

Core Project Group Pty Ltd

Proposed Development

12 Stewart Avenue, Newcastle West

Geotechnical Assessment

Report No. RGS01102.1-AC

4 April 2016

REGIONAL
GEOTECHNICAL SOLUTIONS





Manning-Great Lakes

Port Macquarie

Coffs Harbour

RGS01102.1-AC

4 April 2016

Core Project Group Pty Ltd
122a Hannell Street
WICKHAM NSW 2293

Attention: Tom Elliot

Dear Tom,

**RE: Proposed Development – 12 Stewart Avenue, Newcastle West
Geotechnical Assessment**

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a geotechnical investigation and assessment for the proposed redevelopment of a site located at 12 Stewart Avenue, Newcastle West.

The findings of the investigation, as well as comments and recommendations on earthworks, foundations and pavements are presented in the attached report.

If you have any questions regarding this project, or require any additional consultations, please contact Steve Morton or the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

A handwritten signature in dark ink, appearing to read 'Simon Keen', with a horizontal line extending to the right.

Simon Keen

Geotechnical Engineer

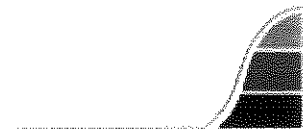


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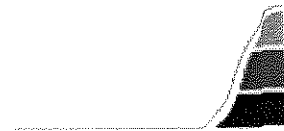
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1 INTRODUCTION

As requested, Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken geotechnical assessment for a proposed development that is to be located at 12 Stewart Avenue, Newcastle West (Lot 102 DP1191992).

The proposed development is to consist of two commercial office buildings up to 8 Storeys with a six storey carpark. Footing loads are expected to be in the order of 5000kN Ultimate. It is not known if basement levels are proposed.

The purpose of the geotechnical assessment was to provide comments and recommendations on the following:

- Geotechnical profile at the site including presence of fill, depth to groundwater, and general implications for development;
- Excavation conditions, need for excavation support, recommended construction baters, and recommendations/parameters for design of excavation support;
- Site preparation and site trafficability including recommendations on construction of working platforms etc;
- Suitability of the site soils for use as fill and on fill construction;
- Recommended foundation types, including end bearing and skin friction parameters for piles and recommended geotechnical parameters for use in the design of tension piles;
- Site classification AS2870-2011;
- Earthquake site classification;
- Rigid and flexible pavement designs for access way and car parking areas, including the treatment of any wet or poor subgrade conditions; and
- The presence of Acid Sulfate Soils and the need for an Acid Sulfate Soil Management Plan.

RGS has also undertaken an assessment regarding the presence of site contamination, the results of which will be presented in a separate report.

2 METHODOLOGY

Field work for the assessment of the site involved the following:

- Observation of site features and surrounding features relevant to the geotechnical conditions of the site;
- Logging and sampling of seven boreholes drilled with a 4WD mounted drill rig to depths of between 0.85 and 2.7m to assess the depth of fill and collect samples for acid sulfate soil and site contamination assessments; and
- Seven Cone Penetration Tests (CPT1 to CPT7) at critical foundation locations nominated by Northrop Consulting Engineers (Northrop) to depths of between 18 and 20m to assess foundation conditions.

Field work was undertaken under the direction and supervision of a Principal Engineer from RGS. Engineering logs of the boreholes and CPTs are presented in Appendix A. Borehole and CPT locations are presented on Figure 1 with the locations being obtained by site measurements relative to existing site features.

3 SITE CONDITIONS

3.1 Surface Conditions

The irregular shaped site is bound by Stewart Avenue to the southeast, Hunter Street to the northeast, and existing single and double storey industrial/commercial structures to the northwest and southwest.

The site is located within a region characterised by a flat alluvial plain associated with the Hunter River catchment. An aerial photograph from the NSW DPI 'Six Viewer' is reproduced below.



The site location is outlined in red

The site is near level with minor slope variations of less than 2°, predominantly comprising a slight slope to the south towards Stewart Avenue. The southern half of the site is covered with existing hardstand pavements and remnants of the former structures that occupied the site. The northern half previously contained a building that has since been demolished. The area is vacant with sand exposed at the surface.

3.2 Subsurface Conditions

The 1:250,000 Geological Series Sheet of Newcastle indicates the site to be underlain by Quaternary marine and freshwater deposits comprising sand, silt, clay and gravel. The 100,000



Newcastle Coalfield Regional Geology Map indicates the Quaternary deposits are in turn underlain by the Lambton Subgroup (comprising the Borehole coal seam) and Waratah Sandstone which form the lower lithologies of the Newcastle Coal Measures.

The boreholes drilled at the site during the current investigation encountered between 0.5 and 1.6m of sand fill that contained some rubble and brick fragments. A 0.4m thick Sandy Clay fill layer was encountered between 0.8 and 1.2m depth in BHR7. Underlying the fill was Aeolian sand, Marine sand and lightly indurated sand to at least the maximum depth of the boreholes of 2.7m.

Four boreholes were drilled within the site as part of a previous investigation undertaken by GeoAust Geotechnical Engineers to depths of between 6 and 7.5m. The boreholes encountered 'poorly compacted' sand fill to depths of between 4.2 and 5.25m (BH3 and BH4) in the central portion of the site. Underlying the fill was loose sand to 6.5m in BH3 overlying dense sand. Underlying the fill in BH1, BH2 and BH4 was medium dense to dense sand.

The materials encountered within the CPTs are summarised in Table 1.

Table 1: Summary of Subsurface Materials

Material Unit	Material Name	Material Description	Depth to Base of Material Layer (m)						
			CPT1	CPT2	CPT3	CPT4	CPT5	CPT6	CPT7
1	Fill		1.1	0.8	0.9	1.1	1.1	1.0	1.3
2	Aeolian Sand & Indurated Sand	Loose Aeolian layers and lenses of dense to very dense indurated sand. A very soft to stiff clay layer up to 0.5m thick was encountered within CPT2 and CPT3 between about 2.5 and 3m depth	5.2	3.8	5.5	3.5	3.7	3.1	2.6
3a	Marine Sand Variable	SAND, generally medium dense to dense with very loose to loose and dense to very dense layers, interbedded firm to stiff clay layers up to 0.8m thick	10.8	9.7	9.9	6.8	6.7	6.6	6.4
3b	Marine Sand MD-D	SAND, medium dense to dense and very dense	14.3	14.2	14.3	14.3	14.3	14.1	14.4
4	Marine Clay	CLAY, stiff to very stiff, upper 0.7m is firm in CPT4	≥ 20	≥ 20	≥ 18	≥ 18	≥ 20	≥ 18	≥ 18

Notes: -- Material was not encountered at the test location
 ≥ Base of material layer was not encountered

Groundwater was encountered at all but three of the test locations and are summarised in Table 2. Groundwater levels do fluctuate as a result of climatic variations such as prolonged rainfall or extended periods of low rainfall etc.

Table 2: Summary of Groundwater Levels Below Existing Surface

CPT1	CPT2	CPT3	CPT4	CPT5	CPT6	CPT7	BHR1	BHR2	BHR3	BHR4	BHR5	BHR6	BHR7	BH1*	BH2*	BH3*	BH4*
2.5	2.2	2.4	2.5	2.5	2.3	2.3	--	3.0	--	--	2.6	2.5	2.6	2.8	3.0	3.1	2.5

Notes: -- Material was not encountered at the test location
 ≥ Boreholes were completed during the previous GeoAust Geotechnical Engineers assessment



4 GEOTECHNICAL CONSTRAINTS

The site is underlain by between 0.5m and 5.25m of granular fill overlying Aeolian sand, marine sand and marine clay to depths of at least 20m. Previous experience close to the site indicates the clay extends to at least 30m. Groundwater was encountered at depths of between 2.2 and 3.0m below current site level.

Pending review of the design loads, structures could be supported by piles founded within the Unit 3b medium dense to dense sand.

A sewer line runs through the site close to the Stewart Street frontage and has an approximate depth of about 6m. Foundations and earth retention structures will need to be designed to accommodate the service.

Should excavations for a basement level be proposed, groundwater inflows are likely to occur during excavation and a dewatering management plan is likely to be required.

5 EARTHWORKS

5.1 Site Preparation

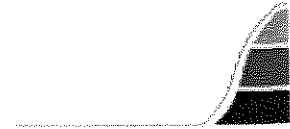
The southwest boundary of the site is covered by a concrete hardstand. The remainder of the site is covered by the disturbed (as a result of demolition) well compacted upper fill layer. Trafficability was good at the time of the investigation. Inclement weather, heavy construction traffic or stripping/excavation is likely to further disturb the sandy soils and a working platform may be required. Such a platform could comprise a 300mm crushed concrete layer or a granular high strength rock fill with a low percentage of fines (i.e. less than 5% passing 75 micron sieve), or similar. Provided the working platform is placed to the correct design level and assuming the layer does not contain clay spoil materials, the working platform could be incorporated into the final rigid pavement design.

5.2 Excavation Conditions and Dewatering

Excavation depths are currently not known, however, it is likely that a single level basement will be constructed over part of the site. A single level basement will involve excavation of the Unit 1, 2 and 3a sand materials which will be achievable with conventional hydraulic excavators or backhoes, pending appropriate dewatering of the excavation area.

Groundwater levels at the site were between 2.2 and 3.0m below existing surface levels at the time of the current investigation. As outlined above, excavation levels are not yet known, however, if basement levels are proposed it is likely that groundwater inflows into the excavation will occur.

Existing buildings that surround the site appear to vary in age with some appearing to be in excess of 40 years old. At least some of these buildings are likely to be founded on high level footings within the sand materials in the upper profile. Management of construction dewatering will therefore be required to manage the risk of damage to adjacent properties due to dewatering



induced settlement. Based on this initial analysis it is recommended that recharge and partial cut-off measures be employed during dewatering for excavation to reduce off-site drawdown impacts.

Partial cut-off measures could involve the use of sheet piles or similar, founded within the Unit 2 or Unit 3a sand materials, together with a line of groundwater injection bores outside the partial cut-off wall to maintain groundwater levels beneath surrounding structures.

Construction of a partial cut-off wall around the basement excavation area would result in reduced groundwater inflows during construction, which would limit groundwater drawdown outside the excavation and thereby reduce the risks of settlement due to lowering of the groundwater table.

Driving of sheet piles may result in settlement of the loose sands and could result in vibration and/or settlement impacts on the adjacent buildings. Alternatively, cut-off walls could be constructed using secant piling. Secant piling would result in significantly lower ground vibration impacts and could potentially be used for the basement walls subject to suitability from a structural and architectural perspective.

Prior to dewatering, if excavation below the water table is proposed, detailed design of the dewatering system would need to be carried out by a dewatering specialist, and would also need to take into account potential impacts on nearby registered water bores.

5.3 Earth Retention & Battered Slopes

Where space permits, temporary batter slopes may be constructed to simplify retaining wall construction and conventional concrete panel or similar walls adopted. Temporary batter slopes may be cut in sand materials above the groundwater level at 2H:1V. Surface water should be diverted away from the slope face and the face protected by the placement of plastic sheeting.

Temporary or permanent retaining walls at the site are likely to require the use of cantilevered wall arrangements. Cantilevered walls away from the zone of influence of the sewer line may be designed based on the following parameters:

- Bulk unit weight, γ = 20 kN/m³
- Effective Friction Angle, ϕ' = 29°
- Effective Cohesion, c' = 0 kPa

Design of the walls must take into account any surcharge from loadings behind the wall. Drainage measures as described above, if properly maintained, should reduce pore pressures at the back of the wall to zero, however, pore pressures may still be generated at other points behind the wall. The design should incorporate an allowance for such pressures and a fluctuating groundwater table.



5.4 Reuse of Site Soils

The existing soil and natural Unit 2 and 3 materials will be suitable for reuse as controlled fill at the site, pending review of the site contamination assessment (to be reported separately by RGS). Offsite disposal of the materials will also be dependent on the results of the contamination assessment.

5.5 Fill Placement & Compaction Requirements

Where fill is required to raise the site to design levels for the placement of high level footings or pavements, or as backfill behind retaining walls, the following procedures should be adopted:

- Prior to filling, the exposed subgrade should be proof roll tested in the presence of a suitably experienced geotechnical practitioner to highlight any soft, wet or excessively deflecting areas. Where these are encountered they should be over-excavated and removed to spoil;
- Where filling is required beneath structures, approved fill should be placed in layers not exceeding 250 mm loose thickness and compacted to a minimum dry density ratio of not less than 98% of standard compaction;
- Where filling is required beneath pavement layers, suitable fill should be placed in layers not exceeding 300 mm loose thickness and compacted to a minimum dry density ratio of 95% standard compaction.

In accordance with AS3798-2007, it is recommended that Level 1 control be implemented for areas of the site that are filled to support structures. Areas of the site that are filled to support pavements should be filled under Level 2 supervision and testing.

6 FOUNDATIONS

6.1 Characteristic Surface Movements (Site Classification)

AS2870-2011, '*Residential Slabs and Footings*', sets out a criteria for the classification of a site and the design and construction of a footing system for a single dwelling house, townhouse or a similar structure. The site classification can be used as a guide in the design of footing systems for structures of similar design, loading, configuration, and performance expectation to a typical residential structure.

Due to the presence of uncontrolled sand fill to depths of greater than 0.8m the site is classified as Class 'P'.

Providing that the 0.8m thick layer of sandy clay fill encountered BHR7 (0.8 to 1.2m depth) is removed, shrink-swell related surface movements are not anticipated at this site.



6.2 Foundation Options

Based on the subsurface conditions encountered at the site, there are several options for support of proposed structures. These options include:

- Shallow pad or strip footings founded in the Unit 2 Sand or controlled fill; or
- Piles founded within the Unit 3b medium dense to dense sands.

Discussion of the options and design parameters for the relevant materials is provided in the following sections.

6.3 Shallow Footings

For pad or strip footings in the Unit 2 Aeolian Sand or the existing granular fill that has been reworked under Level 1 conditions as defined by AS3798-2007, the allowable bearing pressure (ABP) is affected by the width of the footing and the depth of embedment. For shallow footings up to 1m wide founded at a depth of no greater than 1m below the existing surface level, the allowable bearing pressure may be assessed using the equation below:

$$ABP = 50B + 50 \text{ (kPa)} \quad \text{Where } B = \text{Footing width (m)}$$

The assessment of serviceability beneath shallow footings founded as outlined above may be undertaken assuming an elastic modulus of the founding material of $E = 15\text{MPa}$, and considering the effects of uniform, point and line loads from the structure. Assuming loads of up to 120kN/m on strip footings 1.2m wide with a depth of influence of 1.5 times the width of the footing, settlements of up to 20mm to 25mm can be expected.

High level footings are to be founded outside or below all zones of influence from existing or future service trenches, including the existing 6m deep sewer line.

At least the initial stages of footing excavations should be inspected by a suitably experienced geotechnical engineer to confirm that founding conditions are suitable for the proposed building loads. If, during construction, it is apparent that the foundation conditions are different from those described in this report then further geotechnical advice should be sought.

6.4 Piled Foundations

Where shallow footings cannot support the proposed footing loads, piles will be required. The close proximity of buildings to the site and the presence of sand soils will mean that driven piles should not be adopted due to the likelihood of vibration induced damage. Grout injected piles (CFA or similar) will provide an appropriate alternative. Geotechnical design parameters for pile foundations have been provided in Table 3.

Piles founded in the Unit 3b sand layer should be founded into the sand at a depth of one times the diameter of the pile, and the base of the pile must be terminated not less than five pile diameters



above the base of the sand unit. Should piles extend to within less than five diameters of the base of the sand layer as indicated in Table 1, pile design should be undertaken using the parameters for the underlying Unit 4 clays.

Table 3: Ultimate Design Parameters for Non-Displacement Piles

Material Unit	Material Name	Ultimate End Bearing Capacity, f_b	Ultimate Shaft Adhesion – compression, f_{ms} ⁽²⁾	Effective Vertical Young's Modulus, E'_v	Effective Horizontal Young's Modulus, E'_h
2	Aeolian Sand & Indurated Sand	--	--	--	--
3a	Marine Sand Variable	--	20 kPa	15 MPa	12 MPa
3b	Marine Sand MD-D	5,500 kPa ⁽³⁾	40 kPa	20 MPa	15 MPa
4	Marine Clay St-VSt	500 kPa ⁽¹⁾	50 kPa	15 MPa	12 MPa

Notes: 1 Piles founded at least 1m below the top of the clay due to the presence of an upper firm layer
 2 For piles designed to resist uplift forces, it is recommended that the ultimate skin friction values given above be reduced by 50%
 3 For piles designed for end bearing in sand the base of the pile must be at least than 5 pile diameters above the base of the sand layer.

For pile design in accordance with AS2159-2009, 'Piling-Design and installation', the ultimate geotechnical strength ($R_{d,ug}$) can be calculated using the shaft capacity and ultimate end bearing capacity values provided in Table 3. Calculation of the design geotechnical strength ($R_{d,g}$) requires an assessment of the geotechnical strength reduction factor (Φ_g), which is based on a series of project specific variables. In assessing a suitable geotechnical strength reduction factor for this project, the following assumptions have been made:

- Design of piles and pile groups will be undertaken in accordance with the recommendations presented in this report;
- Limited geotechnical involvement will occur during pile installation;
- Some performance monitoring of the supported structure during or after construction; and
- The foundations will be designed by a designer of at least moderate experience in similar geotechnical profiles and pile design;
- Well established pile design methods will be adopted.

Based on the above and in accordance with AS2159-2009, a risk rating of 1.97 is estimated. Therefore, assuming the pile configuration will have low redundancy a Geotechnical Strength Reduction Factor of $\Phi_g=0.61$ would be appropriate for the site if no static load testing is undertaken. This could be increased to $\Phi_g=0.71$ if a proportion of the piles are dynamically tested or $\Phi_g=0.75$ if a proportion of the piles are statically tested.

In the event that any of the assumptions outlined above are not correct, the Geotechnical Strength Reduction Factor may change and further advice should be sought. Calculation sheets for assessment of the Geotechnical Reduction Factor are presented in Appendix B.



7 EARTHQUAKE SITE FACTOR

Based on the Australian Standard AS1170.4 – 2007 '*Structural Design Actions Part 4: Earthquake Actions in Australia*' the standard nominates earthquake factors based on Subsoil Class and specific locations within Australia. Based on the ground conditions encountered and the location of the site in Newcastle, design for earthquake effects can be undertaken for a Subsoil Class (D_e) Deep Soil Site and a site Hazard Factor (Z) of 0.12.

8 MINE SUBSIDENCE

Assessment for the potential for mine subsidence was not requested within the provided scope of work. We understand this has been addressed by others and therefore RGS did not undertake a mine subsidence assessment for this site.

9 PAVEMENT THICKNESS DESIGN

The pavement thickness design developed for the site has been assessed based on "Austroads - Guide to Pavement Technology Part 2: Pavement Structural Design". The pavement thickness design is presented in Appendix C and has been based on the following assumptions:

- Design traffic of 1 x 10³ HVAG; and
- No concrete shoulder reinforcement is provided to the pavement.

10 ACID SULFATE SOILS

Online mapping produced by the Australian Soil Resource Information System (ASRIS) indicates that the site soils have a low probability of occurrence of acid sulfate soils.

Acid Sulfate Soils (ASS) produce sulphuric acid when exposed to oxygen due to the presence of iron sulphides in the form of pyrite within the soil matrix. These soils form when iron-rich sediments are deposited in saltwater or brackish water environments. Prior to oxidation, these pyritic soils are referred to as Potential ASS. ASS that have produced acid as a result of oxidation are referred to as Actual ASS. They typically occur in natural, low-lying coastal depositional environments below approximately 5m AHD. In the field ASS are generally identified as saline sediments such as alluvial or estuarine soils or bottom sediments in creeks and estuaries.

Nine samples obtained were screened for the presence of actual or potential ASS using methods 23Af and 22Bf of the ASSMAC Acid Sulfate Soils Manual. The test results are attached. The results indicated:

- The samples revealed pH_F values of 4.7 and 7 in distilled water. In this test, pH <4 is an indicator of Actual ASS;



- The samples revealed pH_{FOX} values of 3.4 to 5.0 in hydrogen peroxide. Values of less than 3 or samples showing a significant drop in pH during this test can be an indicator of Potential ASS.

To further assess the source of the acidity in the soil four samples were submitted for Chromium Reducible Sulphur analysis. The test results indicate that all four samples have chromium reducible sulfur values below the laboratory detection limits and hence below the adopted action criteria of 0.03%.

The soils at the site are therefore not considered to be either actual or potential acid sulfate soils. An acid sulfate soil management plan is not required.

11 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical and pavement design practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.

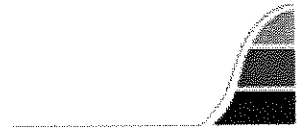
If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

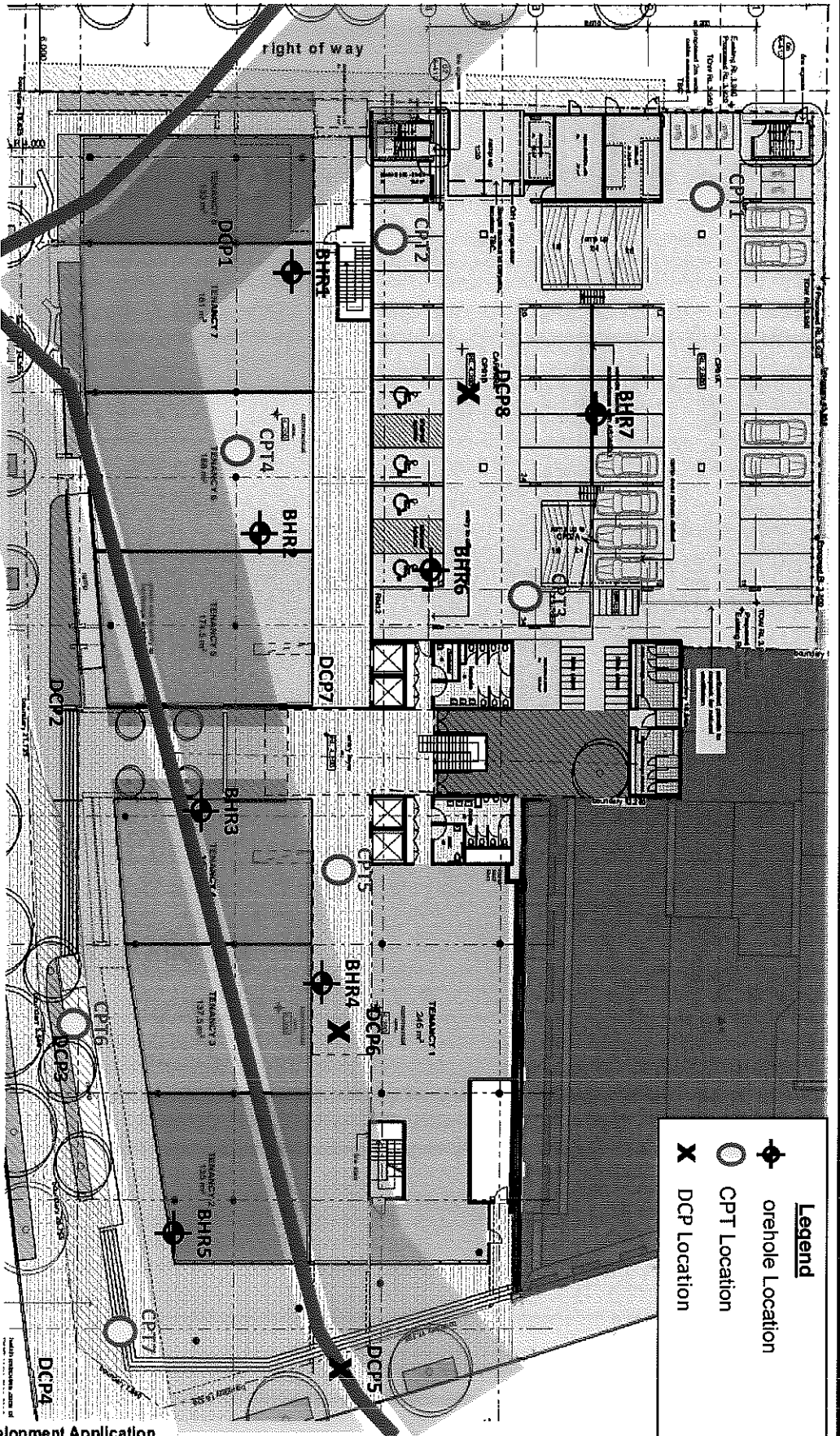
Regional Geotechnical Solutions Pty Ltd

Simon Keen

Geotechnical Engineer



Figures

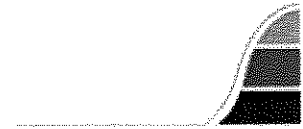


Legend

- orehole Location
- CPT Location
- DCP Location

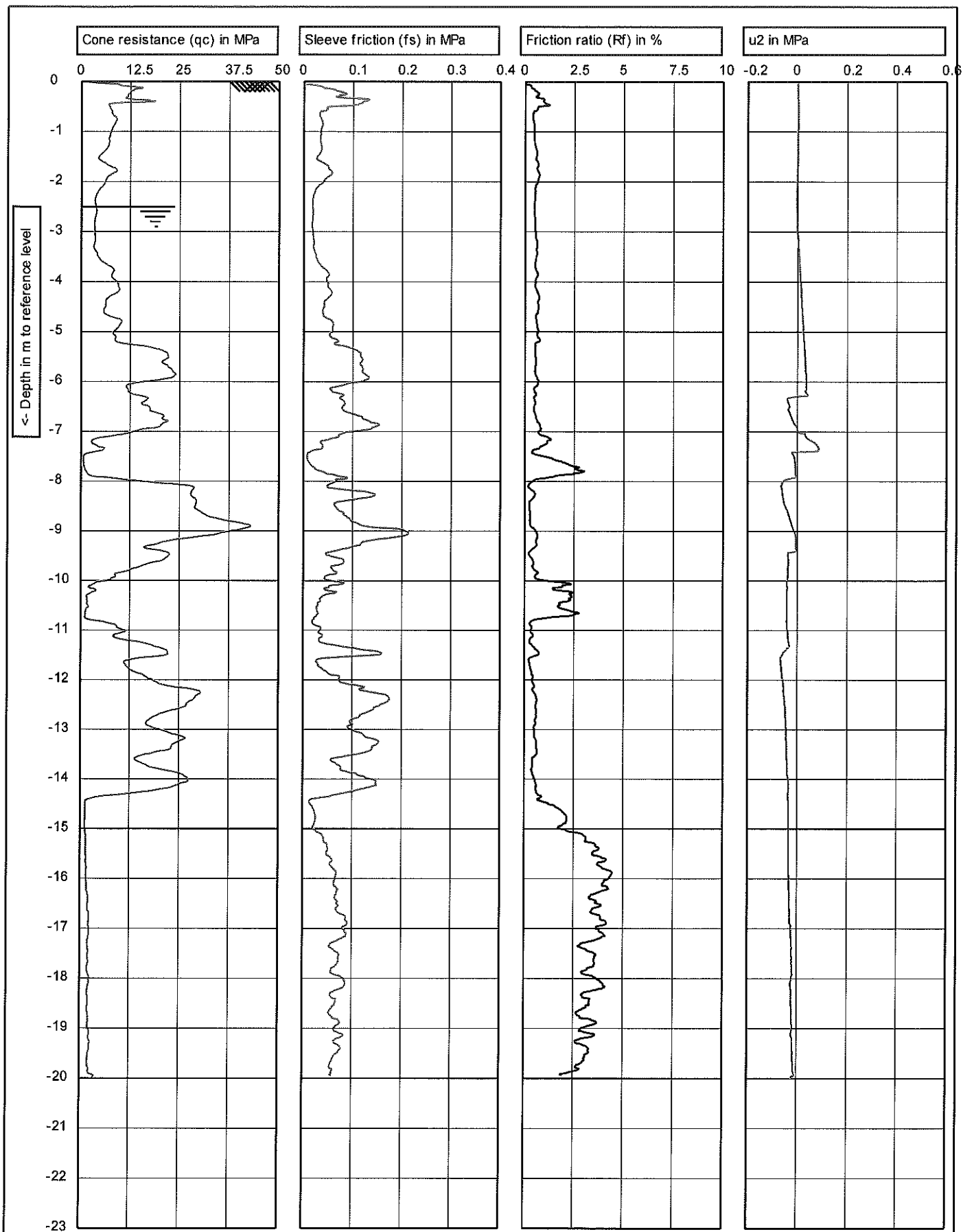
Client: Core Project Group		Job No.	RGSO1102.1
Project: Proposed Multistorey Commercial Development & Carpark		Drawn By:	SK
Title: 12 Stewart Avenue, Newcastle West Typical Section of Excavation Wall		Scale:	As Shown
		Date:	24-Mar-16
		Drawing No.	Figure 1

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GEOTECHNICAL SOLUTIONS

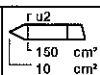


Appendix A

Results of Field Investigations



NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1
G.L. 0 NAP W.L.: -2.5

Project: Geotechnical Investigation
Location: Core Projects Stewart Ave
Position:

Predrill: 0 m Predrilled

Date: 2/24/2016

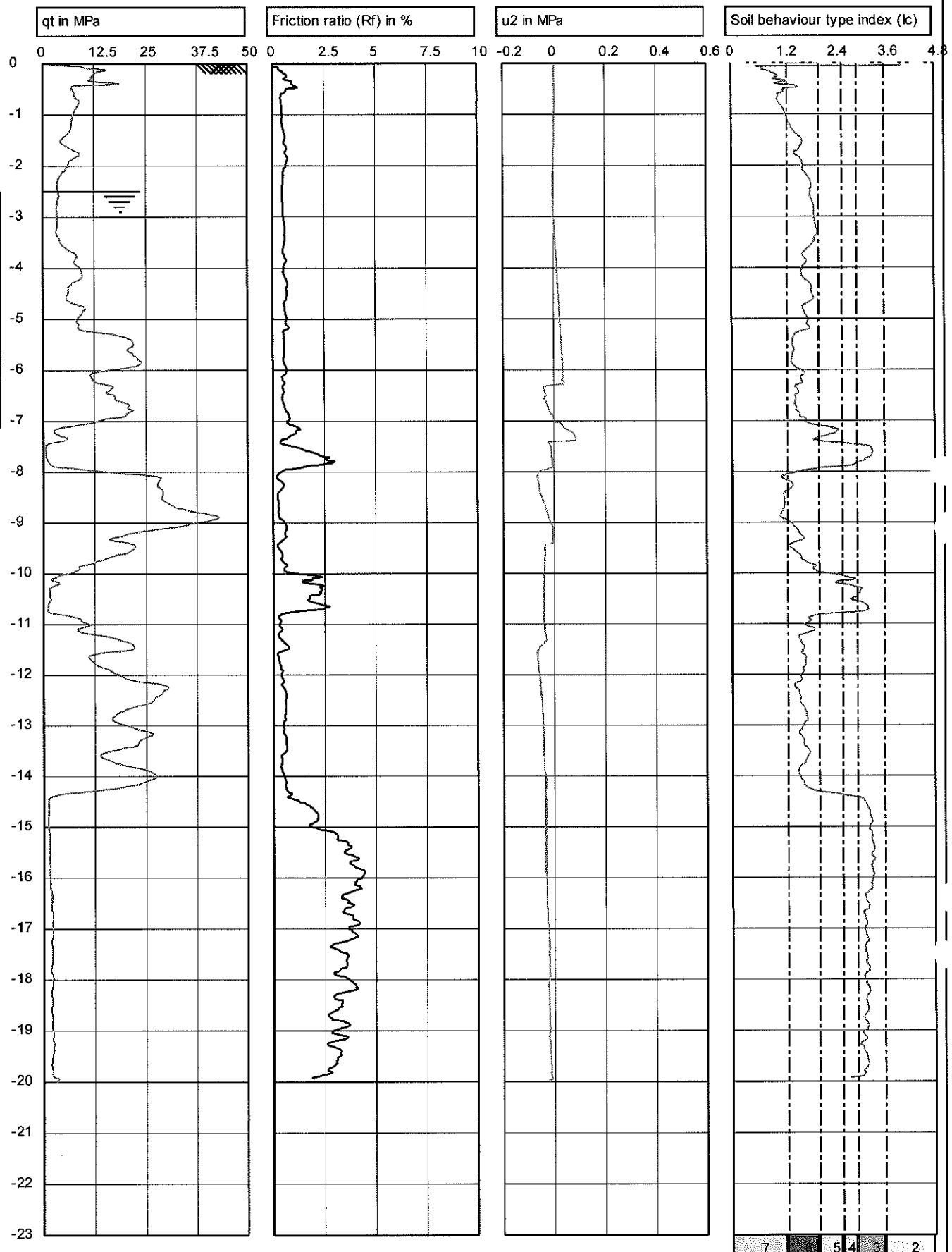
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Project no.: RGS 01102

