0.635	1.77	1.94	0.19	0.05	3.8	0.00
20.22	4.072	88.55	206.69	405.05	0.634	2.17	2.41	0.21	0.05	4.3	0.00
20.24	3.575	84.63	206.94	405.49	0.634	2.37	2.67	0.22	0.05	4.5	0.00
20.26	4.018	82.66	207.17	405.92	0.633	2.06	2.29	0.20	0.05	4.1	0.00
20.28	5.141	87.43	207.40	406.35	0.633	1.70	1.85	0.19	0.05	3.9	0.00
20.3	5.238	94.16	207.64	406.78	0.632	1.80	1.95	0.20	0.05	4.1	0.00
20.32	4.856	86.17	207.87	407.21	0.631	1.77	1.94	0.20	0.05	3.9	0.00
20.34	4.173	83.08	208.10	407.64	0.631	1.99	2.21	0.20	0.05	4.0	0.00
20.36	3.613	72.29	208.34	408.07	0.630	2.00	2.26	0.20	0.05	3.9	0.00
20.38	3.285	78.18	208.57	408.5	0.630	2.38	2.72	0.22	0.05	4.5	0.00
20.4	4.088	79.72	208.81	408.93	0.629	1.95	2.17	0.20	0.05	4.0	0.00
20.42	4.539	81.4	209.03	409.35	0.629	1.79	1.97	0.19	0.05	3.9	0.00
20.44	4.014	77.62	209.26	409.78	0.628	1.93	2.15	0.20	0.05	4.0	0.00
20.46	3.227	78.04	209.49	410.2	0.628	2.42	2.77	0.23	0.05	4.5	0.00
20.48	3.019	70.19	209.72	410.63	0.627	2.32	2.69	0.22	0.05	4.4	0.00
20.5	3.073	67.94	209.95	411.05	0.627	2.21	2.55	0.21	0.05	4.2	0.00
20.52	3.312	61.78	210.17	411.47	0.626	1.87	2.13	0.19	0.05	3.7	0.00
20.54	3.165	70.05	210.39	411.89	0.626	2.21	2.54	0.21	0.05	4.2	0.00
20.56	3.656	82.38	210.62	412.31	0.625	2.25	2.54	0.22	0.05	4.4	0.00
20.58	3.876	79.3	210.84	412.73	0.625	2.05	2.29	0.20	0.05	4.1	0.00
20.6	3.239	84.77	211.06	413.15	0.624	2.62	3.00	0.24	0.05	4.9	0.00
20.62	2.409	80.84	211.28	413.56	0.623	3.36	4.05	0.31	0.05	6.3	0.00
20.64	2.12	76.92	211.50	413.98	0.623	3.63	4.51	0.34	0.05	6.9	0.00
20.66	1.932	69.63	211.71	414.38	0.622	3.60	4.59	0.34	0.05	6.8	0.00
20.68	1.939	54.07	211.91	414.78	0.622	2.79	3.55	0.25	0.05	5.1	0.00
20.7	1.875	48.74	212.12	415.19	0.621	2.60	3.34	0.24	0.05	4.8	0.00
20.72	1.464	45.09	212.34	415.6	0.621	3.08	4.30	0.29	0.05	5.8	0.00
20.74	1.779	50.28	212.56	416.02	0.620	2.83	3.69	0.26	0.05	5.3	0.00
20.76	3.281	54.91	212.77	416.43	0.620	1.67	1.92	0.17	0.05	3.6	0.00
20.78	4.616	63.74	213.00	416.85	0.619	1.38	1.52	0.17	0.05	3.5	0.00
20.8	4.389	72.71	213.23	417.28	0.619	1.66	1.83	0.18	0.05	3.8	0.00
20.82	3.845	77.62	213.46	417.7	0.618	2.02	2.26	0.20	0.05	4.2	0.00
20.84	3.131	79.86	213.68	418.12	0.618	2.55	2.94	0.24	0.05	4.9	0.00
20.86	2.841	81.96	213.91	418.55	0.617	2.88	3.38	0.27	0.05	5.5	0.00
20.88	2.791	81.68	214.14	418.97	0.617	2.93	3.44	0.27	0.05	5.6	0.00
20.9	2.942	79.58	214.36	419.39	0.616	2.70	3.15	0.25	0.05	5.2	0.00
20.92	3.277	71.87	214.57	419.8	0.615	2.19	2.52	0.21	0.05	4.3	0.00
20.94	3.54	71.17	214.80	420.22	0.615	2.01	2.28	0.20	0.05	4.1	0.00
20.96	3.42	74.39	215.02	420.64	0.614	2.18	2.48	0.21	0.05	4.4	0.00
20.98	2.764	68.22	215.25	421.06	0.614	2.47	2.91	0.23	0.05	4.7	0.00
21	2.467	66.4	215.47	421.48	0.613	2.69	3.25	0.25	0.05	5.1	0.00
21.02	2.425	56.31	215.68	421.89	0.613	2.32	2.81	0.22	0.05	4.5	0.00
21.04	2.826	53.36	215.91	422.31	0.612	1.89	2.22	0.19	0.05	3.9	0.00
21.06	2.899	66.4	216.12	422.72	0.612	2.29	2.68	0.22	0.05	4.5	0.00
21.08	3.065	61.5	216.34	423.13	0.611	2.01	2.33	0.20	0.05	4.1	0.00
21.1	2.59	57.29	216.55	423.54	0.611	2.21	2.64	0.21	0.05	4.4	0.00
21.12	1.981	59.81	216.76	423.95	0.610	3.02	3.84	0.28	0.05	5.8	0.00
21.14	1.567	60.79	216.99	424.37	0.610	3.88	5.32	0.38	0.05	7.9	0.00
21.16	2.193	63.46	217.20	424.78	0.609	2.89	3.59	0.27	0.05	5.6	0.00
21.18	3.181	61.78	217.41	425.19	0.608	1.94	2.24	0.19	0.05	4.0	0.00
21.2	3.158	57.43	217.63	425.6	0.608	1.82	2.10	0.19	0.05	3.9	0.00
21.22	2.621	64.16	217.84	426.01	0.607	2.45	2.92	0.23	0.05	4.8	0.00
21.24	2.004	79.72	218.07	426.43	0.607	3.98	5.05	0.39	0.05	8.2	0.00
21.26	2.425	82.94	218.29	426.85	0.606	3.42	4.15	0.33	0.05	6.8	0.00
21.28	3.663	76.64	218.50	427.26	0.606	2.09	2.37	0.21	0.05	4.4	0.00
21.3	3.571	69.35	218.73	427.68	0.605	1.94	2.21	0.20	0.05	4.1	0.00
21.32	3.15	73.13	218.96	428.11	0.605	2.32	2.69	0.22	0.05	4.7	0.00
21.34	3.355	69.77	219.19	428.54	0.604	2.08	2.38	0.21	0.05	4.3	0.00
21.36	4.153	70.33	219.43	428.97	0.604	1.69	1.89	0.19	0.05	3.9	0.00
21.38	5.064	73.83	219.66	429.4	0.603	1.46	1.59	0.18	0.05	3.8	0.00

21.4	5.431	77.06	219.91	429.84	0.603	1.42	1.54	0.19	0.05	3.9	0.00
21.42	5.55	80.56	220.14	430.27	0.602	1.45	1.57	0.19	0.05	4.0	0.00
21.44	5.547	80.42	220.38	430.71	0.602	1.45	1.57	0.19	0.05	4.0	0.00
21.46	5.685	81.68	220.63	431.15	0.601	1.44	1.55	0.19	0.05	4.0	0.00
21.48	5.74	85.47	220.87	431.59	0.600	1.49	1.61	0.20	0.05	4.1	0.00
21.5	5.543	90.65	221.12	432.03	0.600	1.64	1.77	0.20	0.05	4.3	0.00
21.52	5.269	98.93	221.35	432.46	0.599	1.88	2.05	0.22	0.05	4.6	0.00
21.54	4.84	103.69	221.59	432.9	0.599	2.14	2.35	0.23	0.05	4.9	0.00
21.56	4.223	108.32	221.82	433.32	0.598	2.57	2.86	0.26	0.05	5.5	0.00