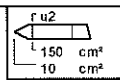
CPT no.: CPT-1

1/3

Depth in m to reference level



**NEWSYD
GEOTECHNICAL
TESTING**
Ph:0408292638

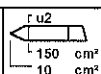


Test according NEN 5140 class 1	
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Project: Geotechnical Investigation	
Location: Core Projects Stewart Ave	
Position:	

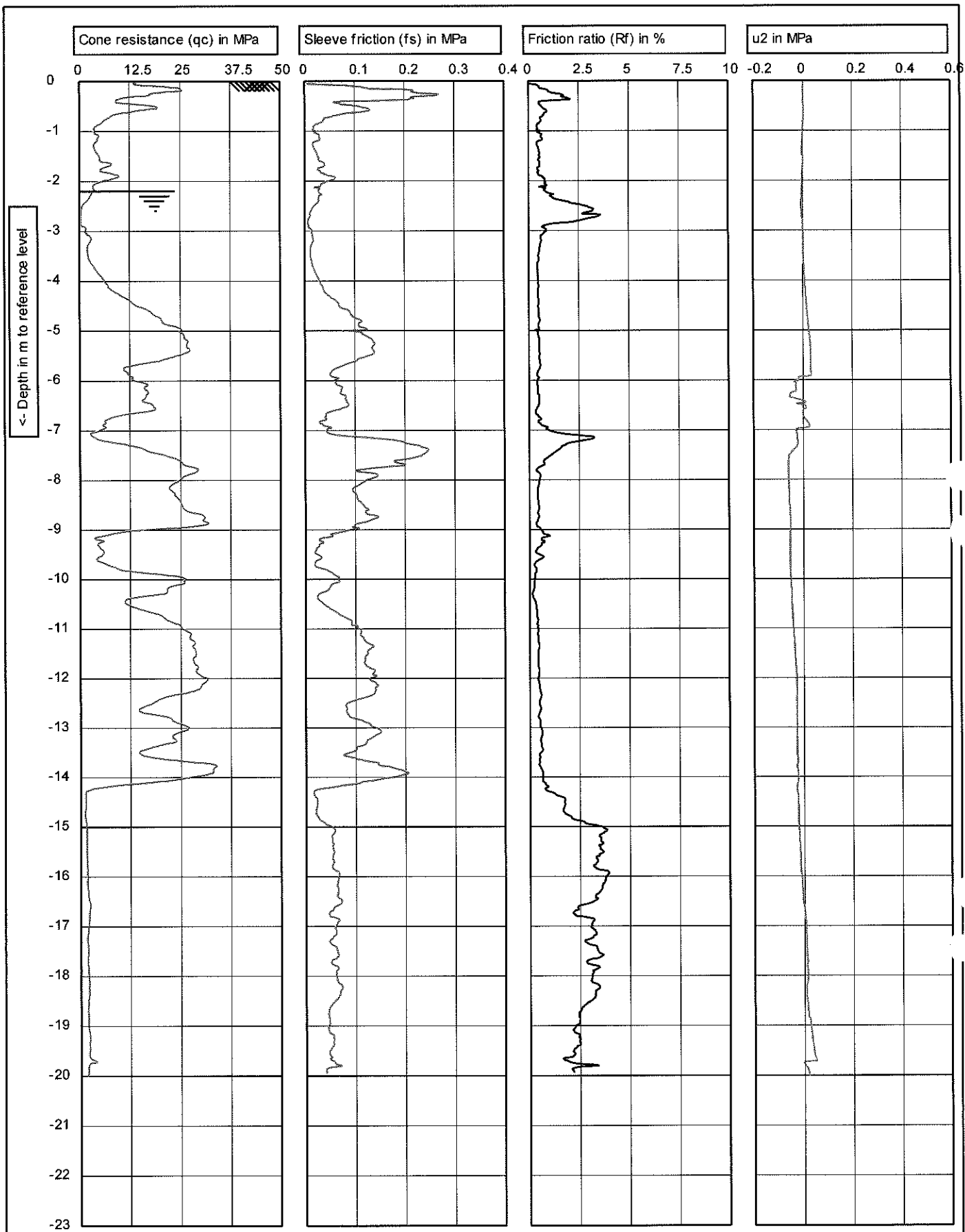
Predrill :	0 m Predrilled	
Date:	2/24/2016	
Cone no.:	C10CRIP.C14476	
Project no.:	RGS 01102	
CPT no.:	CPT-1	2/3

- (3) Clay
 (4) Silty clay
 (5) Silty sand
 (6) Sand clean to silty
 (7) Gravelly sand

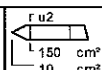
**NEWSYD
 GEOTECHNICAL
 TESTING**
 Ph:0408292638



Test according NEN 5140 class 1		Predrill : 0 m Predrilled	
G.L. 0 NAP	W.L.: -2.5	Date: 2/24/2016	
Project: Geotechnical Investigation Location: Core Projects Stewart Ave Position:		Cone no.: C10CFIP.C14476	
		Project no.: RGS 01102	
		CPT no.: CPT-1	3/3



NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.2

Predrill : 0 m Predrilled

Date: 2/24/2016

Project: Geotechnical Investigation

Location: Core Projects Stewart Ave

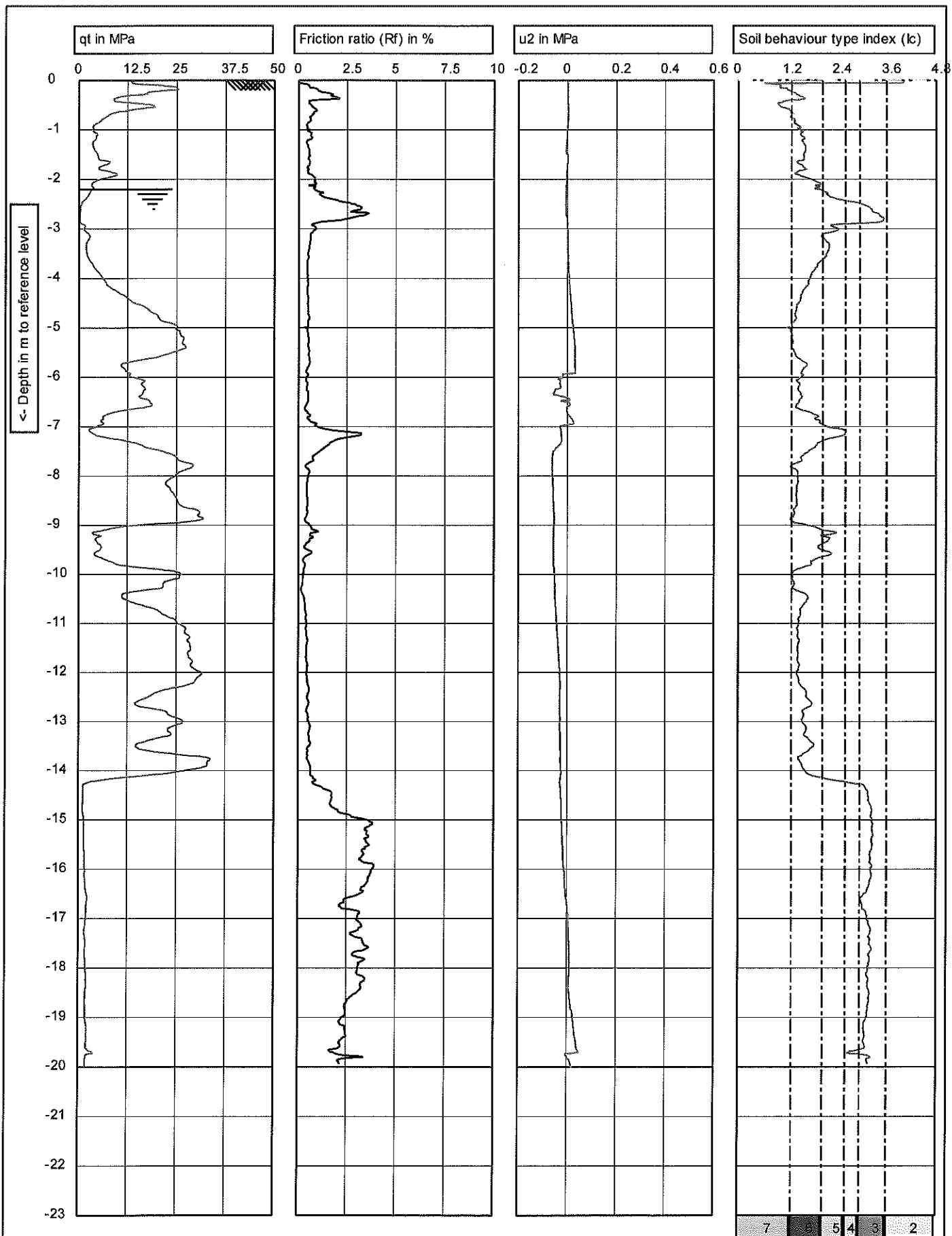
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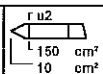
Project no.: RGS 01102

CPT no.: CPT-2

1/3



**NEWSYD
GEOTECHNICAL
TESTING**
Ph:0408292638



Test according NEN 5140 class 1
G.L. 0 NAP W.L.: -2.2
Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill : **0 m Predrilled**

Date: **2/24/2016**

Cone no.: **C10CFIP.C14476**

Project no.: **RGS 01102**

CPT no.: **CPT-2**

2/3

(3) Clay

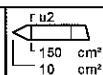
100% clay

100% clay

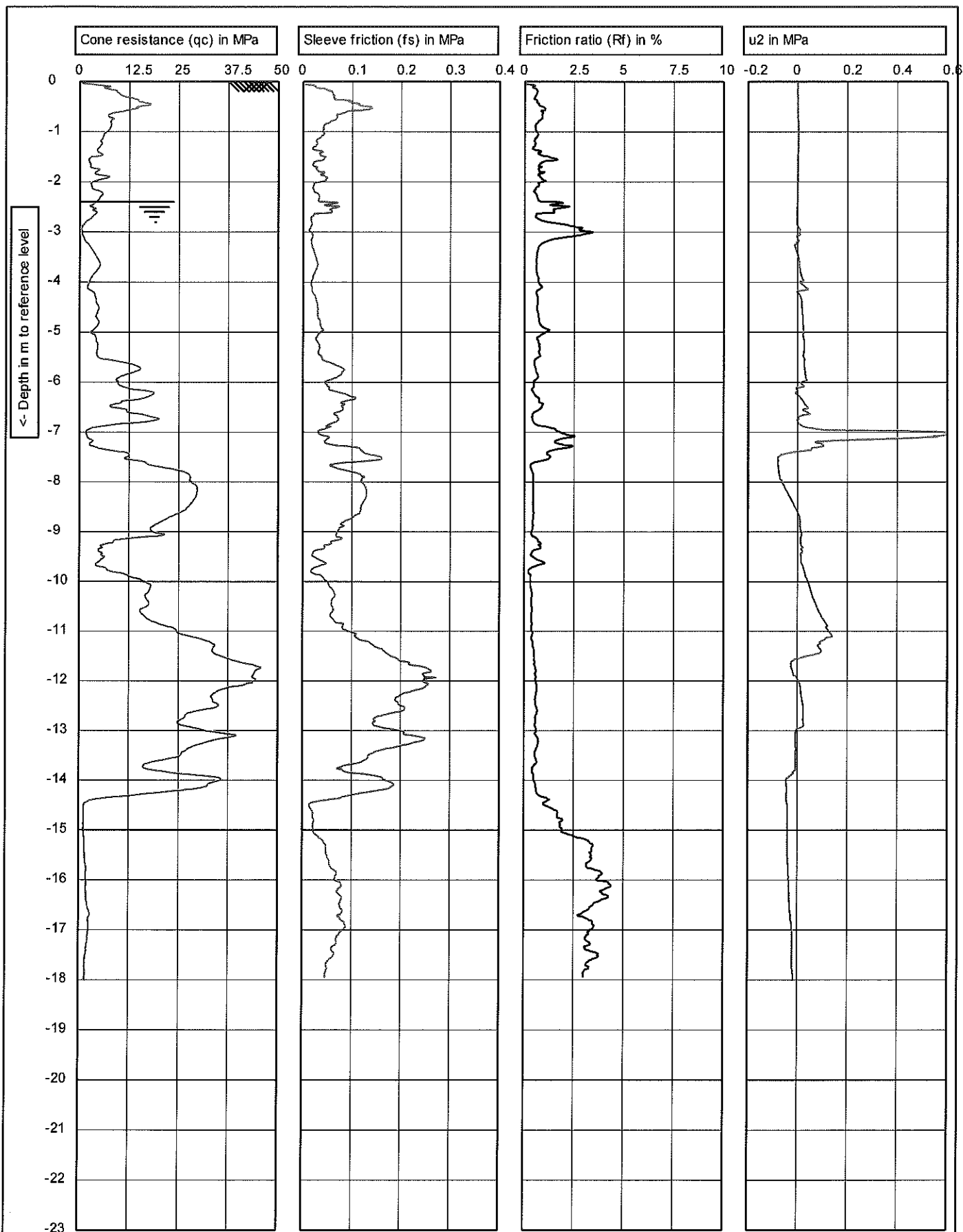
(6) Sand clean to silty

100% sand

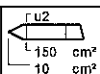
NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1		Predrill : 0 m Pre drilled	
G.L. 0 NAP	W.L.: -2.2	Date: 2/24/2016	
Project: Geotechnical Investigation Location: Core Projects Stewart Ave Position:		Cone no.: C10CFIIP.C14476	
		Project no.: RGS 01102	
		CPT no.: CPT-2	3/3



NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1
G.L. 0 NAP W.L.: -2.4

Project: Geotechnical Investigation
Location: Core Projects Stewart Ave
Position:

Predrill : 0 m Predrilled

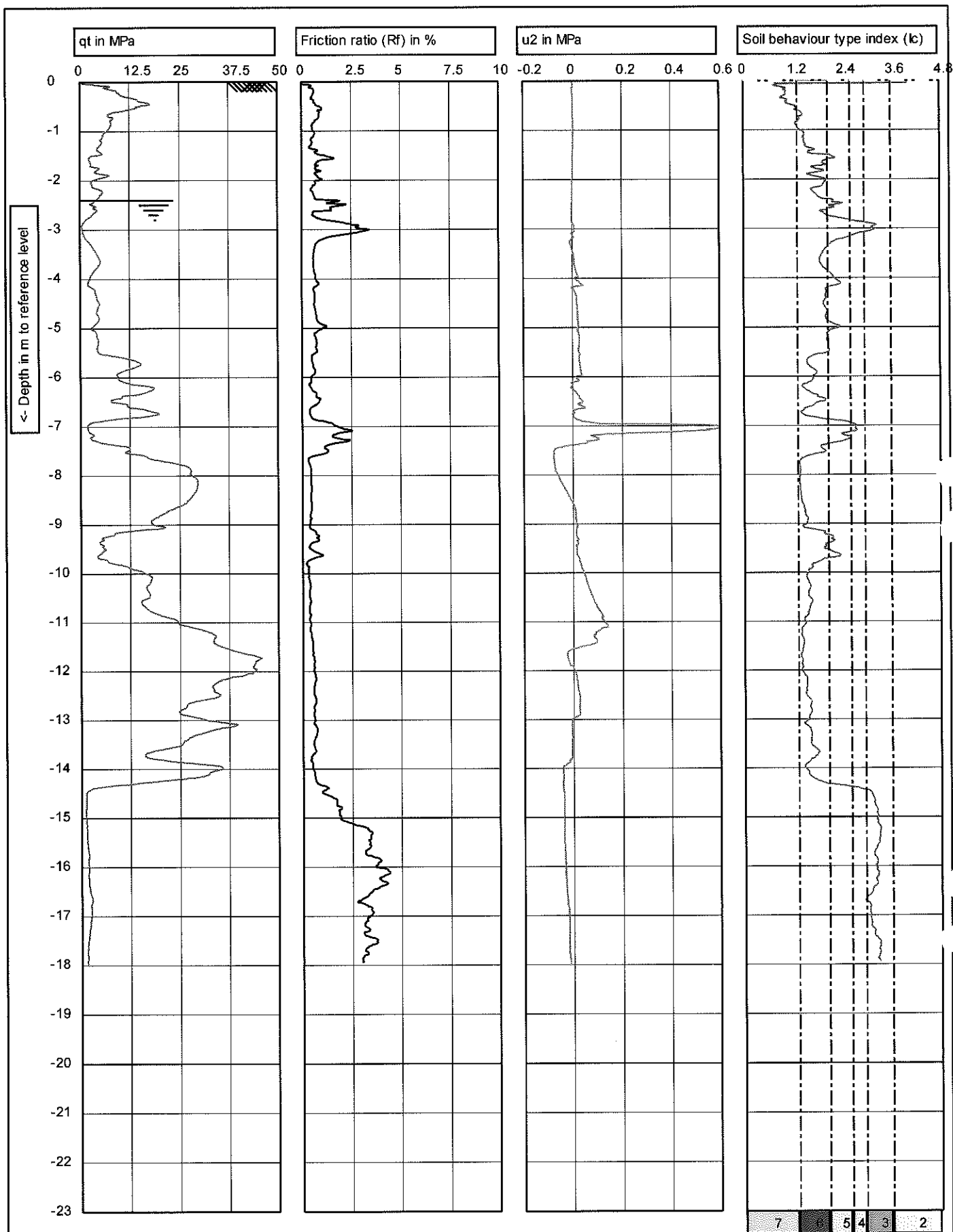
Date: 2/24/2016

Cone no.: C10CFIIP.C14476

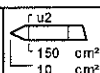
Project no.: RGS 01102

CPT no.: CPT-3

1/3



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GEOTECHNICAL
TESTING
Ph:0408292638



u2
150 cm²
10 cm²

Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.4

Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill : **0 m Predrilled**

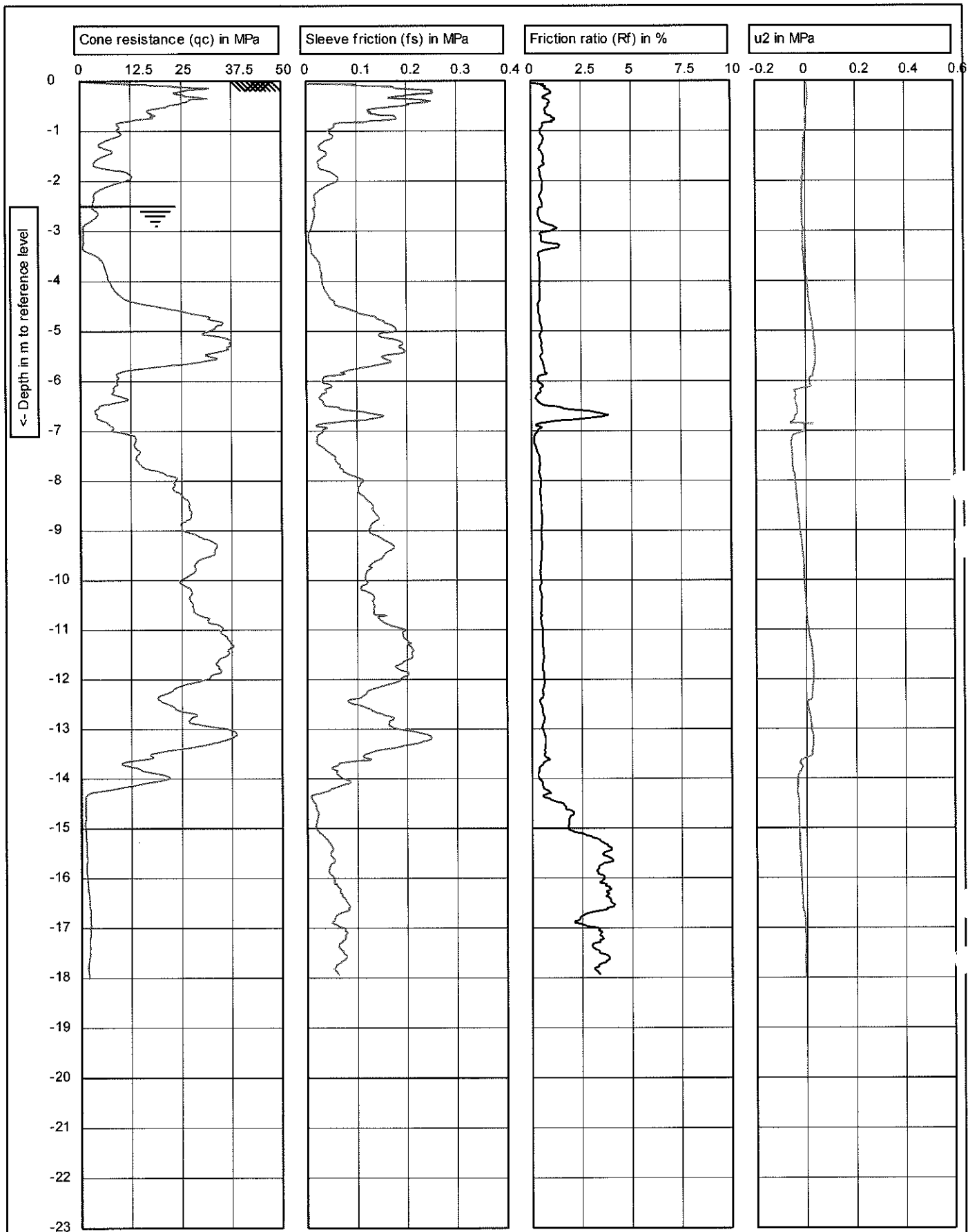
Date: **2/24/2016**

Cone no.: **C10CFIIP.C14476**

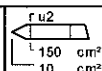
Project no.: **RGS 01102**

CPT no.: **CPT-3** 2/3

(7) Gravelly sand



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GEOTECHNICAL
TESTING
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Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.5

Predrill : 0 m Pre drilled

Date: 2/24/2016

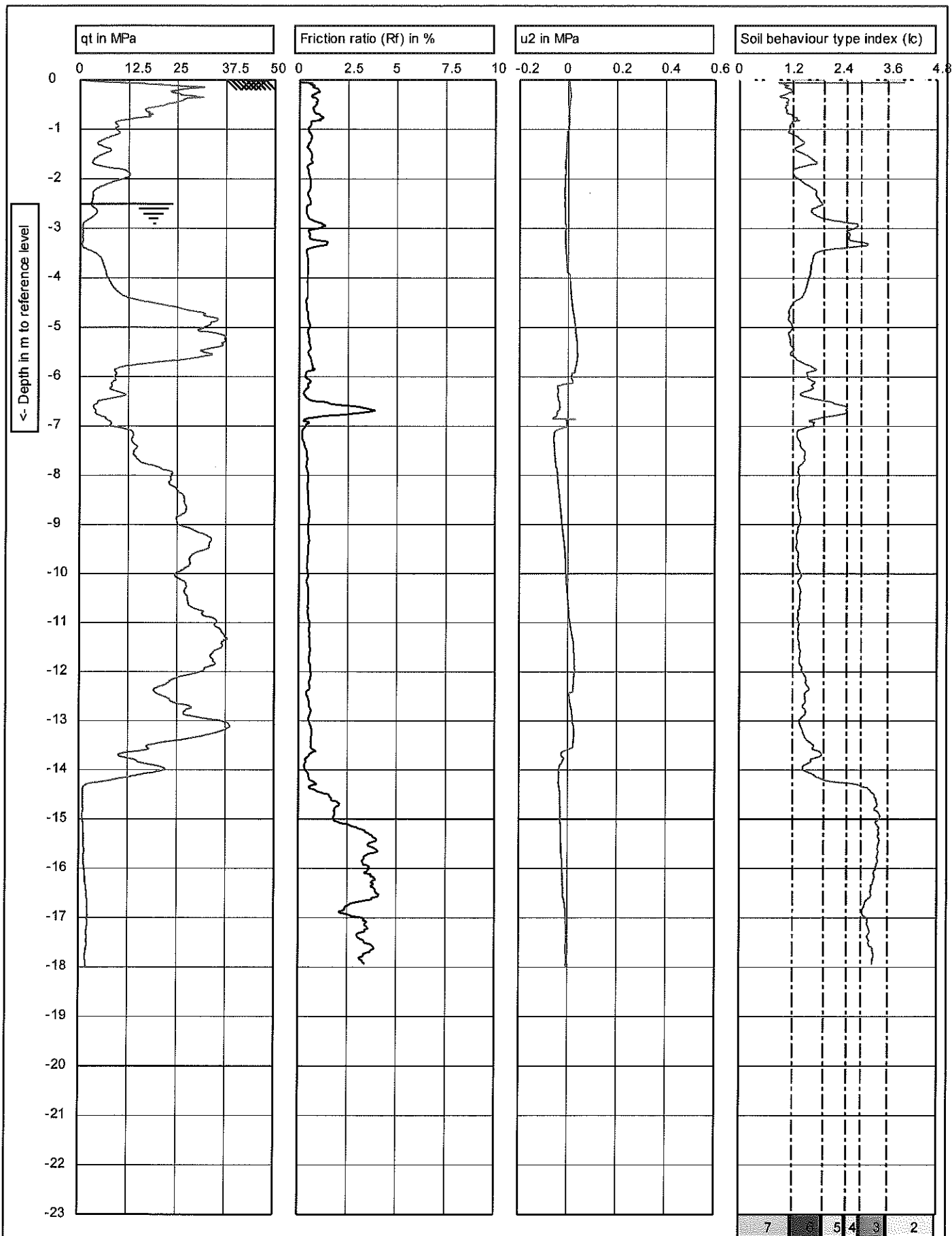
Cone no.: C10CFIP.C14476

Project no.: RGS 01102

CPT no.: CPT-4

1/3

Project: Geotechnical Investigation
Location: Core Projects Stewart Ave
Position:



NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



u2
150 cm²
10 cm²

Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.5

Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill: **0 m Predrilled**

Date: **2/24/2016**

Cone no.: **C10CFIP.C14476**

Project no.: **RGS 01102**

CPT no.: **CPT-4**

2/3

(3) Clay

100 cm
10 cm

(6) Sand clean to silty

100 cm
10 cm

NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.5

Predrill : 0 m Predrilled

Date: 2/24/2016

Project: Geotechnical Investigation

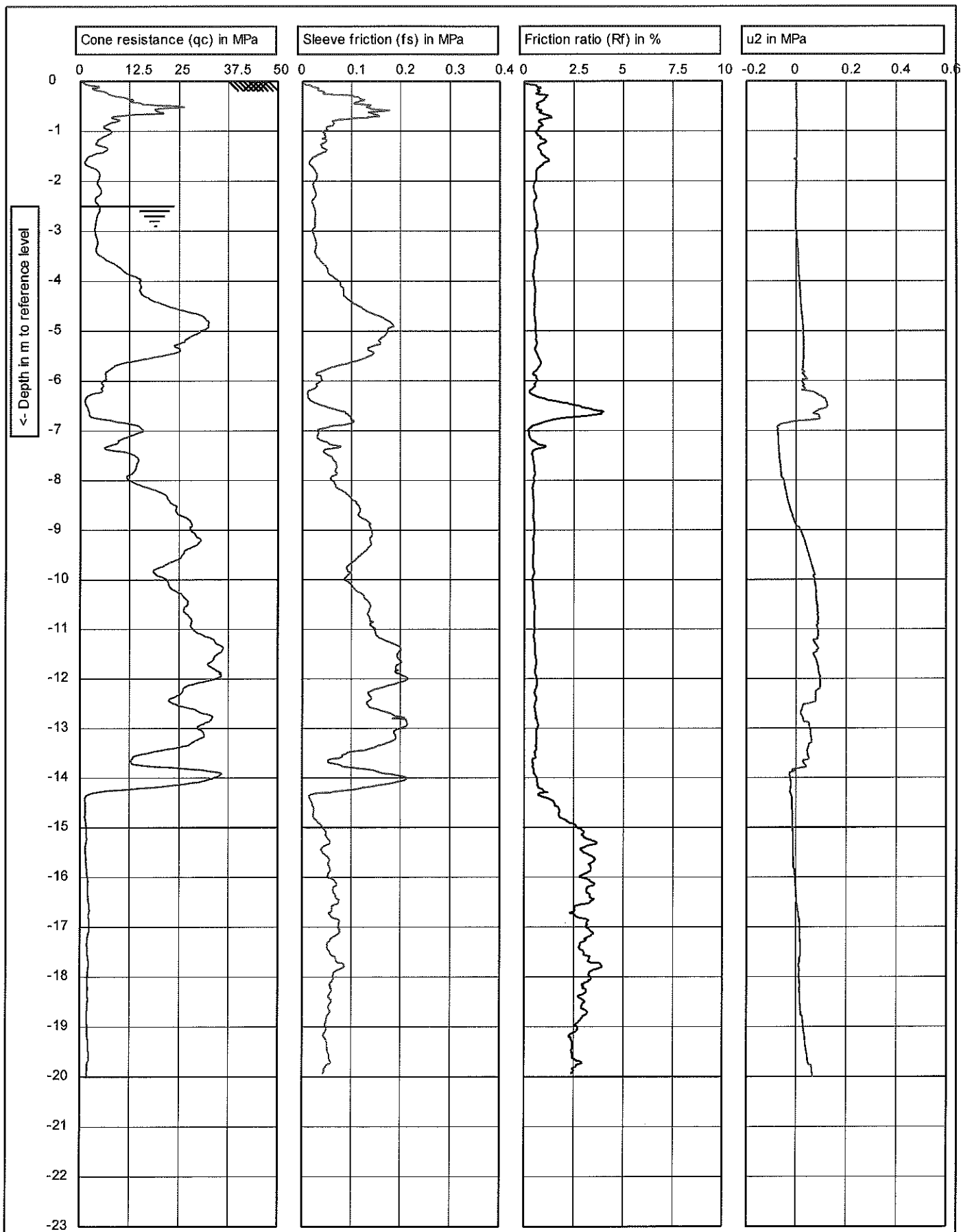
Location: Core Projects Stewart Ave

Position:

Cone no.: C10CFIP.C14476

Project no.: RGS 01102

CPT no.: CPT-4 3/3



**NEWSYD
GEOTECHNICAL
TESTING**
Ph:0408292638



Test according NEN 5140 class 1
G.L. 0 NAP W.L.: -2.5
Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill: **0 m Predrilled**