21.58	3.2	96.4	222.05	433.75	0.598	3.01	3.48	0.29	0.05	6.2	0.00
21.6	2.648	86.73	222.27	434.17	0.597	3.28	3.92	0.32	0.05	6.7	0.00
21.62	2.255	76.36	222.50	434.59	0.597	3.39	4.19	0.33	0.05	6.9	0.00
21.64	2.313	70.05	222.72	435.01	0.596	3.03	3.73	0.29	0.05	6.1	0.00
21.66	2.745	67.66	222.95	435.43	0.596	2.46	2.93	0.24	0.05	5.0	0.00
21.68	4.447	73.83	223.18	435.86	0.595	1.66	1.84	0.19	0.05	4.1	0.00
21.7	4.995	77.9	223.41	436.29	0.595	1.56	1.71	0.19	0.05	4.1	0.00
21.72	4.952	81.96	223.65	436.72	0.594	1.66	1.82	0.20	0.05	4.2	0.00
21.74	4.813	83.64	223.88	437.15	0.594	1.74	1.91	0.20	0.05	4.3	0.00
21.76	4.505	81.54	224.11	437.58	0.593	1.81	2.00	0.20	0.05	4.3	0.00
21.78	4.296	79.86	224.35	438.01	0.592	1.86	2.07	0.20	0.05	4.4	0.00
21.8	4.15	89.67	224.58	438.44	0.592	2.16	2.42	0.23	0.05	4.8	0.00
21.82	4.373	97.38	224.82	438.87	0.591	2.23	2.48	0.23	0.05	5.0	0.00
21.84	3.987	94.02	225.04	439.29	0.591	2.36	2.65	0.24	0.05	5.2	0.00
21.86	3.204	88.41	225.26	439.71	0.590	2.76	3.20	0.27	0.05	5.8	0.00
21.88	2.401	80	225.49	440.13	0.590	3.33	4.08	0.32	0.05	7.0	0.00
21.9	2.151	63.46	225.70	440.54	0.589	2.95	3.71	0.28	0.05	6.1	0.00
21.92	2.073	51.68	225.92	440.96	0.589	2.49	3.17	0.24	0.05	5.2	0.00
21.94	2.521	51.4	226.14	441.37	0.588	2.04	2.47	0.20	0.05	4.4	0.00
21.96	3.023	49.44	226.35	441.78	0.588	1.64	1.92	0.18	0.05	3.8	0.00
21.98	3.092	50.7	226.57	442.19	0.587	1.64	1.91	0.18	0.05	3.9	0.00
22	2.621	49.16	226.78	442.6	0.587	1.88	2.26	0.19	0.05	4.2	0.00
22.02	1.996	42.43	226.99	443.01	0.586	2.13	2.73	0.21	0.05	4.6	0.00
22.04	1.54	36.4	227.20	443.41	0.586	2.36	3.32	0.24	0.05	5.1	0.00
22.06	1.399	30.93	227.39	443.8	0.585	2.21	3.24	0.23	0.05	4.9	0.00
22.08	1.422	23.64	227.60	444.2	0.584	1.66	2.42	0.19	0.05	4.0	0.00
22.1	1.35	19.57	227.79	444.59	0.584	1.45	2.16	0.17	0.05	3.8	0.00
22.12	1.335	22.52	227.97	444.97	0.583	1.69	2.53	0.19	0.05	4.1	0.00
22.14	1.316	22.38	228.17	445.36	0.583	1.70	2.57	0.19	0.05	4.2	0.00
22.16	1.354	24.07	228.37	445.76	0.582	1.78	2.65	0.20	0.05	4.3	0.00
22.18	1.395	27.99	228.56	446.15	0.582	2.01	2.95	0.21	0.05	4.6	0.00
22.2	1.582	28.97	228.77	446.55	0.581	1.83	2.55	0.20	0.05	4.3	0.00
22.22	1.882	32.48	228.96	446.94	0.581	1.73	2.26	0.19	0.05	4.0	0.00
22.24	2.174	35.14	229.17	447.34	0.580	1.62	2.04	0.18	0.05	3.9	0.00
22.26	1.89	38.5	229.37	447.74	0.580	2.04	2.67	0.21	0.05	4.5	0.00