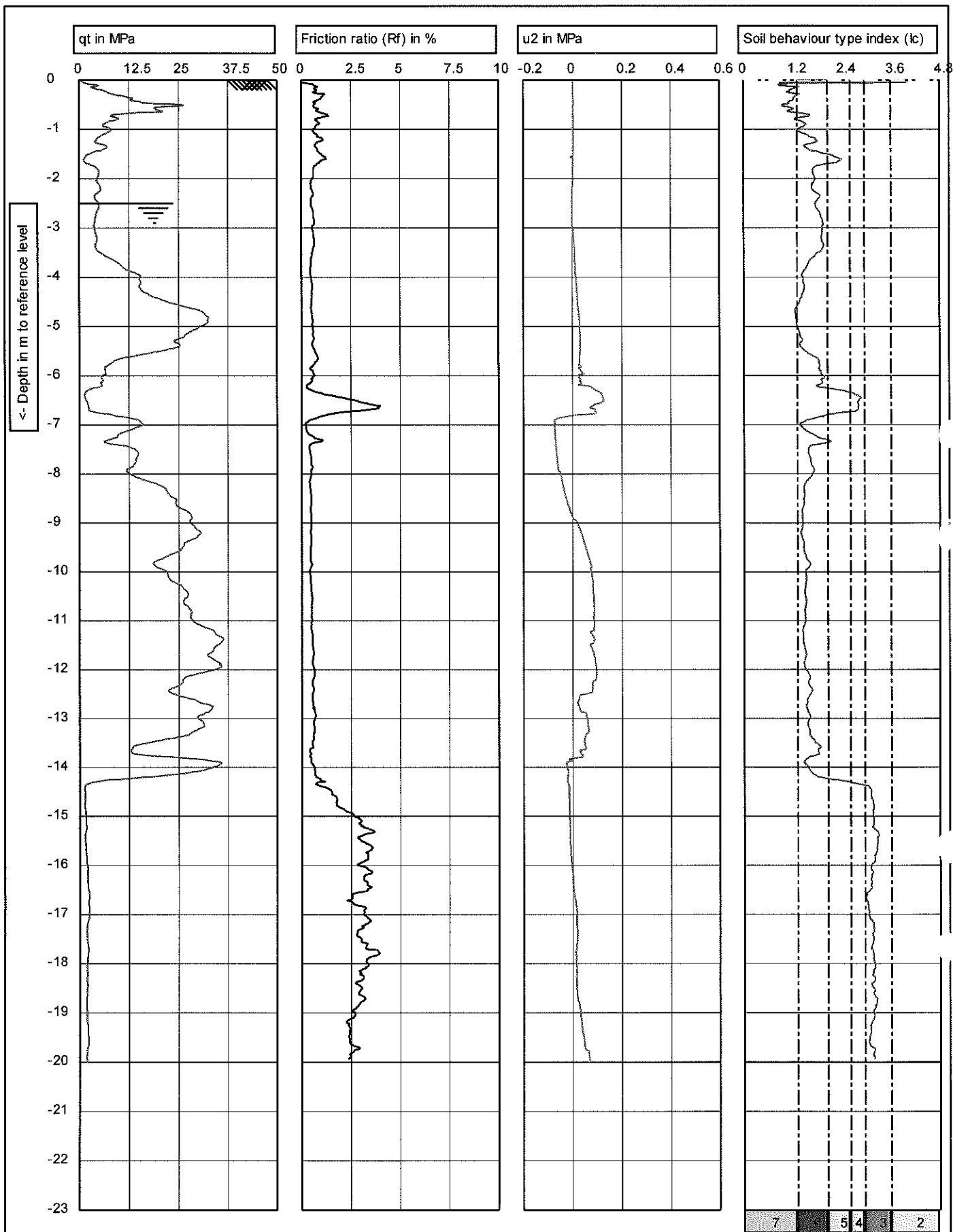
Date: **2/24/2016**

Cone no.: **C10CFIIP.C14476**

Project no.: **RGS 01102**

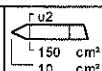
CPT no.: **CPT-5**

1/3



NEWSYD
GEOTECHNICAL
TESTING

Ph:0408292638



Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.5

Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill : **0 m Predrilled**

Date: **2/24/2016**

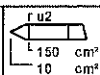
Cone no.: **C10CFIP.C14476**

Project no.: **RGS 01102**

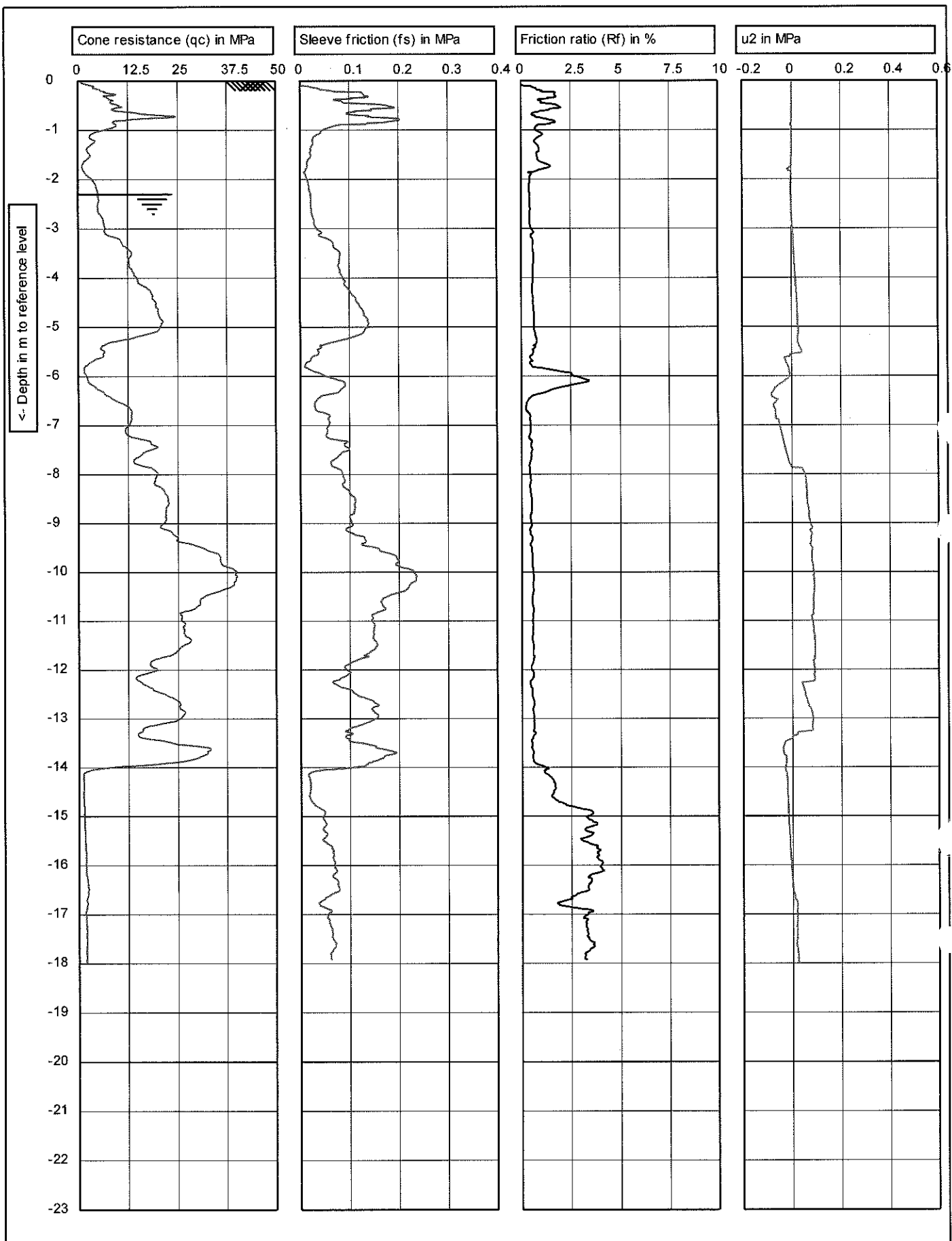
CPT no.: **CPT-5** 2/3

- (2) Organic silt
- (3) Clay
- (4) Silt mixture
- (5) Sand mixture
- (6) Sand clean to silty
- (7) Gravelly sand

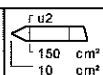
**NEWSYD
GEOTECHNICAL
TESTING**
Ph:0408292638



Test according NEN 5140 class 1		Predrill :	0 m Predrilled	
G.L. 0 NAP	W.L.: -2.5	Date:	2/24/2016	
Project: Geotechnical Investigation Location: Core Projects Stewart Ave Position:		Cone no.:	C10CFIP.C14476	
		Project no.:	RGS 01102	
		CPT no.:	CPT-5	3/3



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GEOTECHNICAL
TESTING
Ph:0408292638



Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.3

Predrill : 0 m Pre drilled

Date: 2/24/2016

Project: Geotechnical Investigation

Location: Core Projects Stewart Ave

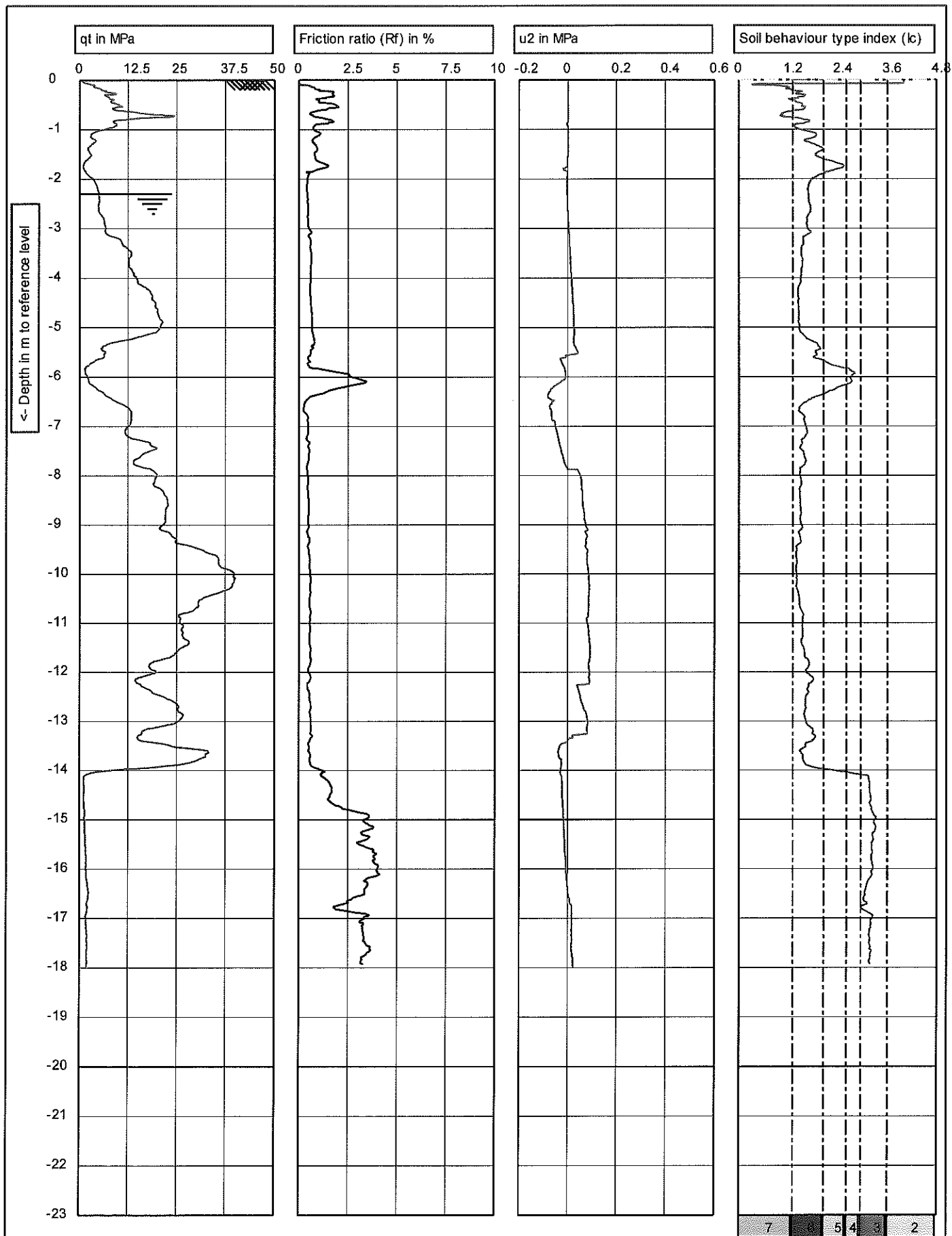
Position:

Cone no.: C10CFIP.C14476

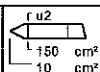
Project no.: RGS 01102

CPT no.: CPT-6

1/3



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TESTING**
Ph:0408292638



Test according NEN 5140 class 1
G.L. 0 NAP W.L.: -2.3

Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill: **0 m Predrilled**

Date: **2/24/2016**

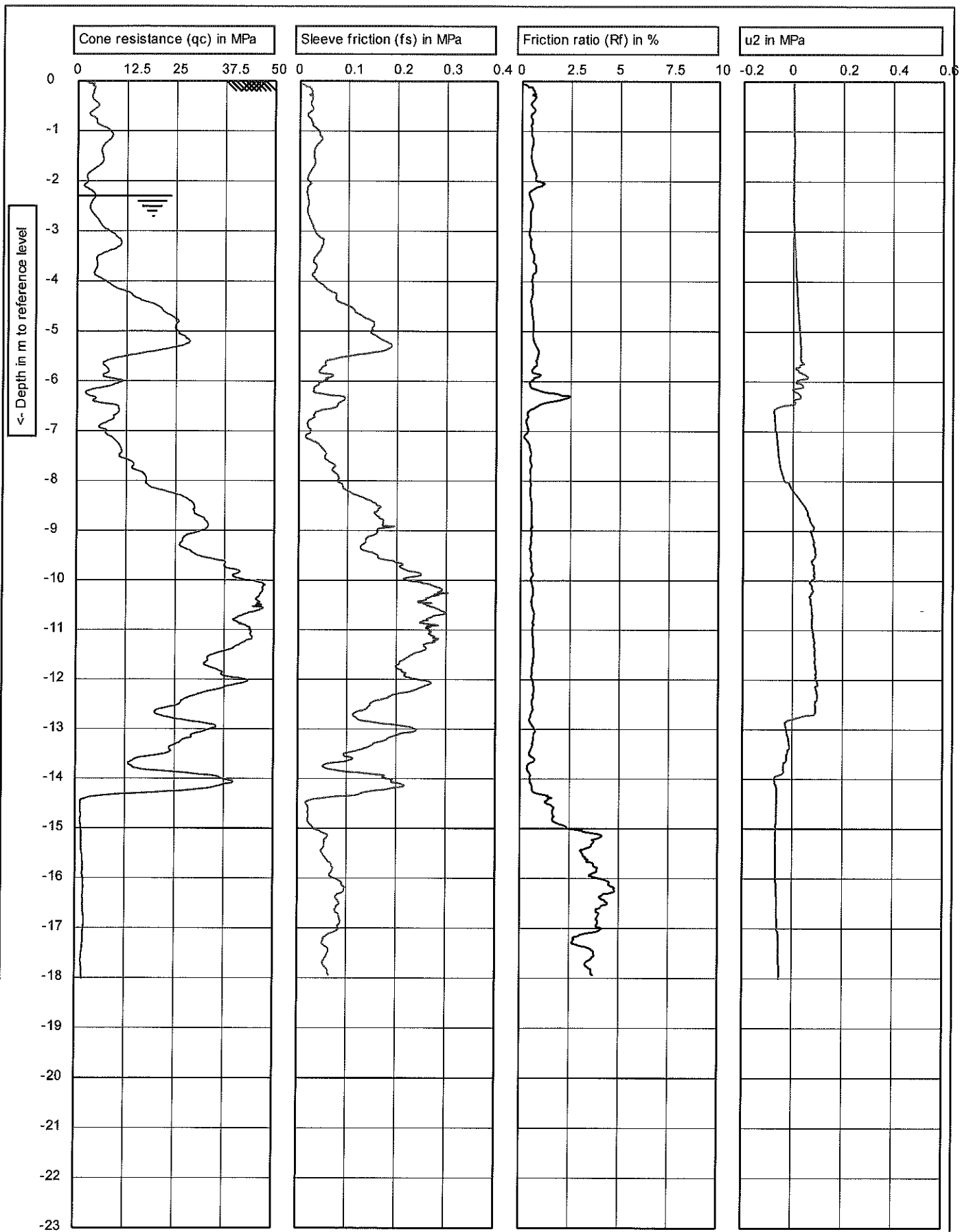
Cone no.: **C10CFIP.C14476**

Project no.: **RGS 01102**

CPT no.: **CPT-6**

2/3

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TESTING
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Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.3

Predrill : **0 m Predrilled**

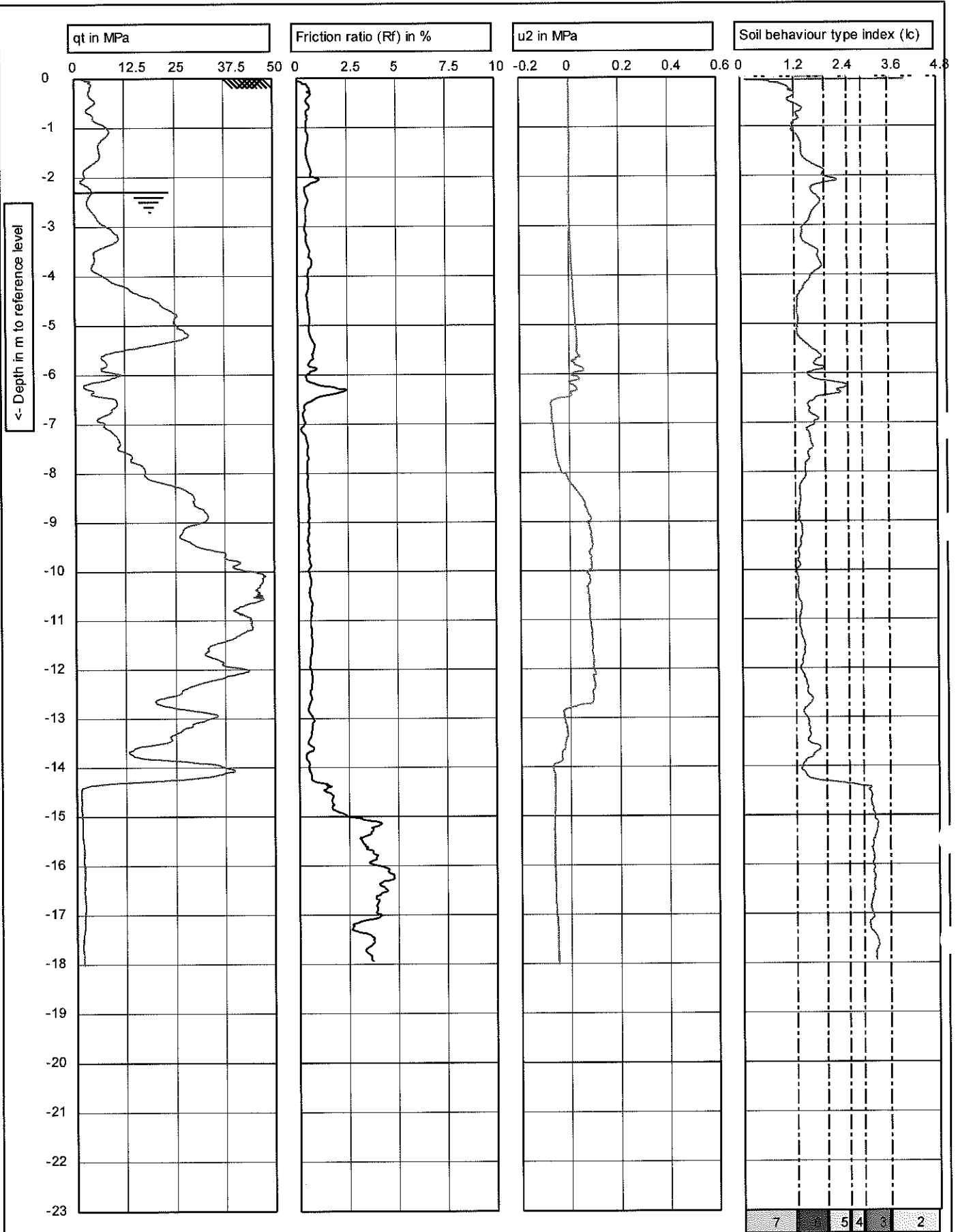
Date: **2/24/2016**

Cone no.: **C10CFIIP.C14476**

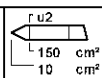
Project no.: **RGS 01102**

CPT no.: **CPT-7**

1/3



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TESTING
Ph:0408292638



Test according NEN 5140 class 1

G.L. 0 NAP

W.L.: -2.3

Project: **Geotechnical Investigation**
Location: **Core Projects Stewart Ave**
Position:

Predrill : **0 m Predrilled**

Date: **2/24/2016**

Cone no.: **C10CFIP.C14476**

Project no.: **RGS 01102**

CPT no.: **CPT-7**

2/3

(2) Organic silt

(3) Clay

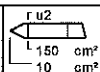
(4) Silt mixture

(5) Sand mixture

(6) Sand clean to silty

(7) Gravelly sand

NEWSYD
GEOTECHNICAL
TESTING
Ph:0408292638



	Test according NEN 5140 class 1		Predrill : 0 m Predrilled	
	G.L. 0 NAP	W.L.: -2.3	Date: 2/24/2016	
Project:	Geotechnical Investigation		Cone no.: C10CFIP.C14476	
Location:	Core Projects Stewart Ave		Project no.: RGS 01102	
Position:			CPT no.:	CPT-7
				3/3



ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: **BHR1**
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR BOREHOLE DIAMETER: 100 mm INCLINATION: 90° EASTING: NORTHING: SURFACE RL: DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT	Not Encountered	E 0.20m		0.5		SP	FILL: Gravelly SAND, fine to medium grained, dark grey, Gravel fine to coarse grained, some glass and chitter, some bricks and rubble	M	VD			FILL
				1.0			Hole Terminated at 0.85 m Due to refusal on obstacle in fill					
				1.5								
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

U₅₀ 50mm Diameter tube sample
CBR Bulk sample for CBR testing
E Environmental sample
ASS Acid Sulfate Soil Sample
B Bulk Sample

Field Tests

PiD Photoionisation detector reading (ppm)
DCP(x-y) Dynamic penetrometer test (test depth interval shown)
HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W _p	Plastic Limit
VSt	Very Stiff	200 - 400	W _L	Liquid Limit
H	Hard	>400		
Fb	Friable			

Density		
V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR2
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR **EASTING:** **SURFACE RL:**
BOREHOLE DIAMETER: 100 mm **INCLINATION:** 90° **NORTHING:** **DATUM:** AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	
ADV		E 0.20m				SP	FILL: Gravelly SAND, fine to medium grained, grey, Gravel fine to coarse grained, some rubble	M		FILL
		0.50m		0.5		SP	FILL: Silty SAND, fine to medium grained, dark grey, with some gravel			FILL - some rubble
		0.60m E				SP	SAND: Fine to medium grained, dark grey-brown, some gravel, timber, glass			FILL
		1.40m		1.0		SP	SAND: Fine to medium grained, pale brown	M		AEOLIAN
		ASS 1.60m		1.5			Becoming darker red-brown			
		2.40m		2.0						
		2.50m ASS		2.5				W		
		3.50m		3.0						
		3.60m ASS		3.5						
				4.0						
				4.20m			Hole Terminated at 4.20 m			
				4.5						

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency

VS	Very Soft	<25
S	Soft	25 - 50
F	Firm	50 - 100
St	Stiff	100 - 200
VSt	Very Stiff	200 - 400
H	Hard	>400
Fb	Friable	

UCS (kPa)

Moisture Condition

D	Dry
M	Moist
W	Wet
W _p	Plastic Limit
W _L	Liquid Limit

Density

V	Very Loose	Density Index <15%
L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: BHR3

CLIENT: Core Project Group

PAGE: 1 of 1

PROJECT NAME:

JOB NO: RGS01102.1

SITE LOCATION: 12 Stewart Avenue, Newcastle

LOGGED BY: SRM

TEST LOCATION: See Figure 1

DATE: 24/2/16

DRILL TYPE: UMDR

EASTING:

SURFACE RL:

BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:

DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT	Not Encountered					SP	FILL: Gravelly SAND, fine to medium grained, dark grey, Gravel fine to coarse grained, some rubble, brick	M				FILL
				0.5	0.50m	SP	SAND: Fine to medium grained, pale brown					AEOLIAN
		0.80m										
		ASS 1.00m		1.0								
		1.30m										
		ASS 1.50m		1.5		1.50m						
							Hole Terminated at 1.50 m					
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)		Moisture Condition	
Water				VS	Very Soft	<25	D	Dry	
	Water Level (Date and time shown)	U ₅₀	50mm Diameter tube sample	S	Soft	25 - 50	M	Moist	
	Water Inflow	CBR	Bulk sample for CBR testing	F	Firm	50 - 100	W	Wet	
	Water Outflow	E	Environmental sample	St	Stiff	100 - 200	W _p	Plastic Limit	
Strata Changes		ASS	Acid Sulfate Soil Sample	VSt	Very Stiff	200 - 400	W _L	Liquid Limit	
		B	Bulk Sample	H	Hard	>400			
				Fb	Friable				
				Density		V	Very Loose	Density Index <15%	
						L	Loose	Density Index 15 - 35%	
						MD	Medium Dense	Density Index 35 - 65%	
						D	Dense	Density Index 65 - 85%	
						VD	Very Dense	Density Index 85 - 100%	

	Gradational or transitional strata	PID	Photoionisation detector reading (ppm)
	Definitive or distinct strata change	DCP(x-y)	Dynamic penetrometer test (test depth interval shown)
		HP	Hand Penetrometer test (UCS kPa)

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency

- VS Very Soft
- S Soft
- F Firm
- St Stiff
- VSt Very Stiff
- H Hard
- Fb Friable

UCS (kPa)

- <25
- 25 - 50
- 50 - 100
- 100 - 200
- 200 - 400
- >400

Moisture Condition

- D Dry
- M Moist
- W Wet
- W_p Plastic Limit
- W_L Liquid Limit

Density

- V Very Loose
- L Loose
- MD Medium Dense
- D Dense
- VD Very Dense

- Density Index <15%
- Density Index 15 - 35%
- Density Index 35 - 65%
- Density Index 65 - 85%
- Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR4
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR **EASTING:** **SURFACE RL:**
BOREHOLE DIAMETER: 100 mm **INCLINATION:** 90° **NORTHING:** **DATUM:** AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	
ADT	Not Encountered	E 0.40m		0.5		SP	FILL: Gravelly SAND, fine to medium grained, dark grey-brown, Gravel fine to coarse grained, some brick, trace glass, concrete	M	D	FILL
				0.50m		SP	SAND: Fine to medium grained, dark brown			
		1.00m		1.0		SP	FILL: SAND, dark grey-brown, some black, trace of gravel	M - W		AEOLIAN
		E 1.20m		1.5		SP				
		1.50m		1.60m		SP	SAND: Fine to medium grained, grey/grey-brown			
		ASS 1.60m		2.0		SP				
		2.00m		2.5						
		ASS 2.20m		2.80m			Hole Terminated at 2.80 m			
				3.0						
				3.5						
				4.0						
				4.5						

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency

VS	Very Soft	UCS (kPa)
S	Soft	<25
F	Firm	25 - 50
St	Stiff	50 - 100
VSt	Very Stiff	100 - 200
H	Hard	200 - 400
Fb	Frable	>400

Density

L	Loose	Density Index 15 - 35%
MD	Medium Dense	Density Index 35 - 65%
D	Dense	Density Index 65 - 85%
VD	Very Dense	Density Index 85 - 100%

Moisture Condition

D	Dry
M	Moist
W	Wet
W _p	Plastic Limit
W _L	Liquid Limit



ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
 PROJECT NAME:
 SITE LOCATION: 12 Stewart Avenue, Newcastle
 TEST LOCATION: See Figure 1

BOREHOLE NO: **BHR5**
 PAGE: 1 of 1
 JOB NO: RGS01102.1
 LOGGED BY: SRM
 DATE: 24/2/16

DRILL TYPE: UMDR EASTING: SURFACE RL:
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: DATUM: AHD

Drilling and Sampling					Material description and profile information				Field Test		Structure and additional observations		
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result	
ADT		E				SP	FILL: Gravelly SAND, fine to coarse grained, some concrete, brick, glass	M	D			FILL	
		0.40m		0.5		0.60m	SP	SAND: Fine to medium grained, grey-brown					AEOLIAN
		0.90m		1.0									
		ASS 1.10m		1.5		1.30m	SP	SAND: Fine to medium grained, dark grey-brown					LIGHTLY INDURATED SAND
		1.50m		2.0									
		ASS 1.70m		2.5	2.40m	SP	SAND: Fine to medium grained, pale grey-brown	W					
				2.70m			Hole Terminated at 2.70 m						
				3.0									
				3.5									
				4.0									
				4.5									

LEGEND:
Water
 Water Level (Date and time shown)
 Water Inflow
 Water Outflow
Strata Changes
 Gradational or transitional strata
 Definitive or distinct strata change

Notes, Samples and Tests
 U₃₀ 50mm Diameter tube sample
 CBR Bulk sample for CBR testing
 E Environmental sample
 ASS Acid Sulfate Soil Sample
 B Bulk Sample
Field Tests
 PID Photoionisation detector reading (ppm)
 DCP(x-y) Dynamic penetrometer test (test depth interval shown)
 HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition	
VS	Very Soft	<25	D	Dry
S	Soft	25 - 50	M	Moist
F	Firm	50 - 100	W	Wet
St	Stiff	100 - 200	W _p	Plastic Limit
VSt	Very Stiff	200 - 400	W _L	Liquid Limit
H	Hard	>400		
Fb	Friable			
Density				
V	Very Loose		Density Index <15%	
L	Loose		Density Index 15 - 35%	
MD	Medium Dense		Density Index 35 - 65%	
D	Dense		Density Index 65 - 85%	
VD	Very Dense		Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
 PROJECT NAME:
 SITE LOCATION: 12 Stewart Avenue, Newcastle
 TEST LOCATION: See Figure 1

BOREHOLE NO: **BHR6**
 PAGE: 1 of 1
 JOB NO: RGS01102.1
 LOGGED BY: SRM
 DATE: 24/2/16

DRILL TYPE: UMDR EASTING:
 BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING:
 SURFACE RL: DATUM: AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	
AD	Not Encountered	0.20m					FILL: Silty Gravelly SAND, fine to medium grained, grey, Gravel fine to coarse grained	M		FILL - some aggregate
		E 0.40m		0.30m		SP	FILL: SAND, fine to medium grained, dark grey-brown, some gravel fine to medium grained, trace brick fragments			FILL
				0.5						
				0.90m		SP	SAND: Fine to medium grained, grey-brown, orange			AEOLIAN
				1.0						
				1.5						
				2.0		SP	SAND: Fine to coarse grained, dark grey	W		MARINE
				2.5						
		2.50m		2.70m			Hole Terminated at 2.70 m			
		ASS 2.70m								
				3.0						
				3.5						
				4.0						
				4.5						

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)	Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25	D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50	M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100	W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200	W _p	Plastic Limit
		B Bulk Sample		VSt	Very Stiff	200 - 400	W _L	Liquid Limit
				H	Hard	>400		
				Fb	Friable			
Strata Changes		Field Tests		Density				
Gradational or transitional strata		PID Photoionisation detector reading (ppm)		V	Very Loose		Density Index <15%	
Definitive or distinct strata change		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		L	Loose		Density Index 15 - 35%	
		HP Hand Penetrometer test (UCS kPa)		MD	Medium Dense		Density Index 35 - 65%	
				D	Dense		Density Index 65 - 85%	
				VD	Very Dense		Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

BOREHOLE NO: **BHR7**

CLIENT: Core Project Group

PAGE: 1 of 1

PROJECT NAME:

JOB NO: RGS01102.1

SITE LOCATION: 12 Stewart Avenue, Newcastle

LOGGED BY: SRM

TEST LOCATION: See Figure 1

DATE: 24/2/16

DRILL TYPE: UMDR EASTING: SURFACE RL: BOREHOLE DIAMETER: 100 mm INCLINATION: 90° NORTHING: DATUM: AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT		E 0.25m		0.20m			FILL: SAND, fine to medium grained, grey	M				FILL - some aggregate and bricks
				0.5			FILL: Gravely SAND, red-brown					FILL - crushed bricks
				0.80m								
				1.0			FILL: Sandy CLAY, medium to high plasticity, pale grey-white, sand fine to coarse, some bricks					FILL - Clay, bricks
				1.20m								
				1.5		SP	SAND: Fine to medium grained, pale grey					AEOLIAN
				1.60m		SP	SAND: Fine to medium grained, brown and orange brown					
				2.0								
				2.5								
				2.70m								
							Hole Terminated at 2.70 m					
				3.0								
				3.5								
				4.0								
				4.5								

LEGEND:

Water

Water Level (Date and time shown)

Water Inflow

Water Outflow

Strata Changes

Gradational or transitional strata

Definitive or distinct strata change

Notes, Samples and Tests

U₅₀ 50mm Diameter tube sample

CBR Bulk sample for CBR testing

E Environmental sample

ASS Acid Sulfate Soil Sample

B Bulk Sample

Field Tests

PID Photoionisation detector reading (ppm)

DCP(x-y) Dynamic penetrometer test (test depth interval shown)

HP Hand Penetrometer test (UCS kPa)

Consistency		UCS (kPa)	Moisture Condition
VS	Very Soft	<25	D Dry
S	Soft	25 - 50	M Moist
F	Firm	50 - 100	W Wet
St	Stiff	100 - 200	W _p Plastic Limit
VSt	Very Stiff	200 - 400	W _L Liquid Limit
H	Hard	>400	
Fb	Friable		
Density			
V	Very Loose		Density Index <15%
L	Loose		Density Index 15 - 35%
MD	Medium Dense		Density Index 35 - 65%
D	Dense		Density Index 65 - 85%
VD	Very Dense		Density Index 85 - 100%

Dynamic Cone Penetrometer

Project Number: RGS01102.1-AC

Date: 2/03/2014

Client: Core Project Group Pty Ltd

Project: Proposed Development

Location: 12 Stewart Avenue, Newcastle West

Test Details: Hammer Mass: 9kg
Hammer drop: 510mm

Rod Tip: Cone
Depth to groundwater:

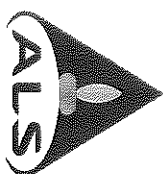
Test as per AS1289 6.3.2

[illegible]



Appendix B

Laboratory Test Result Sheets



Environmental

CERTIFICATE OF ANALYSIS

Work Order

: ES1604423

Client

: REGIONAL GEOTECHNICAL SOLUTION

Contact

: MR SIMON KEEN

Address

: 44 BENT STREET

: WINGHAM NSW, AUSTRALIA 2429

E-mail

: simon.k@regionalgeotech.com.au

Telephone

: +61 02 6553 5641

Facsimile

: ---

Project

: RGS01102.1 UNIT DEVELOPMENT

Order number

: ---

C-O-C number

: ---

Sampler

: ---

Site

: ---

Quote number

: ---

Page

: 1 of 28

Laboratory

: Environmental Division Sydney

Contact

:

Address

: 277-289 Woodpark Road Smithfield NSW Australia 2164

E-mail

:

Telephone

: +61-2-8784 8555

Facsimile

: +61-2-8784 8500

QC Level

: NEPM 2013 B3 & ALS QC Standard

Date Samples Received

: 29-Feb-2016 09:00

Date Analysis Commenced

: 01-Mar-2016

Issue Date

: 09-Mar-2016 20:28

No. of samples received

: 26

No. of samples analysed

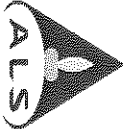
: 21

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

RIGHT SOLUTIONS RIGHT PARTNER



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825

Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category

Ben Felgendrejeris

Brisbane Acid Sulphate Soils, Stafford,
QLD

Celine Conceicao

Senior Spectroscopist

Sydney Inorganics, Smithfield, NSW

Kim McCabe

Senior Inorganic Chemist

Brisbane Acid Sulphate Soils, Stafford,
QLD

Pabi Subba

Senior Organic Chemist

Brisbane Inorganics, Stafford, QLD

Shaun Spooner

Asbestos Identifier

Sydney Inorganics, Smithfield, NSW
Sydney Organics, Smithfield, NSW
Newcastle - Asbestos, Mayfield West,
NSW

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

Λ = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

● EP068: Positive results have been confirmed by re-extraction and re-analysis.

● **EA200: As only one sample container was submitted for multiple tests, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly and NATA accreditation does not apply to analysis on these samples.**

● ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme

● EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.

● EA200 'Am' Amosite (brown asbestos)

● EA200 'Cr' Crocidolite (blue asbestos)

● EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres

● EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.

● EA200 Legend

● EA200 'Ch' Chrysotile (white asbestos)

● EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.

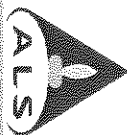
● EA200: Negative results for viny tiles should be confirmed by an independent analytical technique.

● Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benzo(a)anthracene (0.1), Chrysene (0.01), Benzo(b)fluoranthene (0.1), Benzo(e)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.

Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.

● EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2.2





Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time	
Compound		CAS Number	LOR	Unit	Result
EA002 : pH (Solis)					
pH Value	---	0.1	pH Unit	---	---
EA026 : Chromium Reducible Sulfur					
Chromium Reducible Sulfur	---	0.005	%	---	---
EA037 : Ass Field Screening Analysis					
pH (F)	---	0.1	pH Unit	---	---
pH (Fox)	---	0.1	pH Unit	---	---
Reaction Rate	---	1	-	---	---
EA055 : Moisture Content					
Moisture Content (dried @ 103°C)	---	1	%	1.3	3.0
EA200 : AS 4984 - 2004 Identification of Asbestos in Soils					
Asbestos Detected	1332-21-4	0.1	g/kg	No	No
Asbestos Type	1332-21-4	-	-	-	-
Sample weight (dry)	---	0.01	g	37.0	30.6
APPROVED IDENTIFIER:	---	-	-	S.SPOONER	S.SPOONER
ED040S : Soluble Sulfate by ICPAES					
Sulfate as SO4 2-	14806-79-8	10	mg/kg	---	---
ED045G: Chloride by Discrete Analyser					
Chloride	16887-00-6	10	mg/kg	---	---
EG005T: Total Metals by ICP-AES					
Arsenic	7440-38-2	5	mg/kg	<5	<5
Cadmium	7440-43-9	1	mg/kg	<1	<1
Chromium	7440-47-3	2	mg/kg	9	12
Copper	7440-50-8	5	mg/kg	18	104
Lead	7439-92-1	5	mg/kg	28	94
Nickel	7440-02-0	2	mg/kg	8	8
Zinc	7440-66-6	5	mg/kg	83	273
EG035T: Total Recoverable Mercury by FIMS					
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1
EP066: Polychlorinated Biphenyls (PCB)					
Total Polychlorinated Biphenyls	---	0.1	mg/kg	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)					
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05
BHR2 0-0.2					
BHR3 0-0.2					

Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Compound	CAS Number	LOI	Unit	Client sample ID	S101	S102	S105	BHR2 0-0.2	BHR3 0-0.2
					[26-Feb-2016] ES1604423-001	[26-Feb-2016] ES1604423-002	[26-Feb-2016] ES1604423-004	[26-Feb-2016] ES1604423-006	[26-Feb-2016] ES1604423-007
					Result	Result	Result	Result	Result

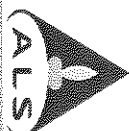
EP068A: Organochlorine Pesticides (OC) - Continued

beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
^ Total Chlordane (sum)	—	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<0.2	<1.0
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<0.2	<1.0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.25	0.05	<0.05	<0.05	<0.25
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25

EP068B: Organophosphorus Pesticides (OP)

Dichloros	62-73-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<0.2	<1.0
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Chlorpyrifos-methyl	5596-13-0	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<0.2	<1.0
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Fenithion	55-38-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.05	<0.25





Analytical Results

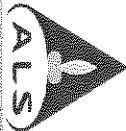
Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S101	S102	S105	BHR2 0-0.2	BHR3 0-0.2
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-001	ES1604423-002	ES1604423-004	ES1604423-006	ES1604423-007
				Result	Result	Result	Result	Result
EP088B: Organophosphorus Pesticides (OP) - Continued								
Parathion	56-38-2	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<1.0
Phirmpfos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
EP076(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	4.0	<0.5	0.6	2.1
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	26.6	<0.5	0.8	11.9
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4.2	<0.5	<0.5	1.8
Fluorene	86-73-7	0.5	mg/kg	<0.5	20.7	<0.5	<0.5	8.3
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	113	0.8	6.6	66.0
Anthracene	120-12-7	0.5	mg/kg	<0.5	27.5	<0.5	2.0	16.9
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	72.0	2.1	11.6	67.1
Pyrene	129-00-0	0.5	mg/kg	<0.5	67.9	2.0	10.2	67.5
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	34.8	1.4	6.1	28.3
Chrysene	218-01-9	0.5	mg/kg	<0.5	28.4	1.0	4.7	23.0
Benzol(b+j)fluoranthene	205-99-2	0.5	mg/kg	<0.5	24.2	1.6	6.6	23.1
Benzol(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	11.3	0.6	2.4	10.0
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	23.1	1.2	4.8	22.1
Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	7.9	<0.5	1.9	7.8
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	2.2	<0.5	0.5	2.2
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	8.8	0.5	2.2	9.4
Sum of polycyclic aromatic hydrocarbons					476	11.2	61.0	368
^ Benzo(a)pyrene TEQ (zero)				---	0.5	mg/kg	<0.5	31.5
^ Benzo(a)pyrene TEQ (half LOR)				---	0.5	mg/kg	0.6	31.5
^ Benzo(a)pyrene TEQ (LOR)				---	0.5	mg/kg	1.2	31.5
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction				---	10	mg/kg	<10	<10
C10 - C14 Fraction				---	50	mg/kg	<50	<50
C15 - C28 Fraction				---	100	mg/kg	<100	1280



Analytical Results

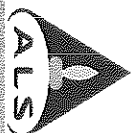
Sub-Matrix: SOIL
 (Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S101		S102		S105		BHR2 0-0.2		BHR3 0-0.2	
		Client sampling date / time		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
Compound	CAS Number	LOR	Unit	ES1604423-001	ES1604423-002	ES1604423-004	ES1604423-006	ES1604423-007					
				Result	Result	Result	Result	Result					
EP080/071: Total Petroleum Hydrocarbons - Continued													
C29 - C36 Fraction		100	mg/kg	<100	670	<100	120	600					
^ C10 - C36 Fraction (sum)		50	mg/kg	<50	2820	<50	310	1880					
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions													
C6 - C10 Fraction		10	mg/kg	<10	<10	<10	<10	<10					
^ C6 - C10 Fraction minus BTEX (F1)		10	mg/kg	<10	<10	<10	<10	<10					
>C10 - C16 Fraction		50	mg/kg	<50	200	<50	<50	140					
>C16 - C34 Fraction		100	mg/kg	<100	2620	<100	300	1630					
>C34 - C40 Fraction		100	mg/kg	<100	300	<100	<100	340					
^ >C10 - C40 Fraction (sum)		50	mg/kg	<50	3120	<50	300	2110					
^ >C10 - C16 Fraction minus Naphthalene (F2)		50	mg/kg	<50	200	<50	<50	140					
EP080: BTEXN													
Benzene		71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2					
Toluene		108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5					
Ethylbenzene		100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5					
meta- & para-Xylene		108-38-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5					
ortho-Xylene		95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5					
^ Sum of BTEX		—	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2					
^ Total Xylenes		1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5					
Naphthalene		91-20-3	1	mg/kg	<1	<1	<1	<1					
EP065: PCB Surrogate													
Decachlorobiphenyl		2051-24-3	0.1	%	61.0	62.0	65.0	65.0					
EP068: Organochlorine Pesticide Surrogate													
Dibromo-DDE		21655-73-2	0.05	%	108	97.0	79.5	96.6					
EP068T: Organophosphorus Pesticide Surrogate													
DEF		78-48-8	0.05	%	88.0	116	94.4	92.9					
EP075(SIM): Phenolic Compound Surrogates													
Phenol-d6		13127-88-3	0.5	%	123	126	122	126					
2-Chlorophenol-D4		93851-73-6	0.5	%	111	115	116	112					
2,4,6-Tribromophenol		118-79-6	0.5	%	85.5	118	116	111					
EP075(SIM): PAH Surrogates													
2-Fluorobiphenyl		321-60-8	0.5	%	124	120	122	116					
Anthracene-d10		1719-06-8	0.5	%	112	113	117	111					



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S101	S102	S105	BHR2 0-0.2	BHR3 0-0.2
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOI	Unit	ES1604423-001	ES1604423-002	ES1604423-004	ES1604423-006	ES1604423-007
				Result	Result	Result	Result	Result
EP076(SIM)T- PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	117	114	127	122	114
EP080S: TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	90.2	87.9	99.2	91.6	90.6
Toluene-D8	2037-26-5	0.2	%	85.5	91.9	95.7	93.7	94.4
4-Bromofluorobenzene	460-00-4	0.2	%	87.4	88.3	96.6	91.5	91.0



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR4 0.0-4		BHR5 0.0-4		BH6 0.2-0.4		BH7 0.2-0.4		S107	
Compound		Client sampling date / time		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
CAS Number		LOR		Unit		Result		Result		Result		Result	
EA002 : pH (Soils)		---		0.1		pH Unit		---		---		---	
EA026 : Chromium Reducible Sulphur		---		0.005		%		---		---		---	
EA037 : Ass Field Screening Analysis		---		0.1		pH Unit		---		---		---	
pH (F)		---		0.1		pH Unit		---		---		---	
pH (Fox)		---		0.1		pH Unit		---		---		---	
Reaction Rate		---		1		-		---		---		---	
EA055 : Moisture Content		---		1		%		10.1		6.1		7.9	
Moisture Content (dried @ 103°C)		---		1		%		10.1		6.1		7.9	
EA200 : AS 4984 - 2004 Identification of Asbestos in Soils		---		0.1		g/kg		No		No		No	
Asbestos Detected		1332-21-4		-		-		-		-		-	
Asbestos Type		1332-21-4		0.01		g		40.5		42.1		32.8	
Sample weight (dry)		---		-		-		S.SPOONER		S.SPOONER		S.SPOONER	
APPROVED IDENTIFIER:		---		-		-		S.SPOONER		S.SPOONER		S.SPOONER	
ED040S : Soluble Sulfate by ICPAES		---		10		mg/kg		---		---		---	
Sulfate as SO ₄ 2-		14808-79-8		10		mg/kg		---		---		---	
ED045G: Chloride by Discrete Analyser		---		10		mg/kg		---		---		---	
Chloride		16867-00-6		10		mg/kg		---		---		---	
EG005T: Total Metals by ICP-AES		---		5		mg/kg		51		<5		<5	
Arsenic		7440-38-2		1		mg/kg		4		<1		<1	
Cadmium		7440-43-9		2		mg/kg		273		7		4	
Chromium		7440-47-3		5		mg/kg		18400		64		15	
Copper		7440-50-8		5		mg/kg		2530		81		69	
Lead		7439-92-1		2		mg/kg		249		14		5	
Nickel		7440-02-0		5		mg/kg		4750		127		93	
Zinc		7440-66-6		0.1		mg/kg		0.5		0.1		<0.1	
EG035T: Total Recoverable Mercury by FIMS		---		0.1		mg/kg		0.5		0.1		<0.1	
Mercury		7439-97-6		0.1		mg/kg		0.5		0.1		<0.1	
EP066: Polychlorinated Biphenyls (PCB)		---		0.1		mg/kg		<0.1		<0.1		<0.1	
Total Polychlorinated biphenyls		---		0.1		mg/kg		<0.1		<0.1		<0.1	
EP068A: Organochlorine Pesticides (OC)		---		0.05		mg/kg		<0.05		<0.05		<0.05	
alpha-BHC		319-84-6		0.05		mg/kg		<0.05		<0.05		<0.05	
Hexachlorobenzene (HCB)		118-74-1		0.05		mg/kg		<0.05		<0.05		<0.05	



Analytical Results

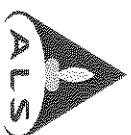
Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID		BHR4 0-0.4	BHR5 0-0.4	BH6 0.2-0.4	BH7 0.2-0.4	S107
[26-Feb-2016]		[26-Feb-2016]				
Compound	CAS Number LOR Unit	ES1604423-008	ES1604423-009	ES1604423-010	ES1604423-011	ES1604423-012
Result						
EP068A: Organochlorine Pesticides (OC) - Continued						
beta-BHC	319-85-7 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2 0.05 mg/kg	<0.05	<0.05	0.08	0.06	<0.05
Heptachlor epoxide	1024-57-3 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	--- 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	959-98-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1 0.05 mg/kg	<0.05	<0.05	0.40	0.28	0.10
4,4'-DDE	72-55-9 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-28-7 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3 0.2 mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53494-70-5 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5 0.2 mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1 0.05 mg/kg	<0.05	<0.05	0.48	0.34	0.10
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
EP068B: Organophosphorus Pesticides (OP)						
Dichlorvos	62-73-7 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4 0.2 mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0 0.2 mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenitrothion	55-38-9 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2 0.05 mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S107	
Compound		Client sampling date / time	[26-Feb-2016]		[26-Feb-2016]
CAS Number	LOR	Unit	Result	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued					
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05
EP075(SIMB): Polynuclear Aromatic Hydrocarbons					
Naphthalene	91-20-3	0.5	mg/kg	<0.5	0.6
Acenaphthylene	208-96-8	0.5	mg/kg	1.4	0.8
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	5.2	2.6
Anthracene	120-12-7	0.5	mg/kg	1.7	0.9
Fluoranthene	206-44-0	0.5	mg/kg	10.6	5.4
Pyrene	129-00-0	0.5	mg/kg	11.0	5.0
Benz(a)anthracene	56-55-3	0.5	mg/kg	6.4	2.9
Chrysene	218-01-9	0.5	mg/kg	5.7	2.3
Benz(b)fluoranthene	205-99-2	0.5	mg/kg	8.4	3.0
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	2.8	1.4
Benz(a)pyrene	50-32-8	0.5	mg/kg	6.1	2.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	2.9	0.9
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	0.7	<0.5
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	3.7	<0.5
Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	66.6	1.0
^ Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	8.9	29.0
^ Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	8.9	3.3
^ Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	8.9	3.6
EP080(071): Total Petroleum Hydrocarbons					
C6 - C9 Fraction	---	10	mg/kg	<10	<10
C10 - C14 Fraction	---	50	mg/kg	<50	<50
C15 - C28 Fraction	---	100	mg/kg	1540	200



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound

CAS Number

LOF

Unit

BHR4 0-0.4

[26-Feb-2016]

BHR5 0-0.4

[26-Feb-2016]

BH6 0.2-0.4

[26-Feb-2016]

BH7 0.2-0.4

[26-Feb-2016]

S107

[26-Feb-2016]

Result

Result

Result

Result

Result

EP080071: Total Petroleum Hydrocarbons - Continued

C29 - C36 Fraction

100 mg/kg

1370

<100

220

<100

160

C10 - C36 Fraction (sum)

50 mg/kg

2910

110

660

<50

360

EP080071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions

C6 - C10 Fraction

10 mg/kg

<10

<10

<10

<10

<10

<10

C6 - C10 Fraction minus BTEX

10 mg/kg

<10

<10

<10

<10

<10

<10

(F1)

>C10 - C16 Fraction

50 mg/kg

<50

<50

60

<50

<50

<50

>C16 - C34 Fraction

100 mg/kg

2860

170

600

160

310

100

>C34 - C40 Fraction

100 mg/kg

680

<100

120

<100

160

410

>C10 - C40 Fraction (sum)

50 mg/kg

3440

170

780

160

<50

<50

>C10 - C16 Fraction minus Naphthalene

50 mg/kg

<50

<50

60

<50

<50

<50

(F2)

EP080: BTEX/N

Benzene

71-43-2

0.2 mg/kg

<0.2

0.3

<0.2

<0.2

<0.2

Toluene

108-88-3

0.5 mg/kg

<0.5

<0.5

<0.5

<0.5

<0.5

Ethylbenzene

100-41-4

0.5 mg/kg

<0.5

<0.5

<0.5

<0.5

<0.5

meta- & para-Xylene

108-38-3 106-42-3

0.5 mg/kg

<0.5

<0.5

<0.5

<0.5

<0.5

ortho-Xylene

95-47-6

0.2 mg/kg

<0.2

0.3

<0.2

<0.2

<0.2

Sum of BTEX

1330-20-7

0.5 mg/kg

<0.5

<0.5

<0.5

<0.5

<0.5

Total Xylenes

91-20-3

1 mg/kg

<1

<1

<1

<1

<1

Naphthalene

2051-24-3

0.1 mg/kg

61.0

60.0

79.0

67.0

63.0

Dechlorobiphenyl

21655-73-2

0.05 mg/kg

100

92.1

103

70.6

117

EP0885: Organochlorine Pesticide Surrogate

Dibromo-DDE

78-48-8

0.05 mg/kg

110

94.7

108

70.1

117

EP0887: Organophosphorus Pesticide Surrogate

DEF

13127-88-3

0.5 mg/kg

118

114

117

116

117

EP078(SIMS): Phenolic Compound Surrogates

2-Chlorophenol-D4

93951-73-6

0.5 mg/kg

114

112

99.2

116

117

2,4,6-Trifluorophenol

118-79-6

0.5 mg/kg

117

118

116

111

110

EP078(SIMS): PAH Surrogates

2-Fluorobiphenyl

321-60-8

0.5 mg/kg

120

117

118

118

118

Anthracene-d10

1719-06-8

0.5 mg/kg

116

114

108

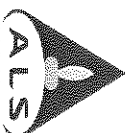
117

115



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR4 0-0.4		BHR5 0-0.4		BHR6 0.2-0.4		BHR7 0.2-0.4		S107	
		Client sampling date / time		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
Compound	CAS Number	LOR	Unit	ES1604423-008		ES1604423-009		ES1604423-010		ES1604423-011		ES1604423-012	
Result				Result		Result		Result		Result		Result	
EP075(SIM)T: PAH Surrogates - Continued													
4-Terphenyl-d14	1718-51-0	0.5	%	113		122		121		127		125	
EP080(S): TPH(M)/BTEX Surrogates													
1,2-Dichloroethane-D4	17060-07-0	0.2	%	94.0		89.1		82.2		90.3		84.7	
Toluene-D8	2037-26-5	0.2	%	100		86.9		86.4		89.2		91.4	
4-Bromofluorobenzene	460-00-4	0.2	%	94.8		88.7		80.0		90.0		88.2	



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

S104

BHR4 1-1-2

BHR2 2.4-2.5

BHR2 3.5-3.6

BHR2 4.1-4.2

Client sampling date / time

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

Compound

CAS Number

LOF Unit

ES1604423-013

ES1604423-014

ES1604423-015

ES1604423-016

ES1604423-017

Result

Result

Result

Result

Result

EA002 : pH (Soils)

pH Value

0.1 pH Unit

7.8

EA026 : Chromium Reducible Sulfur

Chromium Reducible Sulfur

0.005 %

<0.005

<0.005

EA037 : Asx Field Screening Analysis

pH (F)

0.1 pH Unit

5.8

6.4

7.0

pH (Fox)

0.1 pH Unit

5.0

5.0

5.0

Reaction Rate

1 -

1

1

1

EA055 : Moisture Content

Moisture Content (dried @ 103°C)

1 %

14.0

9.7

20.0

EA200 : AS 4984 - 2004 Identification of Asbestos in Soils

Asbestos Detected

1332-21-4 0.1 g/kg

No

No

Asbestos Type

1332-21-4 -

-

-

Sample weight (dry)

0.01 g

29.4

30.8

APPROVED IDENTIFIER:

- S.SPOONER

S.SPOONER

S.SPOONER

ED040S : Soluble Sulfate by ICPAES

Sulfate as SO4 2-

14808-79-8 10 mg/kg

60

ED045G : Chloride by Discrete Analyser

Chloride

16887-00-6 10 mg/kg

<10

EG005T : Total Metals by ICP-AES

Arsenic

7440-38-2 5 mg/kg

<5

<5

Cadmium

7440-43-9 1 mg/kg

<1

<1

Chromium

7440-47-3 2 mg/kg

6

6

Copper

7440-50-8 5 mg/kg

78

132

Lead

7439-92-1 5 mg/kg

259

92

Nickel

7440-02-0 2 mg/kg

20

10

Zinc

7440-68-6 5 mg/kg

346

110

EG035T : Total Recoverable Mercury by FIMS

Mercury

7439-97-6 0.1 mg/kg

0.2

0.1

EP066 : Polychlorinated Biphenyls (PCB)

Total Polychlorinated biphenyls

0.1 mg/kg

<0.1

<0.1

EP068A : Organochlorine Pesticides (OC)

alpha-BHC

319-84-6 0.05 mg/kg

<0.05

<0.05

Hexachlorobenzene (HCB)

118-74-1 0.05 mg/kg

<0.05

<0.05



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID			Client sampling date / time	
S104			[26-Feb-2016]	
Compound	CAS Number	LOR	Unit	Result
EP068A: Organochlorine Pesticides (OC) - Continued				
beta-BHC	319-85-7	0.05	mg/kg	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05
^ Total Chlordane (sum)	—	0.05	mg/kg	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	<0.05
EP068B: Organophosphorus Pesticides (OP)				
Dichlorvos	62-73-7	0.05	mg/kg	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05
Fenthion	55-38-9	0.05	mg/kg	<0.05
Chlorpyrifos	2921-86-2	0.05	mg/kg	<0.05
BHR4 1-1.2				
[26-Feb-2016]				
ES1604423-014				
Result				
<0.05				
BHR2 2.4-2.5				
[26-Feb-2016]				
ES1604423-015				
Result				

BHR2 3.5-3.6				
[26-Feb-2016]				
ES1604423-016				
Result				

BHR2 4.1-4.2				
[26-Feb-2016]				
ES1604423-017				
Result				



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

S104

BHR4 1-1-2

BHR2 2-4-2-5

BHR2 3-5-3-6

BHR2 4-1-4-2

Client sampling date / time

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

Compound CAS Number LOR Unit

ES1604423-013

ES1604423-014

ES1604423-015

ES1604423-016

ES1604423-017

Result

Result

Result

Result

Result

EP068B: Organophosphorus Pesticides (OP) - Continued

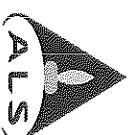
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	---	---	---	---
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	---	---	---	---
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	---	---	---	---

EP076(S)(M)B: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	0.5	mg/kg	0.9	<0.5	---	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg	4.6	<0.5	---	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg	0.7	<0.5	---	---	---	---
Fluorene	86-73-7	0.5	mg/kg	2.9	<0.5	---	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg	33.8	1.5	---	---	---	---
Anthracene	120-12-7	0.5	mg/kg	7.8	<0.5	---	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg	32.5	3.4	---	---	---	---
Pyrene	129-00-0	0.5	mg/kg	26.0	3.0	---	---	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg	13.1	1.9	---	---	---	---
Chrysene	218-01-9	0.5	mg/kg	10.1	1.5	---	---	---	---
Benz(b+g)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	12.2	2.3	---	---	---	---
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	4.6	0.9	---	---	---	---
Benz(a)pyrene	50-32-8	0.5	mg/kg	8.8	1.9	---	---	---	---
Indeno(1,2,3-cd)pyrene	183-39-5	0.5	mg/kg	3.1	1.0	---	---	---	---
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	1.0	<0.5	---	---	---	---
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	3.4	1.0	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg	166	18.4	---	---	---	---
Benzo(e)pyrene TEQ (zero)	---	0.5	mg/kg	13.2	2.5	---	---	---	---
Benzo(e)pyrene TEQ (half LOR)	---	0.5	mg/kg	13.2	2.8	---	---	---	---
Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg	13.2	3.0	---	---	---	---

EP080U071: Total Petroleum Hydrocarbons

C6 - C9 Fraction	---	10	mg/kg	<10	<10	---	---	---	---
C10 - C14 Fraction	---	50	mg/kg	<50	<50	---	---	---	---
C15 - C28 Fraction	---	100	mg/kg	1070	120	---	---	---	---



Analytical Results

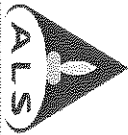
Sub-Matrix: **SOIL**
 (Matrix: **SOIL**)

Client sample ID		Client sampling date / time		Result		Result		Result		Result	
S104		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued											
C29 - C36 Fraction	—	100	mg/kg	500	<100	—	—	—	—	—	—
^ C10 - C36 Fraction (sum)	—	50	mg/kg	1670	120	—	—	—	—	—	—
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions											
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	—	—	—	—	—	—
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	—	—	—	—	—	—
>C10 - C16 Fraction	—	50	mg/kg	70	<50	—	—	—	—	—	—
>C16 - C34 Fraction	—	100	mg/kg	1490	180	—	—	—	—	—	—
>C34 - C40 Fraction	—	100	mg/kg	280	<100	—	—	—	—	—	—
^ >C10 - C40 Fraction (sum)	—	50	mg/kg	1840	180	—	—	—	—	—	—
^ >C10 - C16 Fraction minus Naphthalene (F2)	—	50	mg/kg	70	<50	—	—	—	—	—	—
EP080: BTEXN											
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	—	—	—	—	—	—
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	—	—	—	—	—	—
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	—	—	—	—	—	—
meta- & para-Xylene	108-38-3/106-42-3	0.5	mg/kg	<0.5	<0.5	—	—	—	—	—	—
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	—	—	—	—	—	—
^ Sum of BTEX	—	0.2	mg/kg	<0.2	<0.2	—	—	—	—	—	—
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	—	—	—	—	—	—
Naphthalene	91-20-3	1	mg/kg	<1	<1	—	—	—	—	—	—
EP068: PCB Surrogate											
Decachlorobiphenyl	2051-24-3	0.1	%	70.0	64.0	—	—	—	—	—	—
EP068: Organochlorine Pesticide Surrogate											
Dibromo-DDE	21655-73-2	0.05	%	105	97.2	—	—	—	—	—	—
EP068T: Organophosphorus Pesticide Surrogate											
DEF	78-48-8	0.05	%	79.4	96.8	—	—	—	—	—	—
EP075(SIMS): Phenolic Compound Surrogates											
Phenol-d6	13127-88-3	0.5	%	102	123	—	—	—	—	—	—
2-Chlorophenol-D4	93951-73-6	0.5	%	94.3	114	—	—	—	—	—	—
2,4,6-Trichlorophenol	118-79-6	0.5	%	102	112	—	—	—	—	—	—
EP075(SIMS): PAH Surrogates											
2-Fluorobiphenyl	321-60-8	0.5	%	121	128	—	—	—	—	—	—
Anthracene-d10	1719-06-8	0.5	%	109	119	—	—	—	—	—	—



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S104	BHR4 1-1.2	BHR2 2.4-2.5	BHR2 3.5-3.6	BHR2 4.1-4.2
Compound		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
CAS Number		LOR	Unit	ES1604423-013	ES1604423-014	ES1604423-015	ES1604423-016	ES1604423-017
		Result		Result	Result	Result	Result	Result
EP075(SIM)T: PAH Surrogates - Continued								
4-Terphenyl-d14		1718-51-0	0.5	%	120	126	----	----
EP080S: TPH(V)/BTX Surrogates								
1,2-Dichloroethane-D4		17060-07-0	0.2	%	86.2	91.6	----	----
Toluene-D8		2037-26-5	0.2	%	84.4	93.2	----	----
4-Bromofluorobenzene		460-00-4	0.2	%	81.6	90.0	----	----



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				Client sampling date / time				
				BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
				[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
				ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result

EP0869A: Organochlorine Pesticides (OC) - Continued

beta-BHC	319-85-7	0.05	mg/kg	----	----	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg	----	----	----	----	----
delta-BHC	319-86-8	0.05	mg/kg	----	----	----	----	----
Heptachlor	76-44-8	0.05	mg/kg	----	----	----	----	----
Aldrin	309-00-2	0.05	mg/kg	----	----	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	----	----	----	----	----
^ Total Chlordane (sum)	—	0.05	mg/kg	----	----	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg	----	----	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg	----	----	----	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg	----	----	----	----	----
Dieldrin	60-57-1	0.05	mg/kg	----	----	----	----	----
4,4'-DDE	72-55-9	0.05	mg/kg	----	----	----	----	----
Endrin	72-20-8	0.05	mg/kg	----	----	----	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg	----	----	----	----	----
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	----	----	----	----	----
4,4'-DDD	72-54-8	0.05	mg/kg	----	----	----	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg	----	----	----	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	----	----	----	----	----
4,4'-DDT	50-29-3	0.2	mg/kg	----	----	----	----	----
Endrin ketone	53494-70-5	0.05	mg/kg	----	----	----	----	----
Methoxychlor	72-43-5	0.2	mg/kg	----	----	----	----	----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	----	----	----	----	----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	----	----	----	----	----
	0-2							