22.28	1.498	54.07	229.58	448.15	0.579	3.61	5.15	0.37	0.05	8.1	0.00
22.3	1.722	49.16	229.79	448.55	0.579	2.85	3.86	0.28	0.05	6.2	0.00
22.32	2.459	45.93	229.99	448.95	0.578	1.87	2.29	0.19	0.05	4.3	0.00
22.34	2.733	54.63	230.20	449.36	0.578	2.00	2.39	0.20	0.05	4.5	0.00
22.36	2.123	59.95	230.41	449.76	0.577	2.82	3.58	0.28	0.05	6.1	0.00
22.38	1.734	62.76	230.62	450.17	0.576	3.62	4.89	0.37	0.05	8.1	0.00
22.4	1.894	56.03	230.83	450.57	0.576	2.96	3.88	0.29	0.05	6.4	0.00
22.42	2.162	45.79	231.04	450.98	0.575	2.12	2.68	0.21	0.05	4.7	0.00
22.44	1.981	47.9	231.25	451.39	0.575	2.42	3.13	0.24	0.05	5.3	0.00
22.46	2.147	60.79	231.47	451.8	0.574	2.83	3.59	0.28	0.05	6.1	0.00
22.48	2.814	54.49	231.68	452.21	0.574	1.94	2.31	0.20	0.05	4.4	0.00
22.5	2.899	54.21	231.89	452.61	0.573	1.87	2.22	0.20	0.05	4.4	0.00
22.52	2.479	52.1	232.10	453.02	0.573	2.10	2.57	0.21	0.05	4.7	0.00
22.54	2.027	48.04	232.31	453.43	0.572	2.37	3.05	0.24	0.05	5.2	0.00
22.56	1.738	43.55	232.52	453.83	0.572	2.51	3.39	0.25	0.05	5.6	0.00
22.58	1.814	41.03	232.73	454.24	0.571	2.26	3.02	0.23	0.05	5.1	0.00
22.6	2.046	36.12	232.93	454.64	0.571	1.77	2.27	0.19	0.04	4.2	0.00
22.62	1.806	29.39	233.14	455.04	0.570	1.63	2.18	0.18	0.04	4.1	0.00
22.64	1.665	31.21	233.33	455.43	0.570	1.87	2.58	0.20	0.04	4.5	0.00
22.66	1.734	28.27	233.54	455.83	0.569	1.63	2.21	0.18	0.04	4.1	0.00
22.68	1.726	23.22	233.74	456.23	0.568	1.35	1.83	0.16	0.04	3.7	0.00
22.7	1.521	22.94	233.93	456.62	0.568	1.51	2.16	0.18	0.04	4.0	0.00
22.72	1.418	27.01	234.13	457.01	0.567	1.90	2.81	0.21	0.04	4.7	0.00
22.74	1.475	25.61	234.33	457.41	0.567	1.74	2.52	0.20	0.04	4.4	0.00
22.76	1.441	18.94	234.52	457.8	0.566	1.31	1.93	0.17	0.04	3.7	0.00
22.78	1.468	21.96	234.72	458.19	0.566	1.50	2.17	0.18	0.04	4.0	0.00
22.8	1.605	27.85	234.91	458.58	0.565	1.74	2.43	0.19	0.04	4.3	0.00
22.82	1.65	29.11	235.11	458.97	0.565	1.76	2.44	0.19	0.04	4.4	0.00
22.84	1.471	31.36	235.31	459.37	0.564	2.13	3.10	0.23	0.04	5.1	0.00
22.86	1.331	31.07	235.50	459.76	0.564	2.33	3.57	0.25	0.04	5.6	0.00
22.88	1.384	30.65	235.70	460.15	0.563	2.21	3.32	0.24	0.04	5.3	0.00
22.9	1.624	38.08	235.90	460.55	0.563	2.34	3.27	0.24	0.04	5.5	0.00
22.92	1.673	44.39	236.09	460.94	0.562	2.65	3.66	0.27	0.04	6.1	0.00
22.94	1.696	41.45	236.30	461.34	0.562	2.44	3.36	0.25	0.04	5.7	0.00