EP0868B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	----	----	----	----	----
Demeton-S-methyl	919-86-8	0.05	mg/kg	----	----	----	----	----
Monocrotophos	6923-22-4	0.2	mg/kg	----	----	----	----	----
Dimethoate	60-51-5	0.05	mg/kg	----	----	----	----	----
Diazinon	333-41-5	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	----	----	----	----	----
Parathion-methyl	298-00-0	0.2	mg/kg	----	----	----	----	----
Malathion	121-75-5	0.05	mg/kg	----	----	----	----	----
Fenthion	55-38-9	0.05	mg/kg	----	----	----	----	----
Chlorpyrifos	2921-88-2	0.05	mg/kg	----	----	----	----	----



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
				Client sampling date / time	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
					ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result	Result

EP086B: Organophosphorus Pesticides (OP) - Continued

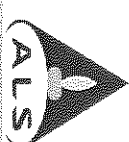
Parathion	56-38-2	0.2	mg/kg	---	---	---	---	---	---
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	---	---	---	---	---	---
Chlorfenvinphos	470-90-6	0.05	mg/kg	---	---	---	---	---	---
Bromophos-ethyl	4824-78-6	0.05	mg/kg	---	---	---	---	---	---
Fenamiphos	22224-92-6	0.05	mg/kg	---	---	---	---	---	---
Prothiofos	34643-46-4	0.05	mg/kg	---	---	---	---	---	---
Ethion	563-12-2	0.05	mg/kg	---	---	---	---	---	---
Carbophenothion	786-19-6	0.05	mg/kg	---	---	---	---	---	---
Azinphos Methyl	86-50-0	0.05	mg/kg	---	---	---	---	---	---

EP075(SIMB): Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	0.5	mg/kg	---	---	---	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg	---	---	---	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg	---	---	---	---	---	---
Fluorene	86-73-7	0.5	mg/kg	---	---	---	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg	---	---	---	---	---	---
Anthracene	120-12-7	0.5	mg/kg	---	---	---	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg	---	---	---	---	---	---
Pyrene	129-00-0	0.5	mg/kg	---	---	---	---	---	---
Benz[a]anthracene	56-55-3	0.5	mg/kg	---	---	---	---	---	---
Chrysene	218-01-9	0.5	mg/kg	---	---	---	---	---	---
Benzo[b]fluoranthene	205-99-2	0.5	mg/kg	---	---	---	---	---	---
Benzo[k]fluoranthene	207-08-9	0.5	mg/kg	---	---	---	---	---	---
Benzo[a]pyrene	50-32-8	0.5	mg/kg	---	---	---	---	---	---
Indeno[1,2,3-cd]pyrene	193-39-5	0.5	mg/kg	---	---	---	---	---	---
Dibenz[a,h]anthracene	53-70-3	0.5	mg/kg	---	---	---	---	---	---
Benzog[h,i]perylene	191-24-2	0.5	mg/kg	---	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons		0.5	mg/kg	---	---	---	---	---	---
Benzo[a]pyrene TEQ (zero)		0.5	mg/kg	---	---	---	---	---	---
Benzo[a]pyrene TEQ (half LOR)		0.5	mg/kg	---	---	---	---	---	---
Benzo[a]pyrene TEQ (LOR)		0.5	mg/kg	---	---	---	---	---	---

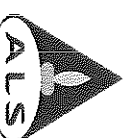
EP080(OT1): Total Petroleum Hydrocarbons

C6 - C9 Fraction	---	10	mg/kg	---	---	---	---	---	---
C10 - C14 Fraction	---	50	mg/kg	---	---	---	---	---	---
C15 - C28 Fraction	---	100	mg/kg	---	---	---	---	---	---



Analytical Results

Sub-Matrix: SOL (Matrix: SOL)		Client sample ID		BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result
EP060071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	---	100	mg/kg	---	---	---	---	---
^ C10 - C36 Fraction (sum)	---	50	mg/kg	---	---	---	---	---
EP060071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	---	---	---	---	---
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	---	---	---	---	---
>C10 - C16 Fraction	---	50	mg/kg	---	---	---	---	---
>C16 - C34 Fraction	---	100	mg/kg	---	---	---	---	---
>C34 - C40 Fraction	---	100	mg/kg	---	---	---	---	---
^ >C10 - C40 Fraction (sum)	---	50	mg/kg	---	---	---	---	---
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg	---	---	---	---	---
EP060: BTEXN								
Benzene	71-43-2	0.2	mg/kg	---	---	---	---	---
Toluene	108-88-3	0.5	mg/kg	---	---	---	---	---
Ethylbenzene	100-41-4	0.5	mg/kg	---	---	---	---	---
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	---	---	---	---	---
ortho-Xylene	95-47-6	0.5	mg/kg	---	---	---	---	---
^ Sum of BTEX	---	0.2	mg/kg	---	---	---	---	---
^ Total Xylenes	1330-20-7	0.5	mg/kg	---	---	---	---	---
Naphthalene	91-20-3	1	mg/kg	---	---	---	---	---
EP0665: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	---	---	---	---	---
EP0685: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	---	---	---	---	---
EP0687: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	---	---	---	---	---
EP075(SIMS): Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	---	---	---	---	---
2-Chlorophenol-D4	93951-73-6	0.5	%	---	---	---	---	---
2,4,6-Tribromophenol	118-79-6	0.5	%	---	---	---	---	---
EP075(SIMS): PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	---	---	---	---	---
Anthracene-d10	1719-06-8	0.5	%	---	---	---	---	---



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result
EP075(SIM) T-PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	---	---	---	---	---
EP080S-TPH(V)/BTEX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	---	---	---	---	---
Toluene-D8	2037-26-5	0.2	%	---	---	---	---	---
4-Bromofluorobenzene	460-00-4	0.2	%	---	---	---	---	---

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID				BHR5 2.5-2.7									
		Client sampling date / time		[26-Feb-2016]											
Compound	CAS Number	LOI	Unit	ES1604423-023		Result		Result		Result		Result		Result	
EA002 : pH (Soils)															
pH Value	---	0.1	pH Unit	---	---	---	---	---	---	---	---	---	---	---	---
EA026 : Chromium Reducible Sulfur															
Chromium Reducible Sulphur	---	0.005	%	<0.005		---		---		---		---		---	
EA037: Ass Field Screening Analysis															
pH (F)	---	0.1	pH Unit	5.9		---		---		---		---		---	
pH (Fox)	---	0.1	pH Unit	5.0		---		---		---		---		---	
Reaction Rate	---	1	-	1		---		---		---		---		---	
EA055: Moisture Content															
Moisture Content (dried @ 103°C)	---	1	%	---		---		---		---		---		---	
EA200: AS 4984 - 2004 Identification of Asbestos in Soils															
Asbestos Detected	1332-21-4	0.1	g/kg	---		---		---		---		---		---	
Asbestos Type	1332-21-4	-	---	---		---		---		---		---		---	
Sample weight (dry)	---	0.01	g	---		---		---		---		---		---	
APPROVED IDENTIFIER:															
ED0405 : Soluble Sulfate by ICPAES															
Sulfate as SO4 2-	14808-79-8	10	mg/kg	---		---		---		---		---		---	
ED045G: Chloride by Discrete Analyser															
Chloride	16887-00-6	10	mg/kg	---		---		---		---		---		---	
EG005T: Total Metals by ICP-AES															
Arsenic	7440-38-2	5	mg/kg	---		---		---		---		---		---	
Cadmium	7440-43-9	1	mg/kg	---		---		---		---		---		---	
Chromium	7440-47-3	2	mg/kg	---		---		---		---		---		---	
Copper	7440-50-8	5	mg/kg	---		---		---		---		---		---	
Lead	7439-92-1	5	mg/kg	---		---		---		---		---		---	
Nickel	7440-02-0	2	mg/kg	---		---		---		---		---		---	
Zinc	7440-66-6	5	mg/kg	---		---		---		---		---		---	
EG035T: Total Recoverable Mercury by FIMS															
Mercury	7439-97-6	0.1	mg/kg	---		---		---		---		---		---	
EP066: Polychlorinated Biphenyls (PCB)															
Total Polychlorinated biphenyls	---	0.1	mg/kg	---		---		---		---		---		---	
EP068A: Organochlorine Pesticides (OC)															
alpha-BHC	319-84-6	0.05	mg/kg	---		---		---		---		---		---	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	---		---		---		---		---		---	





Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

Client sampling date / time

Compound CAS Number LOR Unit

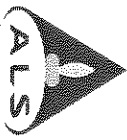
BHR5 2.5-2.7
[26-Feb-2016]
ES1604423-023
Result
Result
Result
Result
Result

EP068A Organochlorine Pesticides (OC) - Continued

beta-BHC	319-85-7	0.05	mg/kg	---	---	---	---	---
gamma-BHC	58-88-9	0.05	mg/kg	---	---	---	---	---
delta-BHC	319-86-8	0.05	mg/kg	---	---	---	---	---
Hepachlor	76-44-8	0.05	mg/kg	---	---	---	---	---
Aldrin	309-00-2	0.05	mg/kg	---	---	---	---	---
Hepachlor epoxide	1024-57-3	0.05	mg/kg	---	---	---	---	---
^ Total Chlordane (sum)								
trans-Chlordane	5103-74-2	0.05	mg/kg	---	---	---	---	---
alpha-Endosulfan	959-98-8	0.05	mg/kg	---	---	---	---	---
cis-Chlordane	5103-71-9	0.05	mg/kg	---	---	---	---	---
Dieldrin	60-57-1	0.05	mg/kg	---	---	---	---	---
4,4'-DDE	72-55-9	0.05	mg/kg	---	---	---	---	---
Endrin	72-20-8	0.05	mg/kg	---	---	---	---	---
beta-Endosulfan	33213-65-9	0.05	mg/kg	---	---	---	---	---
^ Endosulfan (sum)								
4,4'-DDD	115-29-7	0.05	mg/kg	---	---	---	---	---
Endrin aldehyde	72-54-8	0.05	mg/kg	---	---	---	---	---
Endosulfan sulfate	7421-93-4	0.05	mg/kg	---	---	---	---	---
4,4'-DDT	1031-07-8	0.05	mg/kg	---	---	---	---	---
Endrin ketone	50-29-3	0.2	mg/kg	---	---	---	---	---
Endrin ketone	53494-70-5	0.05	mg/kg	---	---	---	---	---
Methoxychlor	72-43-5	0.2	mg/kg	---	---	---	---	---
^ Sum of Aldrin + Dieldrin								
	309-00-2/60-57-1	0.05	mg/kg	---	---	---	---	---
^ Sum of DDD + DDE + DDT								
	72-54-8/72-55-9/5	0.05	mg/kg	---	---	---	---	---
	0.2							

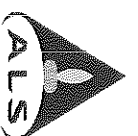
EP068B Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	---	---	---	---	---
Demeton-S-methyl	919-86-8	0.05	mg/kg	---	---	---	---	---
Monocrotophos	6923-22-4	0.2	mg/kg	---	---	---	---	---
Dimethoate	60-51-5	0.05	mg/kg	---	---	---	---	---
Diazinon	333-41-5	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	---	---	---	---	---
Parathion-methyl	298-00-0	0.2	mg/kg	---	---	---	---	---
Malathion	121-75-5	0.05	mg/kg	---	---	---	---	---
Fenitrothion	55-38-9	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos	2921-88-2	0.05	mg/kg	---	---	---	---	---



Analytical Results

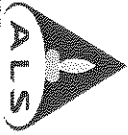
Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR5 2.5-2.7							
		Client sampling date / time		[26-Feb-2016]							
Compound	CAS Number	LOR	Unit	ES1604423-023	Result	Result	Result	Result	Result	Result	Result
EP06B8: Organophosphorus Pesticides (OP) - Continued											
Parathion	56-38-2	0.2	mg/kg	---	---	---	---	---	---	---	---
Phlthippos-ethyl	23505-41-1	0.05	mg/kg	---	---	---	---	---	---	---	---
Chlorfenviphos	470-90-6	0.05	mg/kg	---	---	---	---	---	---	---	---
Bromophos-ethyl	4824-78-6	0.05	mg/kg	---	---	---	---	---	---	---	---
Fenamiphos	22224-92-6	0.05	mg/kg	---	---	---	---	---	---	---	---
Prothiofos	34643-46-4	0.05	mg/kg	---	---	---	---	---	---	---	---
Ethion	563-12-2	0.05	mg/kg	---	---	---	---	---	---	---	---
Carbophenothion	786-19-6	0.05	mg/kg	---	---	---	---	---	---	---	---
Azinphos Methyl	86-50-0	0.05	mg/kg	---	---	---	---	---	---	---	---
EP076(SIM)B: Polynuclear Aromatic Hydrocarbons											
Naphthalene	91-20-3	0.5	mg/kg	---	---	---	---	---	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg	---	---	---	---	---	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg	---	---	---	---	---	---	---	---
Fluorene	86-73-7	0.5	mg/kg	---	---	---	---	---	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg	---	---	---	---	---	---	---	---
Anthracene	120-12-7	0.5	mg/kg	---	---	---	---	---	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg	---	---	---	---	---	---	---	---
Pyrene	129-00-0	0.5	mg/kg	---	---	---	---	---	---	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg	---	---	---	---	---	---	---	---
Chrysene	218-01-9	0.5	mg/kg	---	---	---	---	---	---	---	---
Benz(b+J)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	---	---	---	---	---	---	---	---
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	---	---	---	---	---	---	---	---
Benz(a)pyrene	50-32-8	0.5	mg/kg	---	---	---	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	---	---	---	---	---	---	---	---
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	---	---	---	---	---	---	---	---
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	---	---	---	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons											
^ Benz(a)pyrene TEQ (zero)		0.5	mg/kg	---	---	---	---	---	---	---	---
^ Benz(a)pyrene TEQ (half LOR)		0.5	mg/kg	---	---	---	---	---	---	---	---
^ Benz(a)pyrene TEQ (LOR)		0.5	mg/kg	---	---	---	---	---	---	---	---
EP080071: Total Petroleum Hydrocarbons											
C6 - C9 Fraction		10	mg/kg	---	---	---	---	---	---	---	---
C10 - C14 Fraction		50	mg/kg	---	---	---	---	---	---	---	---
C15 - C28 Fraction		100	mg/kg	---	---	---	---	---	---	---	---



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Compound	CAS Number	LOI	Unit	Client sample ID	Client sampling date / time	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued									
C29 - C36 Fraction	—	100	mg/kg	—	—	—	—	—	—
^ C10 - C36 Fraction (sum)	—	50	mg/kg	—	—	—	—	—	—
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	—	—	—	—	—	—
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	—	—	—	—	—	—
>C10 - C16 Fraction	—	50	mg/kg	—	—	—	—	—	—
>C16 - C34 Fraction	—	100	mg/kg	—	—	—	—	—	—
>C34 - C40 Fraction	—	100	mg/kg	—	—	—	—	—	—
^ >C10 - C40 Fraction (sum)	—	50	mg/kg	—	—	—	—	—	—
^ >C10 - C16 Fraction minus Naphthalene (F2)	—	50	mg/kg	—	—	—	—	—	—
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	—	—	—	—	—	—
Toluene	108-88-3	0.5	mg/kg	—	—	—	—	—	—
Ethylbenzene	100-41-4	0.5	mg/kg	—	—	—	—	—	—
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	—	—	—	—	—	—
ortho-Xylene	95-47-6	0.5	mg/kg	—	—	—	—	—	—
^ Sum of BTEX	—	0.2	mg/kg	—	—	—	—	—	—
^ Total Xylenes	1330-20-7	0.5	mg/kg	—	—	—	—	—	—
Naphthalene	91-20-3	1	mg/kg	—	—	—	—	—	—
EP066: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	—	—	—	—	—	—
EP068: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	—	—	—	—	—	—
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	—	—	—	—	—	—
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	—	—	—	—	—	—
2-Chlorophenol-D4	93951-73-6	0.5	%	—	—	—	—	—	—
2,4,6-Tribromophenol	118-79-6	0.5	%	—	—	—	—	—	—
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	—	—	—	—	—	—
Anthracene-d10	1719-06-8	0.5	%	—	—	—	—	—	—



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID	Client sampling date / time	Result
				BHR5 2.5-2.7	[26-Feb-2016]	---
				ES1604423-023		---
					Result	---
					Result	---
					Result	---
					Result	---
					Result	---

EP075(SIM): PAH Surrogates - Continued						
4-Terphenyl-d14	1718-51-0	0.5	%	---	---	---
EP080S: TPH(V)/BTX Surrogates						
1,2-Dichloroethane-D4	17060-07-0	0.2	%	---	---	---
Toluene-D8	2037-26-5	0.2	%	---	---	---
4-Bromofluorobenzene	460-00-4	0.2	%	---	---	---

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound

Client sample ID - Client sampling date / time

Analytical Results

EA200: AS 4964 - 2004 Identification of Asbestos in Soils						
EA200: Description	S101 - [26-Feb-2016]			Mid brown clay soil with grey rocks.		
EA200: Description	S102 - [26-Feb-2016]			Mid brown sandy soil with grey rocks.		
EA200: Description	S105 - [26-Feb-2016]			Mid grey sandy soil with grey rocks.		
EA200: Description	BHR2 0-0.2 - [26-Feb-2016]			Pale brown sandy soil with grey rocks.		
EA200: Description	BHR3 0-0.2 - [26-Feb-2016]			Mid brown sandy soil with grey rocks.		
EA200: Description	BHR4 0-0.4 - [26-Feb-2016]			Mid brown sandy soil with grey rocks.		
EA200: Description	BHR5 0-0.4 - [26-Feb-2016]			Mid grey sandy soil with grey rocks.		
EA200: Description	BH6 0.2-0.4 - [26-Feb-2016]			Dark grey sandy soil with grey rocks.		
EA200: Description	BH7 0.2-0.4 - [26-Feb-2016]			Mid grey sandy soil with crushed brick debris.		
EA200: Description	S107 - [26-Feb-2016]			Mid brown sandy soil with grey rocks.		
EA200: Description	S104 - [26-Feb-2016]			Dark grey sandy soil with grey rocks.		
EA200: Description	BHR4 1-1.2 - [26-Feb-2016]			Mid grey sandy soil with grey rocks.		



Appendix C

Determination of the Geotechnical Strength Reduction Factor

Determination of the Geotechnical Strength Reduction Factor, Φ_g

AS2159-2009, Section 4.3.1

Job Number: RGS01102.1-AC
 Client: Core Project Group
 Project: Proposed Development
 Site Location: 12 Stewart Avenue, Newcastle West

Pile Testing?	No
Φ_{tf}	
Static/Rapid or Dynamic Load Testing?	
K	
P	

Weighting Factors & Individual Risk Ratings for Risk Factors (Table 4.3.2(A))

Risk Factor	Individual Risk Rating (IRR)		
	Weighting Factor, w_i	Risk weighting	Risk Rating
		(VL=1, M=3 or VH=5)	
Site			
Geological Complexity	2	2	4
Extent of Investigation	2	2	4
Amount/Quality of data	2	2	4
Design			
Experience in similar	1	2	2
Method assessment geotech parameters	2	1	2
Design Method	1	2	2
Method of utilizing results	2	2	4
Installation			
Level of Construction Control	2	2	4
Level of Performance monitoring	0.5	5	2.5

ARR 1.97

Redundancy in System Low

	Low	High
Basic Geotechnical Reduction Factor, Φ_{gb}	0.61	0.7

Adopted Φ_{gb}

0.61

Geotechnical Strength Reduction Factor, Φ_g

0.61

Determination of the Geotechnical Strength Reduction Factor, Φ_g

AS2159-2009, Section 4.3.1

Job Number: RGS01102.1-AC
 Client: Core Project Group
 Project: Proposed Development
 Site Location: 12 Stewart Avenue, Newcastle West

Pile Testing?	Yes
Φ_{tf}	0.9
Static/Rapid or Dynamic Load Testing?	Static
K	0.5
P	2

Weighting Factors & Individual Risk Ratings for Risk Factors (Table 4.3.2(A))

	Individual Risk Rating (IRR)		
Risk Factor	Weighting Factor, w_i	Risk weighting	Risk Rating
		(VL=1, M=3 or VH=5)	
Site			
Geological Complexity	2	3	6
Extent of Investigation	2	1	2
Amount/Quality of data	2	2	4
Design			
Experience in similar	1	2	2
Method assessment geotech parameters	2	1	2
Design Method	1	2	2
Method of utilizing results	2	2	4
Installation			
Level of Construction Control	2	2	4
Level of Performance monitoring	0.5	3	1.5

ARR 1.90

Redundancy in System Low

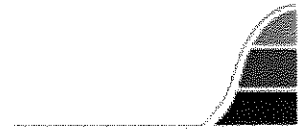
	Low	High
Basic Geotechnical Reduction Factor, Φ_{gb}	0.61	0.7

Adopted Φ_{gb}

0.61

Geotechnical Strength Reduction Factor, Φ_g

0.755



Appendix D

Rigid Pavement Thickness Design Sheet

RIGID PAVEMENT THICKNESS DESIGN

CLIENT: Core Project Group
PROJECT: Proposed Commercial Development
LOCATION: 12 Stewart Avenue, Newcastle West

Job No.: RGS01102.1-AC
Date: 1-Apr-16



ROAD NAME:	Internal Roads		Refer to drawing:	
Chainage Interval (m):	Full Length		Road classification ref:	N/A
Road Classification:	N/A		Design Traffic:	1 x 10 ³ HVAG
Subgrade Conditions				
Expected subgrade:	Sand		Required subgrade compaction:	100%
Adopted Subgrade CBR value:	12%			
Potential construction or performance issues:	Subgrade will comprise sand fill or natural sand. Proof roll to identify and remove soft or heaving areas. Where identified, remove and replace with approved granular fill.			
Pavement Design				
Recommended Pavement Layer Thickness:		Recommended Material requirements		Required Compaction
Wearing course thickness (mm):	-			
Concrete Base thickness (mm):	150		4MPa flexural strength concrete with SL82 mesh	-
Sub-base thickness (mm):	125		Lean Mix	
Select thickness (mm):	as required based on proof roll		CBR>15%, Pl<15%, max particle size 100mm	100% Standard Compaction
Total thickness (mm):	275			
Definitions:				
Design traffic loading:	The anticipated number of Heavy Vehicle Axle Groups (HVAG), as defined by AGPT02-12, in the design lane during the design life of the pavement.			
Modified Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.2.1-2003 or equivalent.			
Standard Compaction:	Minimum required dry density ratio (AS1289 5.4.1-2007) defined as the ratio of the calculated field dry density (AS1289 5.3.1-2004 or equivalent) to the maximum dry density obtained using AS1289 5.1.1-2003 or equivalent.			
Density Index:	Minimum required Density Index AS1289 5.6.1-1998, defined as the ratio of field dry density determined by AS1289 5.3.1-2004 or equivalent to the laboratory values of maximum and minimum density obtained by AS1289 5.5.1-1998 or equivalent			
Note: Pavement designs assume appropriate drainage is installed and maintained.				

Core Project

Proposed Development

12 Stewart Avenue, Newcastle West

Site Contamination Assessment

Report No. RGS01102.1-AD

14 April 2016

REGIONAL
GEOTECHNICAL SOLUTIONS





Manning-Great Lakes

Port Macquarie

Coffs Harbour

RGS01102.1-AD

14 April 2016

Core Project
122a Hannell Street
WICKHAM NSW 2293

Attention: Tom Elliot

Dear Tom

RE: Site Contamination Assessment

Proposed Development – 12 Stewart Avenue, Newcastle West

Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a preliminary site contamination assessment at 12 Stewart Avenue, Newcastle West where it is proposed to construct two commercial office buildings up to 8 Storeys and a six storey carpark.

Presented herein is a summary of the work undertaken, the findings of the site investigation, and a review of the laboratory test results compared to the NEPM (2013) guidelines. The assessment found friable asbestos at two locations and elevated lead concentrations in near surface soils at one location. All other contaminant concentrations were within the health based NEPM (2013) soil investigation guidelines for commercial/industrial land use. Evaluation of results against waste classification guidelines indicates some soils exceeding requirements for General Solid Waste and one instance of soil not meeting requirements for Restricted Solid Waste. Disposal of excavated soils off site is likely to be costly. It is recommended that offsite disposal of excavated soil be minimised.

If you have any questions regarding this project, please contact the undersigned.

For and on behalf of

Regional Geotechnical Solutions Pty Ltd

A handwritten signature in black ink, appearing to read 'S Morton', written over a horizontal line.

Steven Morton

Principal

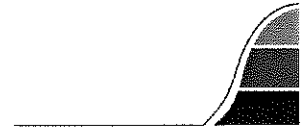


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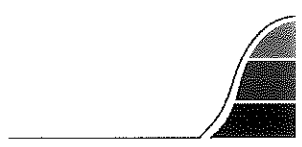
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- Appendix A Results of Field Investigations
- Appendix B Laboratory Test Result Sheets



1 INTRODUCTION

Regional Geotechnical Solutions Pty Ltd (RGS) has undertaken a site contamination assessment at 12 Stewart Avenue, Newcastle West (Lot 102 DP1191992). The proposed development is to consist of two commercial office buildings up to 8 Storeys with a six storey carpark.

The purpose of the site contamination assessment was to provide discussions and recommendations regarding:

- Evaluation of the analysis results against industry accepted criteria (NEPM 2013) for the proposed landuse;
- Provide a plan indicating the location and concentration of contamination across the site including the lateral extent (if found);
- Provide recommendations on site management, the need and options for remediation and any further detailed investigation and testing that is recommended / required; and
- Waste classification for materials to be removed from the site, the requirement for remediation, further investigation, or ongoing management of site contamination (if encountered).

RGS has been provided with a previous Phase 1 site contamination assessment undertaken at the site by Prensa (job no. 11128 dated August 2012). The results of the previous assessment have been reviewed as part of the current assessment.

2 METHODOLOGY

In accordance with the brief, the site was assessed using the following methodology:

- A review of the previous Phase 1 site contamination assessment undertaken by Prensa;
- Site walkover to assess visible surface conditions and identify any evidence of contamination, or past activities that may cause contamination;
- Drilling of seven boreholes (BHR1 to BHR7) to recover soil samples for subsequent laboratory testing; and
- Collection of near surface samples from six locations (S101, S102, S104, S105, S107, S111 and S112).

Sample locations are shown on Figure 1.

3 PREVIOUS SITE CONTAMINATION ASSESSMENT

The previous assessment included a review of historical documentation as well as undertaking soil and groundwater testing.

A review of the findings of the site history study indicates:

- The north-eastern and eastern sections of the site were used as a combination of commercial retail outlets and repair stores since the 1920s;
- Eight underground storage tanks were removed from the footpath to the east of the buildings in the northeast section of the site in 2000. A soil and groundwater investigation by RCA in 2002 found elevated concentrations of copper and Total Recoverable Hydrocarbons (TRH) in soil to the west of the excavations;
- A hazardous materials assessment was undertaken on buildings that previously existed in the northeast of the site in 2002 and identified asbestos, PCBs and lead based paint within the building materials;
- Concentrations of PAH and BaP from soil samples recovered from fill during the Prensa assessment exceeded the NEPM guidelines for a Commercial/Industrial site; and
- No 'significant' contamination was found within groundwater samples recovered and tested during the Prensa assessment.

4 SITE DESCRIPTION

4.1 Surface Conditions

The irregular shaped site is bound by Stewart Avenue to the southeast, Hunter Street to the northeast, and existing single and double storey industrial/commercial structures to the northwest and southwest.

The site is located within a region characterised by a flat alluvial plain associated with the Hunter River catchment. An aerial photograph from the NSW DPI 'Six Viewer' is reproduced below.



The site location is outlined in red



The site is near level with minor slope variations of less than 2°, predominantly comprising a slight slope to the south towards Stewart Avenue. The southern half of the site is covered with existing hardstand pavements and remnants of the former structures that occupied the site. The northern half previously contained a building that has since been demolished. The area is vacant with sand exposed at the surface.

4.2 Subsurface Conditions

The 1:250,000 Geological Series Sheet of Newcastle indicates the site to be underlain by Quaternary marine and freshwater deposits comprising sand, silt, clay and gravel. The 100,000 Newcastle Coalfield Regional Geology Map indicates the Quaternary deposits are in turn underlain by the Lambton Subgroup (comprising the Borehole coal seam) and Waratah Sandstone which form the lower lithologies of the Newcastle Coal Measures.

The boreholes drilled during the current and previous site investigations encountered a profile that generally comprises between 0.5 and 1.6m of sand fill that contained some brick and rubble fragments. Sand fill was also encountered to depths of between 4.2 and 5.25m in the central portion of the site. The fill was underlain by natural sands. Groundwater levels at the site vary from between 2.2 to 3.1m below existing surface levels.

5 SAMPLING & ANALYSIS

5.1 Sample Media

The site history indicated the potential modes of contamination at this site to be:

- Surface spillage or leakage of fuels, oils or similar;
- Importation of contaminants in fill soils;
- Presence of asbestos, PCBs and lead in soils in the vicinity of the buildings in the northeast of the site;
- Dumping or scattering of asbestos in near surface soils;
- Leakage of fuels from nearby underground tanks;
- Leakage of fuel or oil from vehicles stored on site.

The groundwater table was encountered at 2.2 to 3.1m below the ground surface in this investigation and the previous assessments. The installation of groundwater monitoring wells and groundwater sampling by others in 2012 (i.e. after the removal of the fuel tanks) found that no 'significant contamination' was present. Further assessment of groundwater at the site is not considered necessary. It is recommended that copies of the validation reports of the tanks be sought.

The sampling plan was therefore aimed at assessment of contaminants within the soils, with a contingency to investigate potential groundwater impact only if significant soil-borne contamination was encountered.



5.2 Sampling Plan

Based on the identified areas of concern as outlined above, fourteen sampling locations were adopted as shown in Figure 1.

Sampling involved the drilling, logging, and sampling of a borehole at seven locations using a 4WD mounted auger rig and collection of near surface samples at an additional seven locations. Sampling equipment was decontaminated between sample locations and a clean pair of nitrile gloves used for the collection of each sample into laboratory supplied glass sampling jars.

Samples were placed on ice on site and maintained on ice during transport to the testing laboratories. The sampling was carried out in accordance with stringent protocols for decontamination, Quality Control, and sample preservation. Quality Control procedures included taking one duplicate samples to aid in the assessment of data quality.

5.3 Laboratory Analysis

Samples were transported under chain-of-custody to ALS, a NATA accredited specialist chemical testing laboratory. The samples were analysed for the following suite of contaminants:

- Total Recoverable Hydrocarbons (TRH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Pesticides
- Heavy Metals
- Asbestos
- BTEX Compounds

The results are presented in Appendix B.

5.4 Quality Control

Samples were obtained using industry accepted protocols for sample treatment, preservation, and equipment decontamination. One duplicate sample was submitted to the laboratory for analysis as shown below.

- Primary sample (S112 0.0 – 0.2m) and duplicate sample (S115 0.0 – 0.2m).

Comparison between the primary and duplicate samples show good correlation (See Table in Appendix B).



In addition to the field QC procedures, the laboratory conducted internal quality control testing including surrogates, blanks, and laboratory duplicate samples. The results are presented with the laboratory test results in Appendix B.

All laboratory quality control data is within acceptable limits for the tests carried out. Therefore, on the basis of the results of the field and laboratory quality control procedures and testing the data is considered to reasonably represent the concentrations of contaminants in the soils at the sample locations at the time of sampling and the results can be adopted for this assessment.

6 SITE CONTAMINATION ASSESSMENT

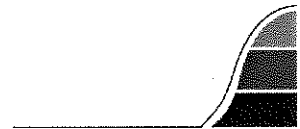
6.1 Guidelines and Assessment Criteria

The assessment was carried out in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013). The NEPM document provides a range of guidelines for assessment of contaminants for various land uses. It is proposed to construct a combined commercial and residential (upper units) development at the site. As the lower levels are to be used for commercial purposes, the investigation levels for "Commercial/Industrial" land use have been adopted as the primary investigation criteria. In accordance with the NEPM guidelines the following criteria were adopted for this assessment:

- Health Investigation Levels (HILs) for Commercial/Industrial land use were used to assess the potential human health impact of heavy metals and PAH;
- Health Screening Levels (HSLs) for coarse textured (sand or gravel) or fine textured (silt or clay) soils on a Commercial/Industrial site were adopted as appropriate for the soils encountered to assess the potential human health impact of petroleum hydrocarbons and BTEX compounds;
- Ecological Investigation Levels (EILs) for residential land use were used for evaluation of the potential ecological / environmental impact of heavy metals and PAH;
- Ecological Screening Levels (ESLs) for coarse textured (sand or gravel) or fine textured (silt or clay) soils on a Commercial/Industrial site were adopted as appropriate for the soils encountered, to assess the potential ecological / environmental impact of petroleum hydrocarbons and BTEX compounds;

The site is situated in a highly disturbed CBD location, with no sensitive ecological receptors on the site or immediate surrounding area. The nearest receptor off site would be the aquatic ecosystem of Newcastle Harbour located 350m to the northeast of the site. The land between the site and the harbour is highly developed, including the inner city commercial area and heavy rail corridor as well as former industrial port facilities. The site has been sealed for a number of decades and the future development will also result in the site surface being sealed by buildings or paving. Sediment run-off from the site to the harbour waterway is not considered feasible provided construction is undertaken in accordance with good sediment and erosion control practice.

Based on the above the assessment presented herein has been based on health based soil investigation criteria, except in cases where no health based criteria exists. In accordance with



NEPM 2013, exceedance of the criteria does not necessarily mean that remediation or clean-up is required, but is a trigger for further assessment of the extent of contamination and associated risks. The adopted criteria are presented in Table 1.

Table 1: Adopted Soil Investigation Criteria (mg/kg)

Analyte	Adopted Soil Investigation Criteria	Analyte	Adopted Soil Investigation Criteria
Benzene	3	Chlordane	530
Toluene	135(1)	Heptachlor	50
Ethyl-benzene	165(1)	Copper	240,000
Xylene	230	Lead	1,500
TPH C6 – C10 (F1)	215(1)	Zinc	400,000
TPH C10 – C16 (F2)	170(1)	Cadmium	900
TPH C16 – C34 (F3)	1,700(1)	Chromium (VI)	3,600
TPH C34 – C40 (F4)	3,300(1)	Arsenic	3,000
Benzo-a-pyrene	40	Nickel	6,000
Phenol	240,000	Mercury	730
DDT+DDE+DDD	3,600	Asbestos	Not Present
Aldrin / Dieldrin	45		

NOTES: Based on ecological screening levels (ESL).

6.2 Test Results

An evaluation of the laboratory test results against the adopted soil assessment criteria as presented in Table 1 is provided in the summary table in Appendix B. The findings are summarised below:

- Results of heavy metal analysis revealed that one sample (BHR4 0.0-0.4m) exceeded the adopted assessment criteria for lead. The sample also produced elevated concentrations of As, Cr, Cu, Ni and Zn, however, these concentrations were below the adopted assessment criteria. All other samples revealed concentrations well below the adopted assessment criteria;
- Results of BTEX analysis revealed concentrations below the limit of laboratory detection and hence well below the adopted assessment criteria;
- Results of TRH C6-C10 (F1) analysis revealed concentrations below the limit of laboratory detection and hence well below the adopted assessment criteria;
- Results of TRH C10-C16 (F2) analysis revealed some slightly elevated levels, however, the concentrations were well below the adopted health based assessment criteria;



- Results of TRH C16-C34 (F3) analysis revealed some elevated concentrations with two near surface samples (S102 and BHR4 0.0 – 0.4m) exceeding the adopted ecological screening value. All other samples were below the adopted assessment criteria;
- Results of TRH C34-C40 (F4) analysis revealed some slightly elevated levels, however, the concentrations were well below the adopted assessment criteria;
- Results of PAH analysis revealed some slightly elevated levels, however, the concentrations were well below the adopted health based assessment criteria;
- Results of Polychlorinated Biphenyls (PCB) analysis recorded values below level of recording for all samples tested;
- Results of organochlorine (OC) and organophosphorus (OP) pesticide analysis revealed some slightly elevated levels, however, the concentrations were well below the adopted assessment criteria; and
- Asbestos was detected in two near surface samples (S111 and S112).

It is noted that PAH concentrations twelve of the fourteen locations exceeded the ecological assessment criteria, but were well below the health based criteria, which were the criteria adopted for this assessment for reasons outlined in Section 6.1, except in cases where no health based criteria exists.

6.3 Assessment & Conclusions

For all samples tested the analysis found that:

- One near surface sample from the northeast of the site (to the west of the sewer line) exceeded health based assessment criteria for lead for commercial/industrial land use;
- Two near surface samples, one from the northeast and one from the east of the site, exceeded ecological assessment criteria for TRH C16-C34 (F3) for commercial/industrial land use; and
- Two near surface samples found the presence of friable asbestos.

For all other samples tested the analysis found that heavy metals, TPH, BTEX, PAH, OC/OP pesticides, PCBs and the presence of asbestos were either at concentrations below the laboratory detection limits or at concentrations below the adopted assessment criteria for commercial/industrial land use.

The encountered asbestos is likely to be present as a result of the demolition of the former structures at the site. Asbestos sheeting was not observed on the surface during the assessment. It is recommended that further quantitative testing be undertaken at the two locations to determine whether the percentage of asbestos present exceeds the health screening levels for contamination in soil. If concentrations exceed the adopted assessment criteria an asbestos management plan would be required which would provide further details on the required removal of affected soils as asbestos waste. An alternative may be to identify the affected soils and seal them beneath building slabs on the site to prevent exposure of, or contact with the asbestos post development.



The near surface soils around BHR4 where a high lead concentration was encountered will require remediation and a remedial action plan is required. Remediation will include removal and disposal of the lead affected soil at a licenced landfill. Elevated lead concentrations were not encountered at this location in a sample collected from 1.0-1.2m and therefore the lead appears to be confined to the upper fill layer. The borehole logs indicate that the base of the fill layer is at 0.5m, however, verification testing would be required at the base of the excavation to ensure that all of the contaminated soil has been removed. The estimated area around BHR4 that will require remediation is illustrated on Figure 2.

The two samples where concentrations of TRH C16-C34 exceed the adopted assessment criteria are below the management limit for TPH fractions in soil for a coarse grained soil (NEPM 2012 Table 1B(7)). As there are no sensitive ecological receptors on the site or immediate surrounding area and considering that the future development will also result in the site surface being sealed by buildings or pavements, further assessment or remediation at the site as a result TRH is not required.

The soils around the former underground fuel storage tanks and associated infrastructure along the eastern site boundary are likely to contain potentially small areas of contamination in the form of TPH, lead and PAH even if the tanks and infrastructure have been previously validated. Although the tanks were located outside the site boundary it is possible that some affected soil extends onto the site. If excavations such as basement excavation is to be undertaken adjacent to the site boundary a contingency should be provided for the possibility of encountering some hydrocarbon impacted soil that may require specific remediation or removal.

7 OFFSITE DISPOSAL OF SITE SOILS

7.1 Virgin Excavated Natural Material (VENM)

The Protection of the Environment Operations Act 1997 (POEO Act) defines virgin excavated natural material (VENM) as 'natural material (such as clay, gravel, sand, soil or rock fines):

- (a) that has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities and
- (b) that does not contain any sulfidic ores or soils or any other waste

The existing fill at the site does not meet the requirements for VENM.

As detailed within the geotechnical report prepared for the site by RGS (Report RGS01102.1-AC), the natural soils below 2m depth at the site are considered to be acid sulfate soils. Accordingly, natural soils excavated from below this depth may be classified as Virgin Excavated Material (VENM) and may be disposed of accordingly.



7.2 Excavated Natural Material

The soils encountered at the site have been assessed in relation to the 'Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014 - The excavated natural material order 2014', with a view of granting an exemption under the 'Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 - The excavated natural material exemption 2014' to allow the potential re-use of the material for engineering fill or earthworks within the area.

The Excavated Natural Material (ENM) Exemption applies to naturally occurring soil and rock that has:

- a) Been excavated from the ground;
- b) Contains at least 98% (by weight) natural material; and
- c) Does not meet the definition of Virgin Excavated Natural Material (VENM) in the Act.

The boreholes drilled during the investigation indicate that the predominantly sand and gravel fill material contains greater than 2% foreign materials (in the form of concrete, coal and slag). Based on the investigations undertaken to date, the fill material does not meet the requirements for Excavated Natural Material (ENM).

Further more detailed investigations and sampling can be undertaken which may delineate areas of fill that do and do not meet the requirements for ENM.

7.3 Waste Classification

Table 2 of the 'Waste Classification Guidelines (2009)' nominates a suite of analytes to be tested (Column 1) and also provides the maximum concentration (CT1) allowable within the soil for classification without the need for additional toxicity characteristics leaching procedure (TCLP) testing for both general solid waste (Column 2) and restricted solid waste (Column 3) for each analyte. Should the CT1 values be exceeded, the guidelines provide a Specific Contaminant Concentration (SCC) value to allow further evaluation of contaminant concentrations in conjunction with TCLP testing.

The results of this assessment indicate:

- Total PAH - Two samples (S102 and BHR3) exceed the SCC for General solid waste;
- BaP - Twelve samples exceed the CT1 for General solid waste and three samples exceed the CT1 for Restricted solid waste. Two samples (S102 and BHR3) exceed the maximum SCC for restricted solid waste if they were to be used with TCLP results;
- Chromium (VI) - One sample exceeds the SCC for General solid waste if Chromium VI. Chromium speciation testing would be required to assess whether the materials encountered were chromium VI or the more common chromium III;
- Lead - Seven samples exceed the CT1 criteria for general solid waste and five samples exceed the CT1 for restricted solid waste. One sample exceeds the maximum SCC for general solid waste if it were to be used with TCLP results but is below the maximum SCC with TCLP level for restricted solid waste; and



- Nickel – Three samples exceed the CT1 for general solid waste and one sample exceeds the SCC for restricted solid waste. All samples are below the maximum SCC for general solid waste if they were to be used with TCLP results.

Of the fourteen samples tested the results indicate that only one of the samples meets the requirement for general solid waste without TCLP testing. Two of the samples exceed the requirements for restricted solid waste, even if TCLP testing was undertaken. Based on these results the fill at the site is not considered to meet the requirements for either general solid waste and may not meet requirements for restricted solid waste.

Based on the above, more detailed assessment of areas requiring excavation would be required to further classify the soils. Based on the waste classification undertaken to date, removal and disposal of the soils would be costly, with some soils on site requiring disposal as restricted solid waste. The extent of these soils requires further determination if such excavation and disposal is proposed.

It is therefore recommended that the excavation and removal of soils from the site be minimised, and that existing site soils remain on site to the maximum extent possible. Where excavation is proposed, it is recommended that the extent of excavation be determined and additional assessment of the soils in those specific areas be undertaken to allow classification and disposal methods to be determined for the soils requiring disposal.

8 LIMITATIONS

The findings presented in the report and used as the basis for recommendations presented herein were obtained using normal, industry accepted geotechnical practises and standards. To our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, however, can it be considered that these findings represent the actual state of the site at all points. If site conditions encountered during construction vary significantly from those discussed in this report, Regional Geotechnical Solutions Pty Ltd should be contacted for further advice.

This report alone should not be used by contractors as the basis for preparation of tender documents or project estimates. Contractors using this report as a basis for preparation of tender documents should avail themselves of all relevant background information regarding the site before deciding on selection of construction materials and equipment.



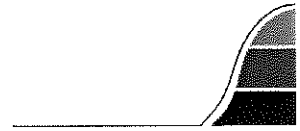
If you have any questions regarding this project, or require any additional consultations, please contact the undersigned.

For and on behalf of

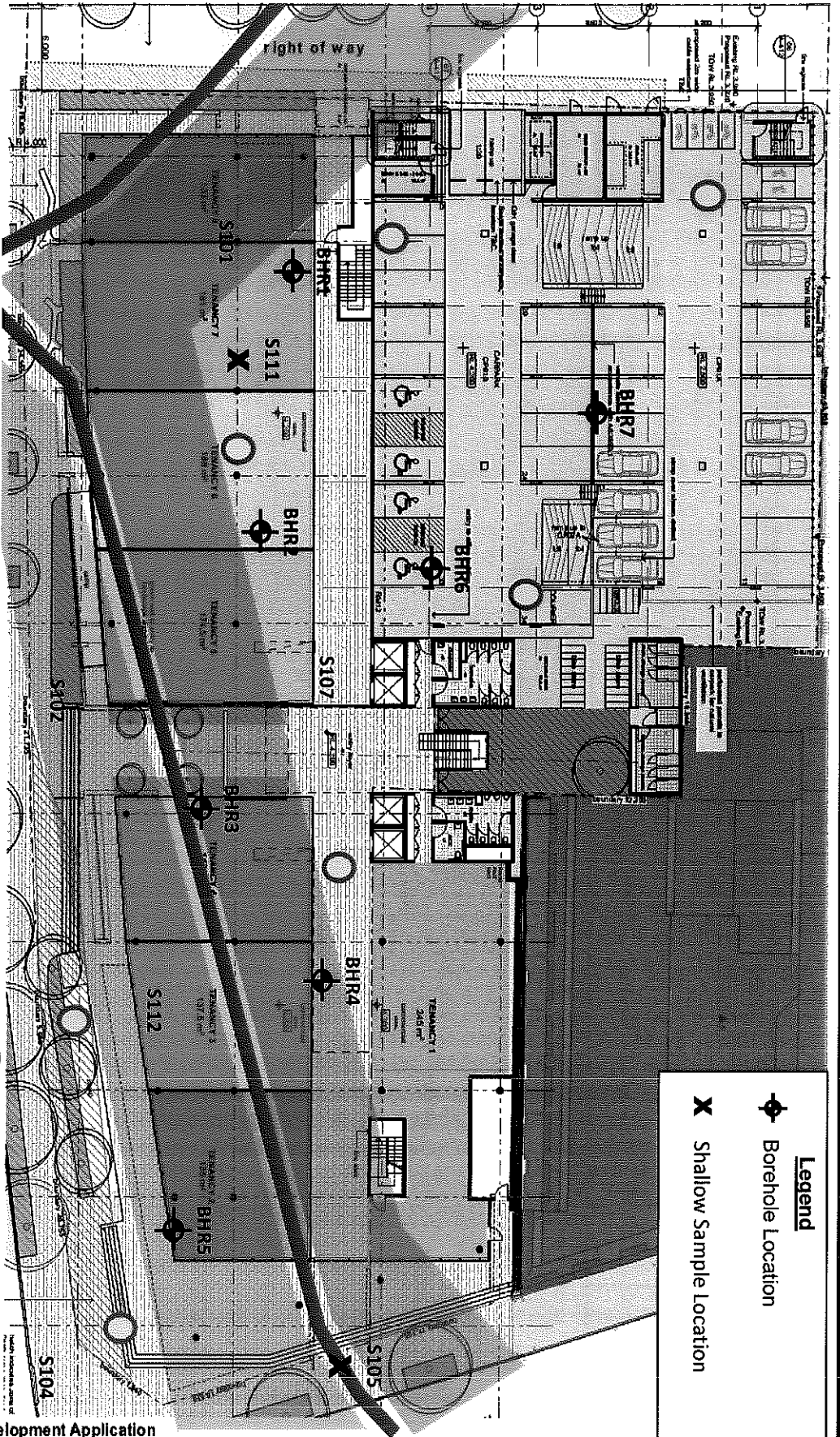
Regional Geotechnical Solutions Pty Ltd

Steven Morton

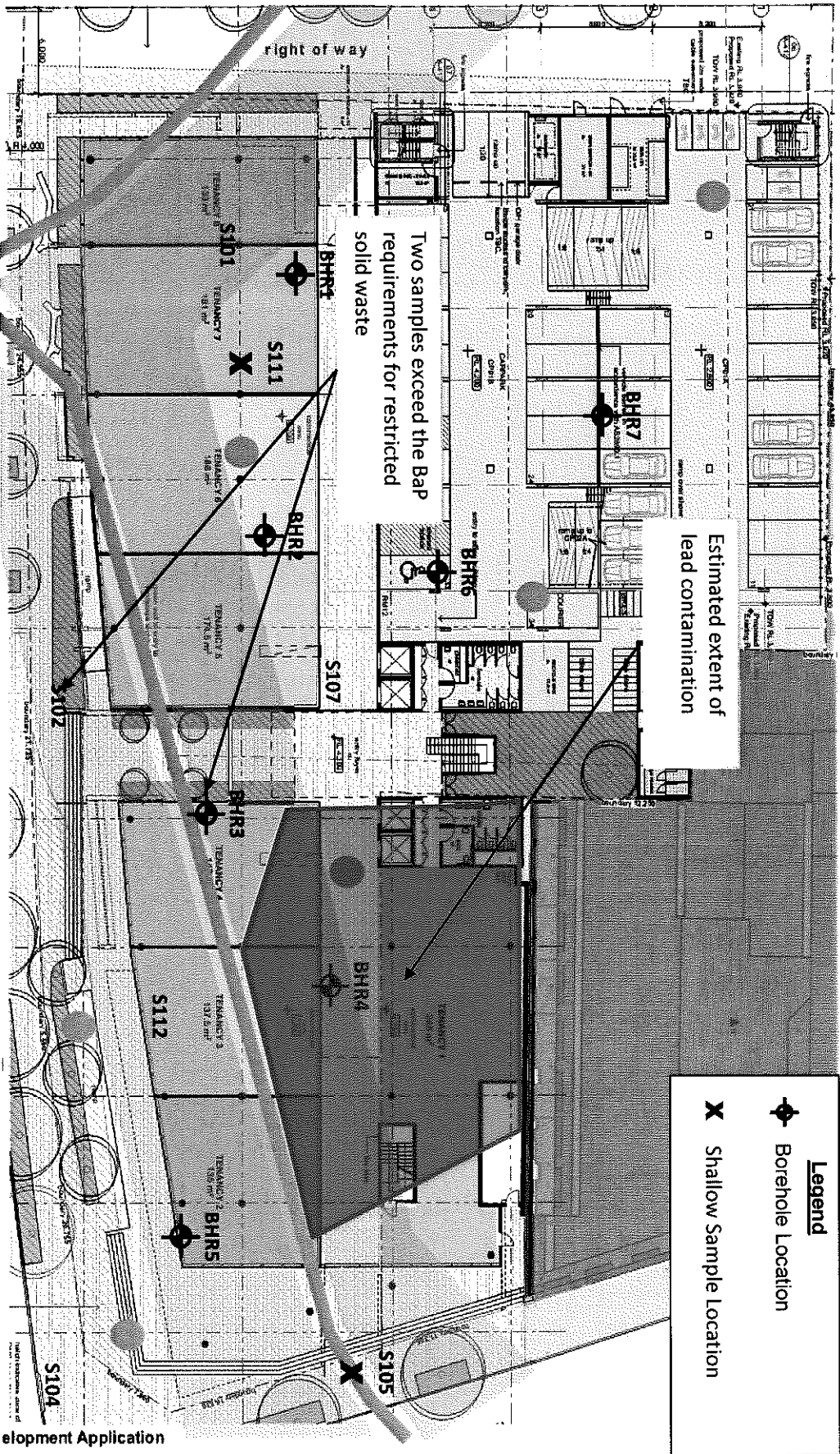
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Figures



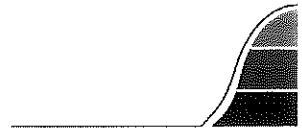
REGIONAL GEOTECHNICAL SOLUTIONS		Client: Core Project Group		Job No. RGS01102.1	
Project: Proposed Multistorey Commercial Development & Carpark		Drawn By: SK		Scale: As Shown	
Title: 12 Stewart Avenue, Newcastle West Sample Location Plan		Date: 13-Apr-16		Drawing No. Figure 1	



Legend

- Borehole Location
- Shallow Sample Location

REGIONAL GEOTECHNICAL SOLUTIONS					
Client:	Core Project Group			Job No.	RGSO1102.1
Project:	Proposed Multistorey Commercial Development & Carpark			Drawn By:	SK
	12 Stewart Avenue, Newcastle West			Scale:	As Shown
Title:	Estimated Extents of Lead Contamination			Date:	13-Apr-16
				Drawing No.	Figure 2



Appendix A

Results of Field Investigations

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR1
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT	Not Encountered	E 0.20m		0.5		SP	FILL: Gravelly SAND, fine to medium grained, dark grey, Gravel fine to coarse grained, some glass and chitter, some bricks and rubble	M	VD			FILL
				1.0			Hole Terminated at 0.85 m Due to refusal on obstacle in fill					
				1.5								
				2.0								
				2.5								
				3.0								
				3.5								
				4.0								
				4.5								

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)		Moisture Condition	
Water				VS	Very Soft	<25		D	Dry
	Water Level	U ₅₀	50mm Diameter tube sample	S	Soft	25 - 50		M	Moist
	Water Inflow	CBR	Bulk sample for CBR testing	F	Firm	50 - 100		W	Wet
	Water Outflow	E	Environmental sample	St	Stiff	100 - 200		W _p	Plastic Limit
Strata Changes		ASS	Acid Sulfate Soil Sample	VSt	Very Stiff	200 - 400		W _L	Liquid Limit
	Gradational or transitional strata	B	Bulk Sample	H	Hard	>400			
	Definitive or distinct strata change			Fb	Friable				
		Field Tests		Density	V	Very Loose	Density Index <15%		
		PID	Photoionisation detector reading (ppm)	L	Loose	Density Index 15 - 35%			
		DCP(x-y)	Dynamic penetrometer test (test depth interval shown)	MD	Medium Dense	Density Index 35 - 65%			
		HP	Hand Penetrometer test (UCS kPa)	D	Dense	Density Index 65 - 85%			
				VD	Very Dense	Density Index 85 - 100%			

BOREHOLE NO: BHR2

CLIENT: Core Project Group

PAGE: 1 of 1

PROJECT NAME:

JOB NO: RGS01102.1

SITE LOCATION: 12 Stewart Avenue, Newcastle

LOGGED BY: SRM

TEST LOCATION: See Figure 1

DATE: 24/2/16

DRILL TYPE: UMDR

EASTING:

SURFACE RL:

BOREHOLE DIAMETER: 100 mm

INCLINATION: 90°

NORTHING:

DATUM:

AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result		
ADV		E 0.20m				SP	FILL: Gravelly SAND, fine to medium grained, grey, Gravel fine to coarse grained, some rubble	M			FILL		
		0.50m 0.60m E		0.5		SP	FILL: Silty SAND, fine to medium grained, dark grey, with some gravel				FILL - some rubble		
				0.70m		SP	SAND: Fine to medium grained, dark grey-brown, some gravel, timber, glass				FILL		
				1.0									
		1.40m ASS 1.60m		1.5			Becoming darker red-brown	M					AEOLIAN
				2.0									
		2.40m 2.50m ASS		2.5									
				3.0									
		3.50m 3.60m ASS		3.5									
				4.0									
			4.20m			Hole Terminated at 4.20 m							
			4.5										

LEGEND:

Water

 Water Level
(Date and time shown)

 Water Inflow

 Water Outflow

Strata Changes

 Gradational or transitional strata

 Definitive or distinct strata change

Notes, Samples and Tests

U₅₀ 50mm Diameter tube sample

CBR Bulk sample for CBR testing

E Environmental sample

ASS Acid Sulfate Soil Sample

B Bulk Sample

Field Tests

PID Photoionisation detector reading (ppm)

DCP(x-y) Dynamic penetrometer test (test depth interval shown)

HP Hand Penetrometer test (UCS kPa)

<u>Consistency</u>		<u>UCS (kPa)</u>	<u>Moisture Condition</u>
VS	Very Soft	<25	D Dry
S	Soft	25 - 50	M Moist
F	Firm	50 - 100	W Wet
St	Stiff	100 - 200	W _p Plastic Limit
VSt	Very Stiff	200 - 400	W _L Liquid Limit
H	Hard	>400	
Fb	Friable		

<u>Density</u>			
V	Very Loose	Density Index <15%	
L	Loose	Density Index 15 - 35%	
MD	Medium Dense	Density Index 35 - 65%	
D	Dense	Density Index 65 - 85%	
VD	Very Dense	Density Index 85 - 100%	

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR3
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR **BOREHOLE DIAMETER:** 100 mm **INCLINATION:** 90° **EASTING:** **NORTHING:** **SURFACE RL:** **DATUM:** AHD

Drilling and Sampling				Material description and profile information				Field Test		Structure and additional observations	
METHOD	WATER	SAMPLES	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type		Result
ADT	Not Encountered			0.5	SP	FILL: Gravelly SAND, fine to medium grained, dark grey, Gravel fine to coarse grained, some rubble, brick	M				FILL
		0.80m									
		ASS 1.00m		1.0		SAND: Fine to medium grained, pale brown					AEOLIAN
		1.30m									
		ASS 1.50m		1.5							
						Hole Terminated at 1.50 m					
				2.0							
				2.5							
				3.0							
				3.5							
				4.0							
				4.5							

LEGEND:

Water

Water Level (Date and time shown)

Water Inflow

Water Outflow

Strata Changes

Gradational or transitional strata

Definitive or distinct strata change

Notes, Samples and Tests

U₅₀ 50mm Diameter tube sample

CBR Bulk sample for CBR testing

E Environmental sample

ASS Acid Sulfate Soil Sample

B Bulk Sample

Field Tests

PID Photoionisation detector reading (ppm)

DCP(x-y) Dynamic penetrometer test (test depth interval shown)

HP Hand Penetrometer test (UCS kPa)

Consistency

VS Very Soft <25

S Soft 25 - 50

F Firm 50 - 100

St Stiff 100 - 200

VSt Very Stiff 200 - 400

H Hard >400

Fb Friable

UCS (kPa)

Moisture Condition

D Dry

M Moist

W Wet

W_p Plastic Limit

W_L Liquid Limit

Density

V Very Loose Density Index <15%

L Loose Density Index 15 - 35%

MD Medium Dense Density Index 35 - 65%

D Dense Density Index 65 - 85%

VD Very Dense Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR5
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR		BOREHOLE DIAMETER: 100 mm		INCLINATION: 90°		EASTING: NORTHING:		SURFACE RL: DATUM: AHD				
Drilling and Sampling				Material description and profile information				Field Test				
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	Structure and additional observations
ADT		E		0.40m		SP	FILL: Gravely SAND, fine to coarse grained, some concrete, brick, glass	M	D			FILL
				0.90m		SP	SAND: Fine to medium grained, grey-brown					AEOLIAN
		ASS	1.10m									
			1.50m			SP	SAND: Fine to medium grained, dark grey-brown					LIGHTLY INDURATED SAND
		ASS	1.70m									
				2.40m		SP	SAND: Fine to medium grained, pale grey-brown	W				
				2.70m			Hole Terminated at 2.70 m					
				3.0								
				3.5								
				4.0								
				4.5								

LEGEND:

Water

Water Level (Date and time shown)

Water Inflow

Water Outflow

Strata Changes

Gradational or transitional strata

Definitive or distinct strata change

Notes, Samples and Tests

U₅₀ 50mm Diameter tube sample

CBR Bulk sample for CBR testing

E Environmental sample

ASS Acid Sulfate Soil Sample

B Bulk Sample

Field Tests

PID Photoionisation detector reading (ppm)

DCP(x-y) Dynamic penetrometer test (test depth interval shown)

HP Hand Penetrometer test (UCS kPa)

Consistency	UCS (kPa)	Moisture Condition
VS Very Soft	<25	D Dry
S Soft	25 - 50	M Moist
F Firm	50 - 100	W Wet
St Stiff	100 - 200	W _p Plastic Limit
VSt Very Stiff	200 - 400	W _L Liquid Limit
H Hard	>400	
Fb Friable		

Density	Density Index
V Very Loose	<15%
L Loose	15 - 35%
MD Medium Dense	35 - 65%
D Dense	65 - 85%
VD Very Dense	85 - 100%

ENGINEERING LOG - BOREHOLE

CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR6
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR **EASTING:** **SURFACE RL:**
BOREHOLE DIAMETER: 100 mm **INCLINATION:** 90° **NORTHING:** **DATUM:** AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT	Not Encountered	0.20m		0.5		SP	FILL: Silty Gravelly SAND, fine to medium grained, grey, Gravel fine to coarse grained	M				FILL - some aggregate
		0.30m					FILL: SAND, fine to medium grained, dark grey-brown, some gravel fine to medium grained, trace brick fragments					FILL
		0.40m					0.90m					SAND: Fine to medium grained, grey-brown, orange
						2.0	SP	2.00m	SAND: Fine to coarse grained, dark grey	W		MARINE
						2.5						
		2.50m		2.5								
		ASS										
		2.70m										
				3.0			Hole Terminated at 2.70 m					
				3.5								
				4.0								
				4.5								

LEGEND:

Water

- Water Level (Date and time shown)
- Water Inflow
- Water Outflow

Strata Changes

- Gradational or transitional strata
- Definitive or distinct strata change

Notes, Samples and Tests

- U₅₀ 50mm Diameter tube sample
- CBR Bulk sample for CBR testing
- E Environmental sample
- ASS Acid Sulfate Soil Sample
- B Bulk Sample

Field Tests

- PID Photoionisation detector reading (ppm)
- DCP(x-y) Dynamic penetrometer test (test depth interval shown)
- HP Hand Penetrometer test (UCS kPa)

Consistency

- VS Very Soft <25
- S Soft 25 - 50
- F Firm 50 - 100
- St Stiff 100 - 200
- VSt Very Stiff 200 - 400
- H Hard >400
- Fb Friable

UCS (kPa)

Moisture Condition

- D Dry
- M Moist
- W Wet
- W_p Plastic Limit
- W_L Liquid Limit

Density

- V Very Loose Density Index <15%
- L Loose Density Index 15 - 35%
- MD Medium Dense Density Index 35 - 65%
- D Dense Density Index 65 - 85%
- VD Very Dense Density Index 85 - 100%

ENGINEERING LOG - BOREHOLE

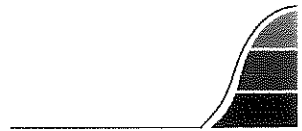
CLIENT: Core Project Group
PROJECT NAME:
SITE LOCATION: 12 Stewart Avenue, Newcastle
TEST LOCATION: See Figure 1

BOREHOLE NO: BHR7
PAGE: 1 of 1
JOB NO: RGS01102.1
LOGGED BY: SRM
DATE: 24/2/16

DRILL TYPE: UMDR **BOREHOLE DIAMETER:** 100 mm **INCLINATION:** 90° **EASTING:** **NORTHING:** **SURFACE RL:** **DATUM:** AHD

Drilling and Sampling					Material description and profile information					Field Test		Structure and additional observations
METHOD	WATER	SAMPLES	RL (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION: Soil type, plasticity/particle characteristics, colour, minor components	MOISTURE CONDITION	CONSISTENCY DENSITY	Test Type	Result	
ADT		E 0.25m		0.20m 0.5 0.80m 1.0 1.20m 1.5 1.60m 2.0 2.5 2.70m	SP SP	FILL: SAND, fine to medium grained, grey	M				FILL - some aggregate and bricks	
						FILL: Gravelly SAND, red-brown					FILL - crushed bricks	
						FILL: Sandy CLAY, medium to high plasticity, pale grey-white, sand fine to coarse, some bricks					FILL - Clay, bricks	
						SAND: Fine to medium grained, pale grey					AEOLIAN	
						SAND: Fine to medium grained, brown and orange brown						
						Hole Terminated at 2.70 m						

LEGEND:		Notes, Samples and Tests		Consistency		UCS (kPa)		Moisture Condition	
Water		U ₅₀ 50mm Diameter tube sample		VS	Very Soft	<25		D	Dry
Water Level (Date and time shown)		CBR Bulk sample for CBR testing		S	Soft	25 - 50		M	Moist
Water Inflow		E Environmental sample		F	Firm	50 - 100		W	Wet
Water Outflow		ASS Acid Sulfate Soil Sample		St	Stiff	100 - 200		W _p	Plastic Limit
Strata Changes		B Bulk Sample		VSt	Very Stiff	200 - 400		W _L	Liquid Limit
Gradational or transitional strata		Field Tests		H	Hard	>400			
Definitive or distinct strata change		PID Photoionisation detector reading (ppm)		Fb	Friable				
		DCP(x-y) Dynamic penetrometer test (test depth interval shown)		Density	V	Very Loose	Density Index <15%		
		HP Hand Penetrometer test (UCS kPa)			L	Loose	Density Index 15 - 35%		
					MD	Medium Dense	Density Index 35 - 65%		
					D	Dense	Density Index 65 - 85%		
					VD	Very Dense	Density Index 85 - 100%		