22.96	1.726	37.1	236.49	461.73	0.561	2.15	2.93	0.22	0.04	5.1	0.00
22.98	1.76	30.65	236.70	462.13	0.560	1.74	2.36	0.19	0.04	4.4	0.00
23	1.863	28.83	236.90	462.53	0.560	1.55	2.06	0.18	0.04	4.1	0.00
23.02	1.84	27.57	237.10	462.93	0.560	1.50	2.00	0.18	0.04	4.0	0.00
23.04	1.726	25.33	237.30	463.32	0.560	1.47	2.01	0.18	0.04	4.0	0.00
23.06	1.57	22.66	237.50	463.72	0.560	1.44	2.05	0.18	0.04	4.0	0.00

23.08	1.445	20	237.70	464.11	0.559	1.38	2.04	0.17	0.04	3.9	0.00
23.1	1.449	19.57	237.89	464.5	0.559	1.35	1.99	0.17	0.04	3.9	0.00
23.12	1.433	18.72	238.08	464.89	0.559	1.31	1.93	0.17	0.04	3.8	0.00
23.14	1.35	20	238.28	465.28	0.559	1.48	2.26	0.18	0.04	4.2	0.00
23.16	1.251	20.84	238.47	465.67	0.559	1.67	2.65	0.20	0.04	4.5	0.00
23.18	1.224	21.54	238.65	466.05	0.559	1.76	2.84	0.21	0.04	4.7	0.00
23.2	1.274	22.94	238.85	466.44	0.558	1.80	2.84	0.21	0.04	4.8	0.00
23.22	1.319	24.07	239.04	466.83	0.558	1.82	2.82	0.21	0.04	4.8	0.00
23.24	1.357	25.47	239.23	467.21	0.558	1.88	2.86	0.21	0.04	4.9	0.00
23.26	1.395	29.11	239.42	467.6	0.558	2.09	3.14	0.23	0.04	5.2	0.00
23.28	1.483	23.79	239.62	468	0.558	1.60	2.34	0.19	0.04	4.3	0.00
23.3	1.548	16.81	239.82	468.39	0.558	1.09	1.56	0.15	0.04	3.5	0.00
23.32	1.673	18.72	240.01	468.78	0.557	1.12	1.55	0.16	0.04	3.5	0.00
23.34	1.772	18.72	240.21	469.18	0.557	1.06	1.44	0.15	0.04	3.4	0.00
23.36	1.719	19.79	240.41	469.57	0.557	1.15	1.58	0.16	0.04	3.6	0.00
23.38	1.414	21.4	240.60	469.96	0.557	1.51	2.27	0.19	0.04	4.2	0.00
23.4	1.266	21.4	240.80	470.35	0.557	1.69	2.69	0.20	0.04	4.6	0.00
23.42	1.274	20.28	240.99	470.74	0.557	1.59	2.52	0.20	0.04	4.5	0.00
23.44	1.274	20.56	241.18	471.13	0.556	1.61	2.56	0.20	0.04	4.5	0.00
23.46	1.281	21.82	241.37	471.51	0.556	1.70	2.70	0.20	0.04	4.7	0.00
23.48	1.369	16.17	241.56	471.9	0.556	1.18	1.80	0.16	0.04	3.8	0.00
23.5	1.441	18.94	241.76	472.29	0.556	1.31	1.96	0.17	0.04	3.9	0.00
23.52	1.468	19.57	241.95	472.68	0.556	1.33	1.97	0.17	0.04	3.9	0.00
23.54	1.51	20	242.14	473.07	0.556	1.32	1.93	0.17	0.04	3.9	0.00
23.56	1.407	19.36	242.34	473.46	0.556	1.38	2.07	0.18	0.04	4.1	0.00
23.58	1.319	20	242.53	473.85	0.555	1.52	2.37	0.19	0.04	4.3	0.00
23.6	1.346	18.3	242.72	474.24	0.555	1.36	2.10	0.18	0.04	4.1	0.00
23.62	1.342	17.45	242.91	474.62	0.555	1.30	2.01	0.17	0.04	4.0	0.00
23.64	1.361	19.79	243.10	475.01	0.555	1.45	2.23	0.18	0.04	4.2	0.00