Appendix B

Laboratory Test Result Sheets



Client: Core Project Group
Job No. RGS011021-AD
Project: Proposed Development
Location: 12 Stewart Avenue, Newcastle West

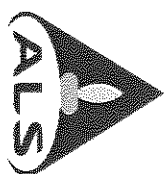
Summary Table - Comparison of Chemical Analysis Results (concentrations in mg/kg) for a COMMERCIAL/INDUSTRIAL Site
National Environment Protection (Assessment of Site Contamination) Measure (NEPM 2013)

Location	DEPTH (m)	MATERIAL	ASBESTOS PRESENCE	TOTAL RECOVERABLE HYDROCARBONS				PAH		OC-OP PESTICIDE	BTEX	PCB	HEAVY METALS							
				C6-C10	C10-C16	C16-C34	C34-C40	TOTAL 10-40	Total				As	Cd	Cu*	Cu	Pb	Ni	Zn	Hg
S101		Fill	No	<10	<50	<100	<100	<50	<0.5	<0.5	<0.05	<0.2	<0.1	<5	<1	9	18	28	8	83
S102		Fill	No	<10	200	2620	300	3120	476	33.5	<0.25	<0.2	<0.1	<5	<1	12	104	94	8	273
S105		Fill	No	<10	<50	<100	<100	<50	11.2	1.8	0.05	<0.2	<0.1	<5	<1	<2	<5	51	<2	31
BHR2	0.0 - 0.2	Fill	No	<10	<50	300	<100	300	61	7.1	<0.05	<0.2	<0.1	<5	<1	4	18	112	6	110
BHR3	0.0 - 0.2	Fill	No	<10	140	1630	340	2110	368	31.5	<0.25	<0.2	<0.1	<5	<1	9	166	448	28	283
BHR4	0.0 - 0.4	Fill	No	<10	<50	2860	580	3440	66.6	8.9	<0.05	<0.2	<0.1	51	4	273	18400	2530	249	4750
BHR4	1.0 - 1.2	Fill	No	<10	<50	180	<100	180	18.4	2.5	<0.05	<0.2	<0.1	<5	<1	6	132	92	10	110
BHR5	0.0 - 0.4	Fill	No	<10	<50	170	<100	170	9.5	1.3	<0.05	0.3	<0.1	<5	<1	7	64	81	14	127
BHR5	0.0 - 0.4	Fill	No	<10	<50	600	120	780	6.1	<0.5	0.48	<0.2	<0.1	6	<1	5	25	430	18	127
BH6	0.2 - 0.4	Fill	No	<10	<50	160	<100	160	6.7	0.8	0.34	<0.2	<0.1	<5	<1	4	15	69	5	93
BH7	0.2 - 0.4	Fill	No	<10	<50	310	100	410	29	3	0.1	<0.2	<0.1	<5	<1	6	29	89	7	117
S107		Fill	No	<10	<50	1490	280	1840	166	13.2	<0.05	<0.2	<0.1	<5	<1	6	78	259	20	346
S111	0.0 - 0.2	Fill	Yes	<10	<50	310	<100	310	18.2	2.4	<0.05	<0.2	<0.1	5	<1	7	402	288	15	299
S112	0.0 - 0.2	Fill	Yes	<10	<50	680	230	910	14.5	1.9	<0.05	<0.2	<0.1	11	1	29	990	590	85	857
S115 (S112 Dupl.)	0.0 - 0.2	Fill	Yes	<10	<50	570	200	770	15.7	2	<0.05	<0.2	<0.1	10	1	24	1430	747	54	874
Health Based Soil Investigation Level:				1000	800				4000	40	45	NL	1	3000	900	3600	240000	1500	6000	400000
Ecological Investigation Level (EL):																				
Ecological Screening Level (ESL):				215	170	1700	3300				75		Coarse grained soil in mg/kg							
				215	170	2500	6600				95		Fine grained soil in mg/kg							

NOTES:

- Denotes concentration exceeds health based guideline for Industrial/Commercial land use
- Denotes concentration exceeds ecological guideline for Industrial/ Commercial land use
- Denotes concentration exceeds health and ecological based guideline for Industrial/ Commercial land use
- NL No Limit available
- LOR Limit of Reporting
- TRH health based guidelines for upper 1m of soil

[illegible]



Environmental

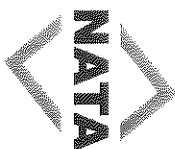
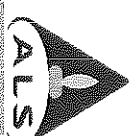
CERTIFICATE OF ANALYSIS

Work Order	: ES1604423	Page	: 1 of 28
Client	: REGIONAL GEOTECHNICAL SOLUTION	Laboratory	: Environmental Division Sydney
Contact	: MR SIMON KEEN	Contact	:
Address	: 44 BENT STREET WINGHAM NSW, AUSTRALIA 2429	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: simon.k@regionalgeotech.com.au	E-mail	:
Telephone	: +61 02 6553 5641	Telephone	: +61-2-8784 8555
Facsimile	: ---	Facsimile	: +61-2-8784 8500
Project	: RGS01102.1 UNIT DEVELOPMENT	QC Level	: NEPM 2013 B3 & ALS QC Standard
Order number	: ---	Date Samples Received	: 29-Feb-2016 09:00
C-O-C number	: ---	Date Analysis Commenced	: 01-Mar-2016
Sampler	: ---	Issue Date	: 09-Mar-2016 20:28
Site	: ---	No. of samples received	: 26
Quote number	: ---	No. of samples analysed	: 21

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results



WORLD RECOGNISED
ACCREDITATION

NATA Accredited Laboratory 825
Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories

Position

Accreditation Category

Ben Felgendrejeris

Brisbane Acid Sulphate Soils, Stafford,
QLD

Celine Conceicao

Senior Spectroscopist

Sydney Inorganics, Smithfield, NSW

Kim McCabe

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Shaun Spooner

Asbestos Identifier

Sydney Inorganics, Smithfield, NSW
Sydney Organics, Smithfield, NSW
Newcastle - Asbestos, Mayfield West,
NSW



Page : 3 of 28
Work Order : ES1604423
Client : REGIONAL GEOTECHNICAL SOLUTION
Project : RGS01102.1 UNIT DEVELOPMENT

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

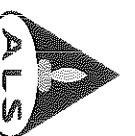
Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

LOR = Limit of reporting

n = This result is computed from individual analyte detections at or above the level of reporting

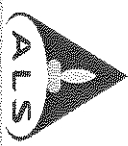
ø = ALS is not NATA accredited for these tests.

- EF068: Positive results have been confirmed by re-extraction and re-analysis.
- EA200: As only one sample container was submitted for multiple tests, sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly and NATA accreditation does not apply to analysis on these samples.
- ASS: EA037 (Rapid Field and F(ox) screening): pH F(ox) Reaction Rate: 1 - Slight; 2 - Moderate; 3 - Strong; 4 - Extreme
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ('Free Fibres') detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benzo(a)anthracene (0.1), Chrysene (0.01), Benzo(b+) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time		Result		Result		Result		Result	
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
EA002 : pH (Soils)													
pH Value	---	0.1	pH Unit	---	---	---	---	---	---	---	---	---	---
EA026 : Chromium Reducible Sulphur													
Chromium Reducible Sulphur	---	0.005	%	---	---	---	---	---	---	---	---	---	---
EA037 : Ass Field Screening Analysis													
pH (F)	---	0.1	pH Unit	---	---	---	---	---	---	---	---	---	---
pH (Fox)	---	0.1	pH Unit	---	---	---	---	---	---	---	---	---	---
Reaction Rate	---	1	-	---	---	---	---	---	---	---	---	---	---
EA055: Moisture Content													
Moisture Content (dried @ 103°C)	---	1	%	1.3	3.0	3.5	2.8	9.3					
EA200 : AS 4964 - 2004 Identification of Asbestos in Soils													
Asbestos Detected	1332-21-4	0.1	g/kg	No	No	No	No	No					
Asbestos Type	1332-21-4	-	-	-	-	-	-	-					
Sample weight (dry)	---	0.01	g	37.0	30.6	36.6	37.9	37.2					
APPROVED IDENTIFIER:	---	-	-	S.SPOONER	S.SPOONER	S.SPOONER	S.SPOONER	S.SPOONER					
ED0405 : Soluble Sulfate by ICPAES													
Sulfate as SO ₄ -2	14808-79-8	10	mg/kg	---	---	---	---	---					
ED0456: Chloride by Discrete Analyser													
Chloride	16887-00-6	10	mg/kg	---	---	---	---	---					
EG0051: Total Metals by ICP-AES													
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5					
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1					
Chromium	7440-47-3	2	mg/kg	9	12	<2	4	9					
Copper	7440-50-8	5	mg/kg	18	104	<5	18	166					
Lead	7439-92-1	5	mg/kg	28	94	51	112	448					
Nickel	7440-02-0	2	mg/kg	8	8	<2	6	26					
Zinc	7440-66-6	5	mg/kg	83	273	31	110	283					
EG0351: Total Recoverable Mercury by FIMS													
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	0.1					
EP066: Polychlorinated Biphenyls (PCB)													
Total Polychlorinated biphenyls	---	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1					
EP068A: Organochlorine Pesticides (OC)													
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25					
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25					



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID					
	S101	S102	S105	BHR2 0-0.2	BHR3 0-0.2	
Compound	Client sampling date / time	Client sampling date / time	Client sampling date / time	Client sampling date / time	Client sampling date / time	
CAS Number	LOR	Unit				
	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	
	ES1604423-001	ES1604423-002	ES1604423-004	ES1604423-006	ES1604423-007	

EP0683A: Organochlorine Pesticides (OC) - continued

beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
^ Total Chlordane (sum)	—	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.25	0.05	<0.05	<0.25
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<1.0
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<1.0
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.25	0.05	<0.05	<0.25
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25

EP0683B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<1.0
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<1.0	<0.2	<0.2	<1.0
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.25	<0.05	<0.05	<0.25



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time	
Compound	CAS Number	LOR	Unit	Result	Result
EP068B: Organophosphorus Pesticides (OP) - Continued					
Parathion	56-38-2	0.2	mg/kg	<0.2	<1.0
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.25
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.25
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.25
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.25
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.25
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.25
Carbophenothion	766-19-6	0.05	mg/kg	<0.05	<0.25
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.25
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons					
Naphthalene	91-20-3	0.5	mg/kg	<0.5	4.0
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	25.6
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	4.2
Fluorene	86-73-7	0.5	mg/kg	<0.5	20.7
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	113
Anthracene	120-12-7	0.5	mg/kg	<0.5	27.5
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	72.0
Pyrene	129-00-0	0.5	mg/kg	<0.5	67.9
Benz[a]anthracene	56-55-3	0.5	mg/kg	<0.5	34.8
Chrysene	218-01-9	0.5	mg/kg	<0.5	28.4
Benzo[b]fluoranthene	205-99-2	0.5	mg/kg	<0.5	24.2
Benzo[k]fluoranthene	207-08-9	0.5	mg/kg	<0.5	11.3
Benzo[a]pyrene	50-32-8	0.5	mg/kg	<0.5	23.1
Indeno[1,2,3-cd]pyrene	193-39-5	0.5	mg/kg	<0.5	7.9
Dibenz[a,h]anthracene	53-70-3	0.5	mg/kg	<0.5	2.2
Benzog[h,i]perylene	191-24-2	0.5	mg/kg	<0.5	8.8
Sum of polycyclic aromatic hydrocarbons				<0.5	11.2
A Benzo[a]pyrene TEQ (zero)				<0.5	33.5
A Benzo[a]pyrene TEQ (half LOR)				0.6	33.5
A Benzo[a]pyrene TEQ (LOR)				1.2	33.5
EP080(J)T: Total Petroleum Hydrocarbons					
C6 - C9 Fraction	—	10	mg/kg	<10	<10
C10 - C14 Fraction	—	50	mg/kg	<50	<50
C15 - C28 Fraction	—	100	mg/kg	<100	190
					1260



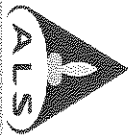
Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S101	S102	S105	BHR2 0-0.2	BHR3 0-0.2
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-001	ES1604423-002	ES1604423-004	ES1604423-006	ES1604423-007
				Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	---	100	mg/kg	<100	670	<100	120	600
^ C10 - C36 Fraction (sum)	---	50	mg/kg	<50	2820	<50	310	1880
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	---	50	mg/kg	<50	200	<50	<50	140
>C16 - C34 Fraction	---	100	mg/kg	<100	2620	<100	300	1630
>C34 - C40 Fraction	---	100	mg/kg	<100	300	<100	<100	340
^ >C10 - C40 Fraction (sum)	---	50	mg/kg	<50	3120	<50	300	2110
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg	<50	200	<50	<50	140
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	---	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	2
EP066S: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	61.0	96.0	62.0	65.0	65.0
EP066S: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	108	97.0	79.5	96.6	76.1
EP066T: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	88.0	116	94.4	92.9	86.9
EP075(SIM)S: Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	123	126	122	126	127
2-Chlorophenol-D4	93951-73-6	0.5	%	111	115	116	112	115
2,4,6-Trichlorophenol	118-79-6	0.5	%	85.5	118	116	111	122
EP075(SIM)T: PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	124	120	122	116	118
Anthracene-d10	1719-06-8	0.5	%	112	113	117	111	112



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time	
Compound	CAS Number	LOI	Unit	Result	Result
EP075(SIM)T-PAH Surrogates - Continued					
4-Terphenyl-d14	1718-51-0	0.5	%	117	114
EP080S-TPHV/BTEX Surrogates					
1,2-Dichloroethane-D4	17080-07-0	0.2	%	90.2	87.9
Toluene-D8	2037-26-5	0.2	%	85.5	91.9
4-Bromofluorobenzene	460-00-4	0.2	%	87.4	88.3
				96.6	91.5
				91.6	90.6
				93.7	94.4
				91.5	91.0



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID BHR4 0-0.4 BHR5 0-0.4 BH6 0.2-0.4 BH7 0.2-0.4 S107

Client sampling date / time [26-Feb-2016] [26-Feb-2016] [26-Feb-2016] [26-Feb-2016] [26-Feb-2016]

Compound	CAS Number	LOR	Unit	Result	Result	Result	Result	Result
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EA002: pH (Soils) --- 0.1 pH Unit --- --- --- --- ---

EA026 : Chromium Reducible Sulfur --- 0.005 % --- --- --- --- ---

EA037: Ass Field Screening Analysis

pH (F) --- 0.1 pH Unit --- --- --- --- ---

pH (Fox) --- 0.1 pH Unit --- --- --- --- ---

Reaction Rate --- 1 - --- --- --- ---

EA055: Moisture Content

Moisture Content (dried @ 103°C) --- 1 % 10.1 6.1 16.7 7.9 5.6

EA200: AS 4964 - 2004 Identification of Asbestos in Soils

Asbestos Detected 1332-21-4 0.1 g/kg No No No No No

Asbestos Type 1332-21-4 - - - - -

Sample weight (dry) --- 0.01 g 40.5 42.1 29.2 32.8 34.4

APPROVED IDENTIFIER: --- - - S.SPOONER S.SPOONER S.SPOONER S.SPOONER S.SPOONER

ED040S : Soluble Sulfate by ICRAES

Sulfate as SO4 2- 14908-79-8 10 mg/kg --- --- --- --- ---

ED045G: Chloride by Discrete Analyser

Chloride 16967-00-6 10 mg/kg --- --- --- --- ---

EG005T: Total Metals by ICP-AES

Arsenic 7440-38-2 5 mg/kg 61 <5 6 <5 <5

Cadmium 7440-43-9 1 mg/kg 4 <1 <1 <1 <1

Chromium 7440-47-3 2 mg/kg 273 7 5 4 6

Copper 7440-50-8 5 mg/kg 18400 64 25 15 29

Lead 7439-92-1 5 mg/kg 2530 81 430 69 89

Nickel 7440-02-0 2 mg/kg 249 14 18 5 7

Zinc 7440-66-6 5 mg/kg 4750 127 127 93 117

EG035T: Total Recoverable Mercury by FIMS

Mercury 7439-97-6 0.1 mg/kg 0.5 0.1 0.2 <0.1 0.1

EP006: Polychlorinated Biphenyls (PCB)

Total Polychlorinated biphenyls --- 0.1 mg/kg <0.1 <0.1 <0.1 <0.1

EP008A: Organochlorine Pesticides (OC)

alpha-BHC 319-84-6 0.05 mg/kg <0.05 <0.05 <0.05 <0.05

Hexachlorobenzene (HCB) 118-74-1 0.05 mg/kg <0.05 <0.05 <0.05 <0.05



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

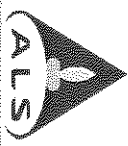
Sub-Matrix: SOIL (Matrix: SOIL)	Client sample ID	BHR4 0.0.4	BHR5 0.0.4	BH6 0.2.0.4	BH7 0.2.0.4	S107		
	Client sampling date / time	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]		
Compound	CAS Number	LOQ	Unit	ES1604423-008	ES1604423-009	ES1604423-010	ES1604423-011	ES1604423-012

EP068A: Organochlorine Pesticides (OC) - Continued

beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.08	0.06	<0.05	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
^ Total Chlordane (sum)	---	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
alpha-Endosulfan	969-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.40	0.28	0.10	0.10
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Endrin ketone	53484-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	0.48	0.34	0.10	0.10
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fenithion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

BHR4 0-0.4 BHR5 0-0.4 BH6 0.2-0.4 BH7 0.2-0.4 S107

Client sampling date / time

[26-Feb-2016] [26-Feb-2016] [26-Feb-2016] [26-Feb-2016] [26-Feb-2016]

Compound CAS Number LOR Unit

ES1604423-008 ES1604423-009 ES1604423-010 ES1604423-011 ES1604423-012

Result

Result

Result

Result

Result

EP08B8: Organophosphorus Pesticides (OP) - Continued

Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Phinippos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Bromophos-ethyl	4924-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05

EP07S(SIM)B: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	0.6
Acenaphthylene	208-96-8	0.5	mg/kg	1.4	<0.5	<0.5	<0.5	0.8
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg	5.2	0.8	1.0	0.9	2.6
Anthracene	120-12-7	0.5	mg/kg	1.7	<0.5	<0.5	<0.5	0.9
Fluoranthene	206-44-0	0.5	mg/kg	10.6	1.7	1.4	1.4	5.4
Pyrene	129-00-0	0.5	mg/kg	11.0	1.6	1.4	1.4	5.0
Benz(a)anthracene	56-55-3	0.5	mg/kg	6.4	1.0	0.8	0.8	2.9
Chrysene	218-01-9	0.5	mg/kg	5.7	0.9	0.7	0.7	2.3
Benz(b)fluoranthene	205-99-2	0.5	mg/kg	8.4	1.4	0.8	0.9	3.0
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	2.8	0.5	<0.5	<0.5	1.4
Benz(a)pyrene	50-32-8	0.5	mg/kg	6.1	1.0	<0.5	0.6	2.2
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	2.9	<0.5	<0.5	<0.5	0.9
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	0.7	<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	3.7	0.6	<0.5	<0.5	1.0
Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg	66.6	9.5	6.1	6.7	29.0
^ Benz(a)pyrene TEQ (zero)	---	0.5	mg/kg	8.9	1.3	<0.5	0.8	3.0
^ Benz(a)pyrene TEQ (half LOR)	---	0.5	mg/kg	8.9	1.6	0.7	1.1	3.3
^ Benz(a)pyrene TEQ (LOR)	---	0.5	mg/kg	8.9	1.8	1.3	1.4	3.6

EP08B071: Total Petroleum Hydrocarbons

C6 - C9 Fraction	---	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	---	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	---	100	mg/kg	1540	110	430	<100	200

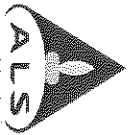


Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID
 Client sampling date / time

Compound	CAS Number	LOI	Unit	Result	Result	Result	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	—	100	mg/kg	1370	<100	220	<100	160
^ C10 - C36 Fraction (sum)	—	50	mg/kg	2910	110	650	<50	360
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	—	50	mg/kg	<50	<50	60	<50	<50
>C16 - C34 Fraction	—	100	mg/kg	2860	170	600	160	310
>C34 - C40 Fraction	—	100	mg/kg	580	<100	120	<100	100
^ >C10 - C40 Fraction (sum)	—	50	mg/kg	3440	170	780	160	410
^ >C10 - C16 Fraction minus Naphthalene (F2)	—	50	mg/kg	<50	<50	60	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	0.3	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	—	0.2	mg/kg	<0.2	0.3	<0.2	<0.2	<0.2
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP068: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	61.0	60.0	79.0	67.0	63.0
EP068: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	100	92.1	103	70.6	117
EP068: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	110	94.7	108	70.1	117
EP075(SIM): Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	118	114	117	118	115
2-Chlorophenol-D4	93851-73-6	0.5	%	114	112	99.2	116	117
2,4,6-Trichlorophenol	118-79-6	0.5	%	117	118	116	111	110
EP075(SIM): PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	120	117	118	118	118
Anthracene-d10	1719-06-8	0.5	%	116	114	108	117	116



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR4 0-0.4		BHR5 0-0.4		BH6 0.2-0.4		BH7 0.2-0.4		S107	
		Client sampling date / time		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
Compound	CAS Number	LOI	Unit	ES1604423-008		ES1604423-009		ES1604423-010		ES1604423-011		ES1604423-012	
				Result		Result		Result		Result		Result	
EP076(SIM)T-PAH Surrogates - Continued													
4-Terphenyl-d14	1718-51-0	0.5	%	113		122		121		127		125	
EP080S: TPH(V)/BTEX Surrogates													
1,2-Dichloroethane-D4	17060-07-0	0.2	%	94.0		89.1		82.2		90.3		84.7	
Toluene-D8	2037-26-5	0.2	%	100		86.9		85.4		89.2		91.4	
4-Bromofluorobenzene	460-00-4	0.2	%	94.8		88.7		80.0		90.0		88.2	



Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S104		BHR4 1-1.2		BHR2 2.4-2.5		BHR2 3.5-3.6		BHR2 4.1-4.2	
Compound		Client sampling date / time		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]		[26-Feb-2016]	
CAS Number		LOR		Unit		Result		Result		Result		Result	
EA002 : pH (Soils)		---		pH Unit		---		---		---		7.8	
EA026 : Chromium Reducible Sulfur		---		0.005		%		---		---		<0.005	
EA037: Ass Field Screening Analysis		---		0.1		pH Unit		---		5.8		7.0	
pH (F)		---		0.1		pH Unit		---		6.0		5.0	
pH (Fox)		---		0.1		pH Unit		---		1		1	
Reaction Rate		---		1		-		---		1		1	
EA055: Moisture Content		---		1		%		14.0		9.7		20.0	
Moisture Content (dried @ 103°C)		---		1		%		14.0		9.7		20.0	
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		1332-21-4		0.1		g/kg		No		No		---	
Asbestos Detected		1332-21-4		-		-		-		---		---	
Asbestos Type		1332-21-4		0.01		g		29.4		30.8		---	
Sample weight (dry)		---		-		-		S.SPOONER		S.SPOONER		---	
APPROVED IDENTIFIER:		---		-		-		S.SPOONER		S.SPOONER		---	
ED040S : Soluble Sulfate by ICPAES		14808-79-8		10		mg/kg		---		---		60	
Sulfate as SO4 2-		14808-79-8		10		mg/kg		---		---		60	
ED045G: Chloride by Discrete Analyser		16887-00-6		10		mg/kg		---		---		<10	
Chloride		16887-00-6		10		mg/kg		---		---		<10	
EG005T: Total Metals by ICP-AES		7440-38-2		5		mg/kg		<5		<5		---	
Arsenic		7440-38-2		5		mg/kg		<5		<5		---	
Cadmium		7440-43-9		1		mg/kg		<1		<1		---	
Chromium		7440-47-3		2		mg/kg		6		6		---	
Copper		7440-50-8		5		mg/kg		78		132		---	
Lead		7439-92-1		5		mg/kg		259		92		---	
Nickel		7440-02-0		2		mg/kg		20		10		---	
Zinc		7440-66-6		5		mg/kg		346		110		---	
EG035T: Total Recoverable Mercury by FIMS		7439-97-6		0.1		mg/kg		0.2		0.1		---	
Mercury		7439-97-6		0.1		mg/kg		0.2		0.1		---	
EP066: Polychlorinated Biphenyls (PCB)		---		0.1		mg/kg		<0.1		<0.1		---	
Total Polychlorinated biphenyls		---		0.1		mg/kg		<0.1		<0.1		---	
EP068A: Organochlorine Pesticides (OC)		319-84-6		0.05		mg/kg		<0.05		<0.05		---	
alpha-BHC		319-84-6		0.05		mg/kg		<0.05		<0.05		---	
Hexachlorobenzene (HCB)		118-74-1		0.05		mg/kg		<0.05		<0.05		---	

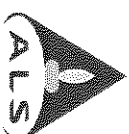
Sub-Matrix: SOIL (Matrix: SOIL)

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID	S104	BHR4 1-1-2	BHR2 2-4-2-5	BHR2 3-5-3-6	BHR2 4-1-4-2
Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	Result	Result	Result	Result
EP088A: Organochlorine Pesticides (OC) - continued							
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	-----	-----
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	-----	-----
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	-----	-----
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	-----	-----
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	-----	-----
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	-----	-----
^ Total Chlordane (sum)	---	0.05	mg/kg	<0.05	<0.05	-----	-----
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	-----	-----
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	-----	-----
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	-----	-----
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	-----	-----
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	-----	-----
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	-----	-----
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	-----	-----
^ Endosulfan (sum)	115-28-7	0.05	mg/kg	<0.05	<0.05	-----	-----
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	-----	-----
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	-----	-----
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	-----	-----
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	-----	-----
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	-----	-----
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	-----	-----
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	-----	-----
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	<0.05	<0.05	-----	-----
0-2							
EP088B: Organophosphorus Pesticides (OP)							
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	-----	-----
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	-----	-----
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	-----	-----
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	-----	-----
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	-----	-----
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	-----	-----
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	-----	-----
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	-----	-----
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	-----	-----
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	-----	-----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time	
Compound		CAS Number	LOR	Unit	Result
EP068B: Organophosphorus Pesticides (OP) - Continued					
Parathion	56-38-2	0.2	mg/kg	<0.2	S104
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	BHR4.1.1.2
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	BHR2.2.4.2.5
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	BHR2.3.5.3.6
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	BHR2.4.1.4.2
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	
EP073(SIMB): Polynuclear Aromatic Hydrocarbons					
Naphthalene	91-20-3	0.5	mg/kg	0.9	
Acenaphthylene	208-96-8	0.5	mg/kg	4.6	
Acenaphthene	83-32-9	0.5	mg/kg	0.7	
Fluorene	86-73-7	0.5	mg/kg	2.9	
Phenanthrene	85-01-8	0.5	mg/kg	33.8	
Anthracene	120-12-7	0.5	mg/kg	7.8	
Fluoranthene	206-44-0	0.5	mg/kg	32.5	
Pyrene	129-00-0	0.5	mg/kg	26.0	
Benz(a)anthracene	56-55-3	0.5	mg/kg	13.1	
Chrysene	218-01-9	0.5	mg/kg	10.1	
Benz(b)fluoranthene	205-99-2	0.5	mg/kg	12.2	
Benz(k)fluoranthene	207-08-9	0.5	mg/kg	4.6	
Benz(a)pyrene	50-32-8	0.5	mg/kg	8.8	
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	3.1	
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	1.0	
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	3.4	
Sum of polycyclic aromatic hydrocarbons					
A Benzo(a)pyrene TEQ (zero)		0.5	mg/kg	16.6	
A Benzo(a)pyrene TEQ (half LOR)		0.5	mg/kg	13.2	
A Benzo(a)pyrene TEQ (LOR)		0.5	mg/kg	13.2	
EP080(071): Total Petroleum Hydrocarbons					
C6 - C9 Fraction		10	mg/kg	<10	
C10 - C14 Fraction		50	mg/kg	<50	
C15 - C28 Fraction		100	mg/kg	1070	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S104	BHR4 1-1.2	BHR2 2.4-2.5	BHR2 3.5-3.6	BHR2 4.1-4.2
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-013	ES1604423-014	ES1604423-015	ES1604423-016	ES1604423-017
				Result	Result	Result	Result	Result
EP080071: Total Petroleum Hydrocarbons - Continued								
C29 - C36 Fraction	---	100	mg/kg	500	<100	-----	---	-----
^ C10 - C36 Fraction (sum)	---	50	mg/kg	1570	120	-----	-----	-----
EP080071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	-----	-----	-----
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	-----	-----	-----
>C10 - C16 Fraction	---	50	mg/kg	70	<50	-----	-----	-----
>C16 - C34 Fraction	---	100	mg/kg	1490	180	-----	-----	-----
>C34 - C40 Fraction	---	100	mg/kg	280	<100	-----	-----	-----
^ >C10 - C40 Fraction (sum)	---	50	mg/kg	1840	180	-----	-----	-----
^ >C10 - C16 Fraction minus Naphthalene (F2)	---	50	mg/kg	70	<50	-----	-----	-----
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	-----	-----	-----
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	-----	-----	-----
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	-----	-----	-----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	-----	-----	-----
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	-----	-----	-----
^ Sum of BTEX	---	0.2	mg/kg	<0.2	<0.2	-----	-----	-----
^ Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	<0.5	-----	-----	-----
Naphthalene	91-20-3	1	mg/kg	<1	<1	-----	-----	-----
EP0665: PCB Surrogate								
Decachlorobiphenyl	2051-24-3	0.1	%	70.0	64.0	-----	-----	-----
EP0685: Organochlorine Pesticide Surrogate								
Dibromo-DDE	21655-73-2	0.05	%	105	97.2	-----	-----	-----
EP0687: Organophosphorus Pesticide Surrogate								
DEF	78-48-8	0.05	%	79.4	96.8	-----	-----	-----
EP075(SIMS): Phenolic Compound Surrogates								
Phenol-d6	13127-88-3	0.5	%	102	123	-----	-----	-----
2-Chlorophenol-D4	93951-73-6	0.5	%	94.3	114	-----	-----	-----
2,4,6-Trichlorophenol	118-79-6	0.5	%	102	112	-----	-----	-----
EP075(SIMS): PAH Surrogates								
2-Fluorobiphenyl	321-60-8	0.5	%	121	128	-----	-----	-----
Anthracene-d10	1719-06-8	0.5	%	109	119	-----	-----	-----



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		S104		BHR4 1-1.2		BHR2 2.4.2.5		BHR2 3.5-3.6		BHR2 4.1.4.2	
Compound	CAS Number	LOR	Unit	Client sampling date / time	Result	Client sampling date / time	Result	Client sampling date / time	Result	Client sampling date / time	Result	Client sampling date / time	Result
EP078(SIM)T: PAH Surrogates - Continued													
4-Terphenyl-d14	1718-51-0	0.5	%	120	Result	126	Result	---	Result	---	Result	---	Result
EP080S: TPH(V)/BTEX Surrogates													
1,2-Dichloroethane-D4	17060-07-0	0.2	%	86.2	Result	91.6	Result	---	Result	---	Result	---	Result
Toluene-D8	2037-26-5	0.2	%	84.4	Result	93.2	Result	---	Result	---	Result	---	Result
4-Bromofluorobenzene	460-00-4	0.2	%	81.6	Result	90.0	Result	---	Result	---	Result	---	Result



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
Compound		Client sampling date / time	CAS Number	LOR	Unit	Result	Result	Result
EA002 : pH (Soils)								
pH Value	---	0.1	pH Unit	---	---	---	---	---
EA026 : Chromium Reducible Sulfur								
Chromium Reducible Sulphur	---	0.005	%	---	---	---	<0.005	---
EA037 : Ass Field Screening Analysis								
pH (F)	---	0.1	pH Unit	4.7	5.0	6.4	6.6	6.2
pH (Fox)	---	0.1	pH Unit	3.4	3.8	4.3	4.3	4.0
Reaction Rate	---	1	-	1	1	1	1	1
EA056 : Moisture Content								
Moisture Content (dried @ 103°C)	---	1	%	---	---	---	---	---
EA200 : AS 4964 - 2004 Identification of Asbestos in Soils								
Asbestos Detected	1332-21-4	0.1	g/kg	---	---	---	---	---
Asbestos Type	1332-21-4	-	--	---	---	---	---	---
Sample weight (dry)	---	0.01	g	---	---	---	---	---
APPROVED IDENTIFIER:		---	-	---	---	---	---	---
ED040S : Soluble Sulfate by ICPAES								
Sulfate as SO4 2-	14808-79-8	10	mg/kg	---	---	---	---	---
ED045G : Chloride by Discrete Analyser								
Chloride	16887-00-6	10	mg/kg	---	---	---	---	---
EG005T : Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	---	---	---	---	---
Cadmium	7440-43-9	1	mg/kg	---	---	---	---	---
Chromium	7440-47-3	2	mg/kg	---	---	---	---	---
Copper	7440-50-8	5	mg/kg	---	---	---	---	---
Lead	7439-92-1	5	mg/kg	---	---	---	---	---
Nickel	7440-02-0	2	mg/kg	---	---	---	---	---
Zinc	7440-66-6	5	mg/kg	---	---	---	---	---
EG036T : Total Recoverable Mercury by FIHS								
Mercury	7439-97-6	0.1	mg/kg	---	---	---	---	---
EP066 : Polychlorinated Biphenyls (PCB)								
Total Polychlorinated biphenyls	---	0.1	mg/kg	---	---	---	---	---
EP068A : Organochlorine Pesticides (OC)								
alpha-BHC	319-84-6	0.05	mg/kg	---	---	---	---	---
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	---	---	---	---	---



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Compound	CAS Number	LOR	Unit	Client sample ID				
				Client sampling date / time				
				BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
				[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
				ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result

EP088A: Organochlorine Pesticides (OC) continued

beta-BHC	319-85-7	0.05	mg/kg	---	---	---	---	---
gamma-BHC	58-89-9	0.05	mg/kg	---	---	---	---	---
delta-BHC	319-86-8	0.05	mg/kg	---	---	---	---	---
Heptachlor	76-44-8	0.05	mg/kg	---	---	---	---	---
Aldrin	309-00-2	0.05	mg/kg	---	---	---	---	---
Heptachlor epoxide	1024-57-3	0.05	mg/kg	---	---	---	---	---
^ Total Chlordane (sum)	---	0.05	mg/kg	---	---	---	---	---
trans-Chlordane	5103-74-2	0.05	mg/kg	---	---	---	---	---
alpha-Endosulfan	959-98-8	0.05	mg/kg	---	---	---	---	---
cis-Chlordane	5103-71-9	0.05	mg/kg	---	---	---	---	---
Dieldrin	60-57-1	0.05	mg/kg	---	---	---	---	---
4,4'-DDE	72-55-9	0.05	mg/kg	---	---	---	---	---
Endrin	72-20-8	0.05	mg/kg	---	---	---	---	---
beta-Endosulfan	33213-65-9	0.05	mg/kg	---	---	---	---	---
^ Endosulfan (sum)	115-29-7	0.05	mg/kg	---	---	---	---	---
4,4'-DDD	72-54-8	0.05	mg/kg	---	---	---	---	---
Endrin aldehyde	7421-93-4	0.05	mg/kg	---	---	---	---	---
Endosulfan sulfate	1031-07-8	0.05	mg/kg	---	---	---	---	---
4,4'-DDT	50-29-3	0.2	mg/kg	---	---	---	---	---
Endrin ketone	53494-70-5	0.05	mg/kg	---	---	---	---	---
Methoxychlor	72-43-5	0.2	mg/kg	---	---	---	---	---
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	---	---	---	---	---
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	---	---	---	---	---
		0.2						

EP088B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	---	---	---	---	---
Demeton-S-methyl	919-86-8	0.05	mg/kg	---	---	---	---	---
Monocrotophos	6923-22-4	0.2	mg/kg	---	---	---	---	---
Dimethoate	60-51-5	0.05	mg/kg	---	---	---	---	---
Diazinon	333-41-5	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	---	---	---	---	---
Parathion-methyl	298-00-0	0.2	mg/kg	---	---	---	---	---
Malathion	121-75-5	0.05	mg/kg	---	---	---	---	---
Fenthion	55-38-9	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos	2921-88-2	0.05	mg/kg	---	---	---	---	---



Analytical Results

Sub-Matrix: SOL
(Matrix: SOL)

Client sample ID

BHR3 0.8-1.0

BHR3 1.3-1.5

BHR4 1.5-1.6

BHR4 2.0-2.2

BHR5 0.9-1.1

Client sampling date / time

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

[26-Feb-2016]

Compound

CAS Number

LOR

Unit

Result

Result

Result

Result

Result

EP068B: Organophosphorus Pesticides (OP) - continued

Parathion	56-38-2	0.2	mg/kg	---	---	---	---	---
Pyrimphos-ethyl	23505-41-1	0.05	mg/kg	---	---	---	---	---
Chlorfenvinphos	470-90-6	0.05	mg/kg	---	---	---	---	---
Bromophos-ethyl	4824-78-6	0.05	mg/kg	---	---	---	---	---
Fenamiphos	22224-92-6	0.05	mg/kg	---	---	---	---	---
Prothidofos	34643-46-4	0.05	mg/kg	---	---	---	---	---
Ethion	563-12-2	0.05	mg/kg	---	---	---	---	---
Carbophenothion	786-19-6	0.05	mg/kg	---	---	---	---	---
Azinphos Methyl	86-50-0	0.05	mg/kg	---	---	---	---	---

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons

Naphthalene	91-20-3	0.5	mg/kg	---	---	---	---	---
Acenaphthylene	208-96-8	0.5	mg/kg	---	---	---	---	---
Acenaphthene	83-32-9	0.5	mg/kg	---	---	---	---	---
Fluorene	86-73-7	0.5	mg/kg	---	---	---	---	---
Phenanthrene	85-01-8	0.5	mg/kg	---	---	---	---	---
Anthracene	120-12-7	0.5	mg/kg	---	---	---	---	---
Fluoranthene	206-44-0	0.5	mg/kg	---	---	---	---	---
Pyrene	129-00-0	0.5	mg/kg	---	---	---	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg	---	---	---	---	---
Chrysene	218-01-9	0.5	mg/kg	---	---	---	---	---
Benzol(b+j)fluoranthene	205-98-2 205-82-3	0.5	mg/kg	---	---	---	---	---
Benzol(k)fluoranthene	207-08-9	0.5	mg/kg	---	---	---	---	---
Benzol(a)pyrene	50-32-8	0.5	mg/kg	---	---	---	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	---	---	---	---	---
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	---	---	---	---	---
Benzol(g,h,i)perylene	191-24-2	0.5	mg/kg	---	---	---	---	---
Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg	---	---	---	---	---
A Benzol(a)pyrene TEQ (zero)	---	0.5	mg/kg	---	---	---	---	---
A Benzol(a)pyrene TEQ (half LOR)	---	0.5	mg/kg	---	---	---	---	---
A Benzol(a)pyrene TEQ (LOR)	---	0.5	mg/kg	---	---	---	---	---

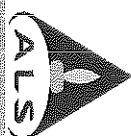
EP080U074: Total Petroleum Hydrocarbons

C6 - C9 Fraction	---	10	mg/kg	---	---	---	---	---
C10 - C14 Fraction	---	50	mg/kg	---	---	---	---	---
C15 - C28 Fraction	---	100	mg/kg	---	---	---	---	---

Analytical Results

Sub-Matrix: SOIL
 (Matrix: SOIL)

Client sample ID		Client sampling date / time		Result	
BHR3 0.8-1.0		[26-Feb-2016]		[26-Feb-2016]	
BHR3 1.3-1.5		[26-Feb-2016]		[26-Feb-2016]	
BHR4 1.5-1.6		[26-Feb-2016]		[26-Feb-2016]	
BHR4 2.0-2.2		[26-Feb-2016]		[26-Feb-2016]	
BHR5 0.9-1.1		[26-Feb-2016]		[26-Feb-2016]	
Compound	CAS Number	LOF	Unit	Result	Result
EP080/071: Total Petroleum Hydrocarbons - Continued					
C29 - C36 Fraction	—	100	mg/kg	—	—
^ C10 - C36 Fraction (sum)	—	50	mg/kg	—	—
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions					
C6 - C10 Fraction	C6_C10	10	mg/kg	—	—
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	—	—
>C10 - C16 Fraction	—	50	mg/kg	—	—
>C16 - C34 Fraction	—	100	mg/kg	—	—
>C34 - C40 Fraction	—	100	mg/kg	—	—
^ >C10 - C40 Fraction (sum)	—	50	mg/kg	—	—
^ >C10 - C16 Fraction minus Naphthalene (F2)	—	50	mg/kg	—	—
EP080: BTEXN					
Benzene	71-43-2	0.2	mg/kg	—	—
Toluene	108-88-3	0.5	mg/kg	—	—
Ethylbenzene	100-41-4	0.5	mg/kg	—	—
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	—	—
ortho-Xylene	95-47-6	0.5	mg/kg	—	—
^ Sum of BTEX	—	0.2	mg/kg	—	—
^ Total Xylenes	1330-20-7	0.5	mg/kg	—	—
Naphthalene	91-20-3	1	mg/kg	—	—
EP068: PCB Surrogate					
Decachlorobiphenyl	2051-24-3	0.1	%	—	—
EP068: Organochlorine Pesticide Surrogate					
Dibromo-DDE	21655-73-2	0.05	%	—	—
EP068: Organophosphorus Pesticide Surrogate					
DEF	78-48-8	0.05	%	—	—
EP075(SIMS): Phenolic Compound Surrogates					
Phenol-d6	13127-88-3	0.5	%	—	—
2-Chlorophenol-D4	93951-73-6	0.5	%	—	—
2,4,6-Tribromophenol	118-79-6	0.5	%	—	—
EP075(SIM): PAH Surrogates					
2-Fluorobiphenyl	321-60-8	0.5	%	—	—
Anthracene-d10	1719-06-8	0.5	%	—	—





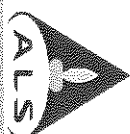
Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR3 0.8-1.0	BHR3 1.3-1.5	BHR4 1.5-1.6	BHR4 2.0-2.2	BHR5 0.9-1.1
		Client sampling date / time		[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]	[26-Feb-2016]
Compound	CAS Number	LOR	Unit	ES1604423-018	ES1604423-019	ES1604423-020	ES1604423-021	ES1604423-022
				Result	Result	Result	Result	Result
EP075(SIM1): PAH Surrogates - Continued								
4-Terphenyl-d14	1718-51-0	0.5	%	-----	-----	-----	-----	-----
EP080S: TPH(V)/BTX Surrogates								
1,2-Dichloroethane-D4	17060-07-0	0.2	%	-----	-----	-----	-----	-----
Toluene-D8	2037-26-5	0.2	%	-----	-----	-----	-----	-----
4-Bromofluorobenzene	460-00-4	0.2	%	-----	-----	-----	-----	-----

Analytical Results



Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		BHR5 2.5-2.7		[26-Feb-2016]		ES1604423-023	
Compound	CAS Number	LOI	Unit	Result	Result	Result	Result	Result	Result
EA002: pH (Soils)									
pH Value	—	0.1	pH Unit	—	—	—	—	—	—
EA026: Chromium Reducible Sulfur									
Chromium Reducible Sulfur	—	0.005	%	<0.005	—	—	—	—	—
EA037: Ass Field Screening Analysis									
pH (F)	—	0.1	pH Unit	5.9	—	—	—	—	—
pH (Fox)	—	0.1	pH Unit	5.0	—	—	—	—	—
Reaction Rate	—	1	-	1	—	—	—	—	—
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	—	1	%	—	—	—	—	—	—
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg	—	—	—	—	—	—
Asbestos Type	1332-21-4	-	-	—	—	—	—	—	—
Sample weight (dry)	—	0.01	g	—	—	—	—	—	—
APPROVED IDENTIFIER:									
ED0405: Soluble Sulfate by ICPAES	—	-	-	—	—	—	—	—	—
Sulfate as SO ₄ 2-	14808-79-8	10	mg/kg	—	—	—	—	—	—
ED045G: Chloride by Discrete Analyser									
Chloride	16887-00-6	10	mg/kg	—	—	—	—	—	—
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	—	—	—	—	—	—
Cadmium	7440-43-9	1	mg/kg	—	—	—	—	—	—
Chromium	7440-47-3	2	mg/kg	—	—	—	—	—	—
Copper	7440-50-8	5	mg/kg	—	—	—	—	—	—
Lead	7439-92-1	5	mg/kg	—	—	—	—	—	—
Nickel	7440-02-0	2	mg/kg	—	—	—	—	—	—
Zinc	7440-66-6	5	mg/kg	—	—	—	—	—	—
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	—	—	—	—	—	—
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	—	0.1	mg/kg	—	—	—	—	—	—
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	—	—	—	—	—	—
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	—	—	—	—	—	—



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID BHR5 2.5-2.7

Client sampling date / time [26-Feb-2016]

Compound CAS Number LOR Unit

ES1604423-023

Result

Result

Result

Result

Result

EP068A: Organochlorine Pesticides (OC) - Continued

beta-BHC	319-85-7	0.05	mg/kg	---	---	---	---	---
gamma-BHC	58-89-9	0.05	mg/kg	---	---	---	---	---
delta-BHC	319-86-8	0.05	mg/kg	---	---	---	---	---
Heptachlor	76-44-8	0.05	mg/kg	---	---	---	---	---
Aldrin	309-00-2	0.05	mg/kg	---	---	---	---	---
Heptachlor epoxide	1024-57-3	0.05	mg/kg	---	---	---	---	---
^ Total Chlordane (sum)	---	0.05	mg/kg	---	---	---	---	---
trans-Chlordane	5103-74-2	0.05	mg/kg	---	---	---	---	---
alpha-Endosulfan	959-98-8	0.05	mg/kg	---	---	---	---	---
cis-Chlordane	5103-71-9	0.05	mg/kg	---	---	---	---	---
Dieldrin	60-57-1	0.05	mg/kg	---	---	---	---	---
4,4'-DDE	72-55-9	0.05	mg/kg	---	---	---	---	---
Endrin	72-20-8	0.05	mg/kg	---	---	---	---	---
beta-Endosulfan	33213-65-9	0.05	mg/kg	---	---	---	---	---
^ Endosulfan (sum)	115-28-7	0.05	mg/kg	---	---	---	---	---
4,4'-DDD	72-54-8	0.05	mg/kg	---	---	---	---	---
Endrin aldehyde	7421-93-4	0.05	mg/kg	---	---	---	---	---
Endosulfan sulfate	1031-07-8	0.05	mg/kg	---	---	---	---	---
4,4'-DDT	50-28-3	0.2	mg/kg	---	---	---	---	---
Endrin ketone	53494-70-5	0.05	mg/kg	---	---	---	---	---
Methoxychlor	72-43-5	0.2	mg/kg	---	---	---	---	---
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	---	---	---	---	---
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	---	---	---	---	---
0-2								

EP068B: Organophosphorus Pesticides (OP)

Dichlorvos	62-73-7	0.05	mg/kg	---	---	---	---	---
Demeton-S-methyl	919-86-8	0.05	mg/kg	---	---	---	---	---
Monocrotophos	6823-22-4	0.2	mg/kg	---	---	---	---	---
Dimethoate	60-51-5	0.05	mg/kg	---	---	---	---	---
Diazinon	333-41-5	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	---	---	---	---	---
Parathion-methyl	298-00-0	0.2	mg/kg	---	---	---	---	---
Malathion	121-75-5	0.05	mg/kg	---	---	---	---	---
Fenthion	55-38-9	0.05	mg/kg	---	---	---	---	---
Chlorpyrifos	2921-88-2	0.05	mg/kg	---	---	---	---	---



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client Sample ID

BHR6 2.5-2.7

Client sampling date / time

[26-Feb-2016]

Compound CAS Number LOR Unit

ES1604423-023

Result

Result

Result

Result

Result

EP080071: Total Petroleum Hydrocarbons - Continued

C29 - C36 Fraction	---	100	mg/kg	---	---	---	---	---	---
A C10 - C36 Fraction (sum)	---	50	mg/kg	---	---	---	---	---	---
EP080071: Total Recoverable Hydrocarbons - NIEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	---	---	---	---	---	---
A C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	---	---	---	---	---	---
(F1)									
>C10 - C16 Fraction		50	mg/kg	---	---	---	---	---	---
>C16 - C34 Fraction		100	mg/kg	---	---	---	---	---	---
>C34 - C40 Fraction		100	mg/kg	---	---	---	---	---	---
A >C10 - C40 Fraction (sum)		50	mg/kg	---	---	---	---	---	---
A >C10 - C16 Fraction minus Naphthalene (F2)		50	mg/kg	---	---	---	---	---	---

EP0800: BTEXN

Benzene	71-43-2	0.2	mg/kg	---	---	---	---	---	---
Toluene	108-88-3	0.5	mg/kg	---	---	---	---	---	---
Ethylbenzene	100-41-4	0.5	mg/kg	---	---	---	---	---	---
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	---	---	---	---	---	---
ortho-Xylene	95-47-6	0.5	mg/kg	---	---	---	---	---	---
A Sum of BTEX		0.2	mg/kg	---	---	---	---	---	---
A Total Xylenes	1330-20-7	0.5	mg/kg	---	---	---	---	---	---
Naphthalene	91-20-3	1	mg/kg	---	---	---	---	---	---

EP0865: PCB Surrogate

Decachlorobiphenyl	2051-24-3	0.1	%	---	---	---	---	---	---
--------------------	-----------	-----	---	-----	-----	-----	-----	-----	-----

EP0885: Organochlorine Pesticide Surrogate

Dibromo-DDE	21655-73-2	0.05	%	---	---	---	---	---	---
-------------	------------	------	---	-----	-----	-----	-----	-----	-----

EP0887: Organophosphorus Pesticide Surrogate

DEF	78-48-8	0.05	%	---	---	---	---	---	---
-----	---------	------	---	-----	-----	-----	-----	-----	-----

EP0765(SIMS): Phenolic Compound Surrogates

Phenol-d6	13127-88-3	0.5	%	---	---	---	---	---	---
-----------	------------	-----	---	-----	-----	-----	-----	-----	-----

2-Chlorophenol-D4

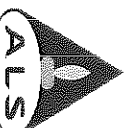
2-Chlorophenol-D4	93951-73-6	0.5	%	---	---	---	---	---	---
-------------------	------------	-----	---	-----	-----	-----	-----	-----	-----

2,4,6-Tribromophenol

2,4,6-Tribromophenol	118-79-6	0.5	%	---	---	---	---	---	---
----------------------	----------	-----	---	-----	-----	-----	-----	-----	-----

EP0765(SIMS): PAH Surrogates

2-Fluorobiphenyl	321-60-8	0.5	%	---	---	---	---	---	---
Anthracene-d10	1719-06-8	0.5	%	---	---	---	---	---	---



Analytical Results

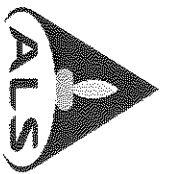
Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sample ID		Client sample ID		Client sample ID		Client sample ID	
Compound		CAS Number	LOI	Unit	Result	Result	Result	Result	Result	Result	Result
EP075(SIM) PAH Surrogates - Continued											
4-Terphenyl-d14		1718-51-0	0.5	%	---	---	---	---	---	---	---
EP0805 TPH(V)BTEX Surrogates											
1,2-Dichloroethane-D4		17060-07-0	0.2	%	---	---	---	---	---	---	---
Toluene-D8		2037-26-5	0.2	%	---	---	---	---	---	---	---
4-Bromofluorobenzene		460-00-4	0.2	%	---	---	---	---	---	---	---

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	S101 - [26-Feb-2016]	Mid brown clay soil with grey rocks.
EA200: Description	S102 - [26-Feb-2016]	Mid brown sandy soil with grey rocks.
EA200: Description	S105 - [26-Feb-2016]	Mid grey sandy soil with grey rocks.
EA200: Description	BHR2 0-0.2 - [26-Feb-2016]	Pale brown sandy soil with grey rocks.
EA200: Description	BHR3 0-0.2 - [26-Feb-2016]	Mid brown sandy soil with grey rocks.
EA200: Description	BHR4 0-0.4 - [26-Feb-2016]	Mid brown sandy soil with grey rocks.
EA200: Description	BHR5 0-0.4 - [26-Feb-2016]	Mid grey sandy soil with grey rocks.
EA200: Description	BH6 0.2-0.4 - [26-Feb-2016]	Dark grey sandy soil with crushed brick debris.
EA200: Description	BH7 0.2-0.4 - [26-Feb-2016]	Mid grey sandy soil with grey rocks.
EA200: Description	S107 - [26-Feb-2016]	Mid brown sandy soil with grey rocks.
EA200: Description	S104 - [26-Feb-2016]	Dark grey sandy soil with grey rocks.
EA200: Description	BHR4 1-1.2 - [26-Feb-2016]	Mid grey sandy soil with grey rocks.



Environmental

CERTIFICATE OF ANALYSIS

Work Order	ES1604828	Page	1 of 7
Client	REGIONAL GEOTECHNICAL SOLUTION	Laboratory	Environmental Division Sydney
Contact	MR STEVE MORTON	Contact	
Address	44 BENT STREET WINGHAM NSW, AUSTRALIA 2429	Address	277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	steve.m@regionalgeotech.com.au	E-mail	
Telephone	+61 02 6553 5641	Telephone	+61-2-8784 8555
Facsimile	---	Facsimile	+61-2-8784 8500
Project	MNC16P-0001	QC Level	NEPM 2013 B3 & ALS QC Standard
Order number	---	Date Samples Received	03-Mar-2016 15:10
C-O-C number	---	Date Analysis Commenced	04-Mar-2016
Sampler	---	Issue Date	10-Mar-2016 15:42
Site	12 STEWART STREET, NSW	No. of samples received	3
Quote number	---	No. of samples analysed	3

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Descriptive Results

NATA Accredited Laboratory 825



Accredited for compliance with
ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Inorganics, Smithfield, NSW
Pabi Subba	Senior Organic Chemist	Sydney Organics, Smithfield, NSW
Shaun Spooner	Asbestos Identifier	Newcastle - Asbestos, Mayfield West, NSW

WORLD RECOGNISED
ACCREDITATION

RIGHT SOLUTIONS RIGHT PARTNER

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extractions/digestion and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.

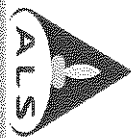
LOR = Limit of reporting

* = This result is computed from individual analyte detections at or above the level of reporting

Ø = ALS is not NATA accredited for these tests.

- EA200 'Am' Amosite (brown asbestos)
- EA200 'Cr' Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benzo(a)anthracene (0.1), Chrysene (0.01), Benzo(b-f) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenzo(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for TEQ Zero are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2





Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

S111

S112

S115

Client sampling date / time

[02-Mar-2016]

[02-Mar-2016]

[02-Mar-2016]

Compound

CAS Number

LOI

Unit

ES1604828-001

ES1604828-002

ES1604828-003

Result

Cr

Ch

Ch

EA055: Moisture Content
Moisture Content (dried @ 103°C)

1

%

4.0

6.9

6.8

EA200: AS 4964 - 2004 Identification of Asbestos in Soils

Asbestos Detected

1332-21-4

0.1

g/kg

Yes

Yes

Yes

Asbestos Type

1332-21-4

-

Sample weight (dry)

0.01

g

34.4

63.9

30.9

APPROVED IDENTIFIER:

-

EG005T: Total Metals by ICP-AES

Arsenic

7440-38-2

5

mg/kg

5

11

10

Cadmium

7440-43-9

1

mg/kg

<1

1

1

Chromium

7440-47-3

2

mg/kg

7

29

24

Copper

7440-50-8

5

mg/kg

402

990

1430

Lead

7439-92-1

5

mg/kg

288

590

747

Nickel

7440-02-0

2

mg/kg

15

85

54

Zinc

7440-66-6

5

mg/kg

299

857

874

EG035T: Total Recoverable Mercury by FIMS

Mercury

7439-97-6

0.1

mg/kg

0.2

1.2

0.2

EP066: Polychlorinated Biphenyls (PCB)

Total Polychlorinated biphenyls

0.1

mg/kg

<0.1

<0.1

<0.1

EP068A: Organochlorine Pesticides (OC)

alpha-BHC

319-94-6

0.05

mg/kg

<0.05

<0.05

<0.05

Hexachlorobenzene (HCB)

118-74-1

0.05

mg/kg

<0.05

<0.05

<0.05

beta-BHC

319-85-7

0.05

mg/kg

<0.05

<0.05

<0.05

gamma-BHC

58-89-9

0.05

mg/kg

<0.05

<0.05

<0.05

delta-BHC

319-86-8

0.05

mg/kg

<0.05

<0.05

<0.05

Hepachlor

76-44-8

0.05

mg/kg

<0.05

<0.05

<0.05

Aldrin

309-00-2

0.05

mg/kg

<0.05

<0.05

<0.05

Hepachlor epoxide

1024-57-3

0.05

mg/kg

<0.05

<0.05

<0.05

trans-Chlordane

5103-74-2

0.05

mg/kg

<0.05

<0.05

<0.05

alpha-Endosulfan

959-98-8

0.05

mg/kg

<0.05

<0.05

<0.05

cis-Chlordane

5103-71-9

0.05

mg/kg

<0.05

<0.05

<0.05

Dieldrin

60-57-1

0.05

mg/kg

<0.05

<0.05

<0.05

4,4'-DDE

72-55-9

0.05

mg/kg

<0.05

<0.05

<0.05

Endrin

72-20-8

0.05

mg/kg

<0.05

<0.05

<0.05

Client sample ID

Client sampling date / time

Compound	CAS Number	LOR	Unit
----------	------------	-----	------

Result

Result

Result

Result

Result

EP068A: Organochlorine Pesticides (OC) - Continued

beta-Endosulfan

Endosulfan (SUR)

4.4'-DDD

Endrin aldehyde

Endosulfan sulfat

4.4 -DDI

Endrin ketone

Methoxychlor

Sum of Aldrin + Dieldrin

Sum of DDD + DLI

EP0683 Organophosphorus Pesticides (OP)

Dichlorvos

Demeton-S-meth

Monocrotophos

Dimethoate

Diazinon

Chlorpyrifos-methyl

Parathion-methyl

Malatyon

Ferunion

Chlorpyrifos

Paraffin

Phosphorescent

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Diagnostik und Therapie

Prothinfo
1-800-444-4444

Ethion

Carbonenhof

Azinphos Methyl

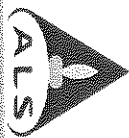
FOOTCAMP

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons

Naphthalene

Acenaphthylene

Acenaphthrene



Analytical Results

Sub-Matrix: SOIL
(Matrix: SOIL)

Client sample ID

S111

S112

S115

Client sampling date / time

[02-Mar-2016]

[02-Mar-2016]

[02-Mar-2016]

CAS Number LOR Unit

ES1604828-001

ES1604828-002

ES1604828-003

Result

Result

Result

Result

Result

EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued

Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	<0.5	---	---
Phenanthrene	85-01-8	0.5	mg/kg	1.2	1.2	1.2	---	---
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	<0.5	---	---
Fluoranthene	206-44-0	0.5	mg/kg	3.1	2.4	2.7	---	---
Pyrene	129-00-0	0.5	mg/kg	3.0	2.4	2.7	---	---
Benz(a)anthracene	56-55-3	0.5	mg/kg	2.0	1.6	1.7	---	---
Chrysene	218-01-9	0.5	mg/kg	1.8	1.4	1.5	---	---
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	2.4	1.9	2.0	---	---
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	1.1	0.7	0.8	---	---
Benzo(a)pyrene	50-32-8	0.5	mg/kg	1.8	1.4	1.5	---	---
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	0.8	0.6	0.7	---	---
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	<0.5	---	---
Benz(g,h,i)perylene	191-24-2	0.5	mg/kg	1.0	0.9	0.9	---	---
Sum of polycyclic aromatic hydrocarbons	---	0.5	mg/kg	18.2	14.5	16.7	---	---
Benzo(a)pyrene TEQ (zero)	---	0.5	mg/kg	2.4	1.9	2.0	---	---
Benzo(a)pyrene TEQ (half LOR)	---	0.5	mg/kg	2.7	2.2	2.3	---	---
Benzo(a)pyrene TEQ (LOR)	---	0.5	mg/kg	3.0	2.4	2.5	---	---

EP080(07): Total Petroleum Hydrocarbons

C6 - C9 Fraction	---	10	mg/kg	<10	<10	<10	---	---
C10 - C14 Fraction	---	50	mg/kg	<50	<50	<50	---	---
C15 - C28 Fraction	---	100	mg/kg	170	300	280	---	---
C29 - C36 Fraction	---	100	mg/kg	120	430	370	---	---
C10 - C36 Fraction (sum)	---	50	mg/kg	290	730	620	---	---

EP080(07): Total Recoverable Hydrocarbons - NEN/2013 Fractions

C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	---	---
C6 - C10 Fraction minus BTEX	C6_C10-BTEX	10	mg/kg	<10	<10	<10	---	---
(F1)								
>C10 - C16 Fraction	---	50	mg/kg	<50	<50	<50	---	---
>C16 - C34 Fraction	---	100	mg/kg	310	680	670	---	---
>C34 - C40 Fraction	---	100	mg/kg	<100	230	200	---	---
>C10 - C40 Fraction (sum)	---	50	mg/kg	310	910	770	---	---
>C10 - C16 Fraction minus Naphthalene	---	50	mg/kg	<50	<50	<50	---	---
(F2)								

EP080: BTEXAN



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)		Client sample ID		Client sampling date / time	
Compound		CAS Number	LOR	Unit	Result
EP080: BTEXN Continued					
Benzene	71-43-2	0.2	mg/kg	<0.2	---
Toluene	108-88-3	0.5	mg/kg	<0.5	---
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	---
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	---
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	---
^a Sum of BTEX	---	0.2	mg/kg	<0.2	---
^a Total Xylenes	1330-20-7	0.5	mg/kg	<0.5	---
Naphthalene	91-20-3	1	mg/kg	<1	---
EP065: PCB Surrogate					
Decachlorobiphenyl	2051-24-3	0.1	%	113	---
EP068S: Organochlorine Pesticide Surrogate					
Dibromo-DDE	21655-73-2	0.05	%	118	---
EP068T: Organophosphorus Pesticide Surrogate					
DEF	78-48-8	0.05	%	115	---
EP075(SIM)S: Phenolic Compound Surrogates					
Phenol-d6	13127-88-3	0.5	%	104	---
2-Chlorophenol-D4	93851-73-6	0.5	%	104	---
2,4,6-Tribromophenol	118-79-6	0.5	%	80.4	---
EP075(SIM)T: PAH Surrogates					
2-Fluorobiphenyl	321-60-8	0.5	%	98.3	---
Anthracene-d10	1719-06-8	0.5	%	109	---
4-Terphenyl-d14	1718-51-0	0.5	%	101	---
EP080S: TPH(V)/BTEX Surrogates					
1,2-Dichloroethane-D4	17060-07-0	0.2	%	102	---
Toluene-D8	2037-26-5	0.2	%	121	---
4-Bromofluorobenzene	460-00-4	0.2	%	114	---

Analytical Results

Descriptive Results

Sub-Matrix: SOIL

Method/Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	S111 - [02-Mar-2016]	Mid grey sandy soil with one loose bundle of friable asbestos fibres approx 3 x 1 x 0.5 mm.
EA200: Description	S112 - [02-Mar-2016]	Mid grey - brown sandy soil with one loose bundle of friable asbestos fibres approx 3 x 1 x 0.5 mm.
EA200: Description	S115 - [02-Mar-2016]	Mid brown sandy soil with one loose bundle of friable asbestos fibres approx 3 x 1 x 0.5 mm.