23.66	1.369	20.98	243.30	475.4	0.555	1.53	2.35	0.19	0.04	4.4	0.00
23.68	1.361	21.96	243.49	475.79	0.555	1.61	2.48	0.20	0.04	4.5	0.00
23.7	1.327	22.24	243.67	476.17	0.554	1.68	2.61	0.20	0.04	4.6	0.00
23.72	1.327	22.38	243.87	476.56	0.554	1.69	2.63	0.20	0.04	4.7	0.00
23.74	1.312	21.54	244.06	476.95	0.554	1.64	2.58	0.20	0.04	4.6	0.00
23.76	1.327	21.26	244.24	477.33	0.554	1.60	2.50	0.20	0.04	4.5	0.00
23.78	1.357	22.1	244.44	477.72	0.554	1.63	2.51	0.20	0.04	4.6	0.00
23.8	1.346	21.82	244.63	478.11	0.554	1.62	2.51	0.20	0.04	4.6	0.00
23.82	1.323	21.4	244.82	478.49	0.553	1.62	2.53	0.20	0.04	4.6	0.00
23.84	1.312	21.68	245.01	478.88	0.553	1.65	2.60	0.20	0.04	4.6	0.00
23.86	1.312	16.17	245.20	479.27	0.553	1.23	1.94	0.17	0.04	3.9	0.00
23.88	1.312	20	245.39	479.65	0.553	1.52	2.40	0.19	0.04	4.4	0.00
23.9	1.316	20.7	245.58	480.04	0.553	1.57	2.48	0.20	0.04	4.5	0.00
23.92	1.342	23.93	245.77	480.43	0.553	1.78	2.78	0.21	0.04	4.9	0.00
23.94	1.38	24.35	245.97	480.82	0.552	1.76	2.71	0.21	0.04	4.8	0.00
23.96	1.593	25.47	246.16	481.21	0.552	1.60	2.29	0.19	0.04	4.4	0.00
23.98	1.544	25.61	246.36	481.6	0.552	1.66	2.41	0.20	0.04	4.5	0.00
24	1.487	24.91	246.55	481.99	0.552	1.68	2.48	0.20	0.04	4.6	0.00
24.02	1.479	24.49	246.74	482.38	0.552	1.66	2.46	0.20	0.04	4.6	0.00
24.04	1.395	23.79	246.94	482.77	0.552	1.71	2.61	0.21	0.04	4.7	0.00
24.06	1.376	22.8	247.13	483.16	0.552	1.66	2.55	0.20	0.04	4.7	0.00
24.08	1.388	21.68	247.33	483.55	0.551	1.56	2.40	0.20	0.04	4.5	0.00
24.1	1.384	20.7	247.52	483.94	0.551	1.50	2.30	0.19	0.04	4.4	0.00
24.12	1.411	21.4	247.71	484.33	0.551	1.52	2.31	0.19	0.04	4.4	0.00
24.14	1.411	20.56	247.90	484.71	0.551	1.46	2.22	0.19	0.04	4.3	0.00
24.16	1.422	20.98	248.09	485.1	0.551	1.48	2.24	0.19	0.04	4.3	0.00
24.18	1.433	22.24	248.28	485.49	0.551	1.55	2.35	0.19	0.04	4.5	0.00
24.2	1.433	23.08	248.48	485.88	0.550	1.61	2.44	0.20	0.04	4.6	0.00
24.22	1.422	21.82	248.67	486.27	0.550	1.53	2.33	0.19	0.04	4.5	0.00
24.24	1.395	21.54	248.87	486.66	0.550	1.54	2.37	0.20	0.04	4.5	0.00
24.26	1.43	21.54	249.06	487.05	0.550	1.51	2.28	0.19	0.04	4.4	0.00
24.28	1.502	21.4	249.25	487.44	0.550	1.42	2.11	0.18	0.04	4.2	0.00
24.3	1.506	23.22	249.45	487.83	0.550	1.54	2.28	0.19	0.04	4.4	0.00
24.32	1.433	24.49	249.64	488.22	0.549	1.71	2.59	0.21	0.04	4.8	0.00
24.34	1.392	22.66	249.83	488.61	0.549	1.63	2.51	0.20	0.04	4.7	0.00
24.36	1.399	23.08	250.03	489	0.549	1.65	2.54	0.20	0.04	4.7	0.00
24.38	1.483	23.5	250.22	489.39	0.549	1.58	2.37	0.20	0.04	4.6	0.00
24.4	1.544	21.82	250.42	489.78	0.549	1.41	2.07	0.18	0.04	4.2	0.00
24.42	1.54	22.24	250.62	490.18	0.549	1.44	2.12	0.19	0.04	4.3	0.00
24.44	1.513	22.52	250.81	490.57	0.548	1.49	2.20	0.19	0.04	4.4	0.00
24.46	1.54	22.38	251.01	490.96	0.548	1.45	2.13	0.19	0.04	4.3	0.00
24.48	1.529	22.1	251.20	491.35	0.548	1.45	2.13	0.19	0.04	4.3	0.00
24.5	1.456	22.1	251.40	491.74	0.548	1.52	2.29	0.19	0.04	4.5	0.00
24.52	1.445	21.82	251.59	492.13	0.548	1.51	2.29	0.19	0.04	4.5	0.00
24.54	1.433	22.38	251.78	492.52	0.548	1.56	2.38	0.20	0.04	4.6	0.00
24.56	1.456	22.94	251.98	492.91	0.548	1.58	2.38	0.20	0.04	4.6	0.00
24.58	1.475	22.24	252.17	493.3	0.547	1.51	2.27	0.19	0.04	4.5	0.00
24.6	1.487	23.36	252.36	493.69	0.547	1.57	2.35	0.20	0.04	4.6	0.00
24.62	1.506	24.63	252.57	494.09	0.547	1.64	2.43	0.20	0.04	4.7	0.00
24.64	1.559	21.96	252.76	494.48	0.547	1.41	2.06	0.18	0.04	4.3	0.00
24.66	1.578	23.5	252.96	494.87	0.547	1.49	2.17	0.19	0.04	4.4	0.00
24.68	1.593	24.07	253.15	495.26	0.547	1.51	2.19	0.19	0.04	4.4	0.00
24.7	1.616	23.5	253.35	495.66	0.546	1.45	2.10	0.19	0.04	4.3	0.00
24.72	1.601	24.07	253.55	496.05	0.546	1.50	2.18	0.19	0.04	4.4	0.00
24.74	1.502	24.77	253.74	496.44	0.546	1.65	2.46	0.20	0.04	4.7	0.00

24.76	1.49	26.59	253.93	496.83	0.546	1.78	2.68	0.22	0.04	5.0	0.00
24.78	1.532	24.63	254.14	497.23	0.546	1.61	2.38	0.20	0.04	4.7	0.00
24.8	1.563	24.49	254.33	497.62	0.546	1.57	2.30	0.20	0.04	4.6	0.00
24.82	1.574	26.31	254.53	498.01	0.545	1.67	2.45	0.21	0.04	4.8	0.00
24.84	1.555	27.43	254.72	498.4	0.545	1.76	2.60	0.21	0.04	5.0	0.00
24.86	1.525	28.13	254.92	498.8	0.545	1.84	2.74	0.22	0.04	5.1	0.00
24.88	1.483	28.27	255.12	499.19	0.545	1.91	2.87	0.23	0.04	5.3	0.00
24.9	1.529	42.57	255.31	499.58	0.545	2.78	4.14	0.31	0.04	7.3	0.00
24.92	1.548		255.50	499.97	0.545	0.00	0.06	0.11	0.04	2.5	0.01
24.94	1.586		255.70	500.36	0.544	0.00	0.06	0.11	0.04	2.5	0.01
24.96	1.627		255.89	500.75	0.544	0.00	0.06	0.11	0.04	2.5	0.01
24.98	1.631		256.09	501.14	0.544	0.00	0.06	0.11	0.04	2.5	0.01
25	1.897		256.28	501.53	0.544	0.00	0.06	0.11	0.04	2.5	0.01
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