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YPL Harbour Facilities Site Characterisation and Generic Risk Assessment

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EXECUTIVE SUMMARY

Royal HaskoningDHV (RHDHV) has been commissioned by York Potash Limited (YPL) to undertake a Land Quality Data Assessment to support the development of Harbour facilities on Teesside for the export of polyhalite bulk fertilizer. The proposed development would comprise a port terminal (harbour facility) at Bran Sands on the Tees estuary, a conveyor system to transfer the product to the port terminal from a materials handling facility (MHF) at Wilton and product storage facilities adjacent to the harbour facility (storage silos).

A desk based study was previously undertaken by RHDHV for the Harbour facilities and incorporated a Preliminary Risk Assessment (PRA), from which an initial Conceptual Site Model (CSM) was developed for the proposed development site. The initial CSM identified two pollutant linkages with a potential medium risk including:

- The potential for contaminants to be present in localised areas within the Made Ground with the potential to impact the health of future site users
- The potential for contaminants to be present in localised areas within the Made Ground with the potential to impact surface water and groundwater via leaching and lateral migration

A low-medium risk was also noted for ground gas. The PRA report concluded that further assessment was required to define the potential risks and to update the CSM including further assessment of soil contamination.

Dunelm were commissioned by FWS acting on behalf of YPL to carry out a ground investigation at the Harbour facilities, including the collection of soil and groundwater samples for laboratory analysis.

The findings of the intrusive investigation and results of the laboratory analysis were subsequently reviewed by RHDHV including the completion of a generic risk assessment for human health and controlled waters.

The intrusive investigation confirmed the presence of Made Ground deposits which were underlain by Tidal Flat deposits and Mercia Mudstone. No visual or olfactory evidence of contamination was recorded other than the Made Ground, which contained slag.

The findings of the data assessment are summarised below:

Risks to Human Health

- The majority of the laboratory results did not exceed the laboratory limit of detection (LLOD), where the LLOD was exceeded the results did not exceed the GAC and are unlikely to represent an unacceptable risk to human health
- Asbestos was detected in the Made Ground and is considered to represent a high risk to construction workers and any operatives undertaking works that would result in disturbance of the Made Ground, however the risk of exposure would be mitigated through the development and implementation of an asbestos management strategy

Risks to Controlled Waters

- Although potential contaminants of concern (PCOC) are present in the Made Ground, they are not leachable at concentrations that would represent an unacceptable risk to controlled waters
- A limited number of PCOC have been recorded in the shallow groundwater at concentrations exceeding the WQS, however it is considered that these would not represent an unacceptable risk to surface waters. Piling will be undertaken at the site as part of the works, and could create preferential pathways to the bedrock aquifer, however the risk of this would be managed through the use of appropriate techniques determined by a piling risk assessment

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Introduction

1 INTRODUCTION

1.1 Introduction

Royal HaskoningDHV (RHDHV) has been commissioned by York Potash Limited (YPL), a subsidiary of Sirius Minerals Ltd, to undertake a Land Quality Data Assessment (Generic Quantitative Risk Assessment (GQRA)) to support the development of Harbour facilities on Teesside for the export of polyhalite bulk fertilizer.

The proposed development would comprise a port terminal (harbour facility) at Bran Sands on the Tees estuary, a conveyor system to transfer the product to the port terminal from a materials handling facility (MHF) at Wilton and product storage facilities adjacent to the port terminal (storage silos). A site location plan is presented in Dunelms Factual Report contained within **Appendix A**. The MHF at Wilton is subject to a separate planning application and is not considered in this assessment.

This document has been prepared for the sole benefit of YPL. Please refer to **Appendix C** for further details.

1.2 Key objectives

The key objectives of this commission were as follows:

- To support an intrusive ground investigation incorporating the collection of soil and groundwater samples being undertaken by Dunelm Geotechnical and Environmental Ltd (Dunelm) and FWS Consultants Ltd (FWS)
- To schedule chemical testing on soil and groundwater samples
- To review and assess field and laboratory data in order to develop a preliminary understanding of the ground conditions
- To review and assess ground gas monitoring data to develop a preliminary understanding of the ground gas regime
- To undertake a Generic Quantitative Risk Assessment to enable potential unacceptable risks to human health and controlled waters to be assessed
- To provide recommendations regarding further studies

1.3 Report format

The remainder of the report comprises the following principal sections:

- **Section 2**, Preliminary Risk Assessment (PRA): Presents a summary of the findings of the desk based study and site reconnaissance.
- **Section 3**, Site Characterisation: Presents the scope of works and findings of the intrusive ground investigation.
- **Section 4**, Risk Assessment: Presents the methodology and findings of the human health, controlled waters and gas risk assessments.
- **Section 5**, Risk Evaluation: Considers the consequence and probability associated with a particular pollutant linkage and presents an updated Conceptual Site Model.
- **Section 6**, Conclusions and Recommendations: Presents a summary of the conclusions of the site characterisation and risk assessment and recommendations for further studies, if required.

2 PRELIMINARY RISK ASSESSMENT

2.1 Introduction

A desk based study was previously undertaken by RHDHV for the Harbour facilities and incorporated a PRA, from which an initial Conceptual Site Model (CSM) was developed for the proposed development site (RHDHV, 2014).

2.2 Initial Conceptual Site Model

The initial CSM is limited to the identification and assessment of potential sources, potential receptors, and the anticipated pathways to those receptors identified as a result of a documentary research. The initial CSM identified plausible pollutant linkages associated with the site as detailed in **Table 2.1** below. The majority of the plausible pollutant linkages were determined to be of low risk based on the information available and the nature of the proposed development. However, two pollutant linkages were indicated to be of potential medium risk:

- The potential for contaminants to be present in localised areas within the Made Ground (on-site slag deposits) with the potential to impact the health of future site users
- The potential for contaminants to be present in localised areas within the Made Ground (on-site slag deposits) with the potential to impact surface water and groundwater via leaching and lateral migration

A low-medium risk was also noted for ground gas.

The PRA report concluded that further assessment was required to define the potential risks and to update the CSM, including further assessment of soil contamination to ensure suitable control measures were adopted for the development, provision of a materials management plan were required to ensure soils are appropriately dealt with during development, and an assessment of soils to ensure their suitability for re-use within the scheme.

Preliminary Risk Assessment

Table 2.1 Initial Conceptual Site Model

Source	Pathway	Receptor	Discussion of Pollutant Linkage	Risk
Made Ground (On-site Slag deposits)	Dermal contact, Ingestion & Inhalation	Site workers (during construction)	Given the nature of the proposed development it is likely that exposure to potential contaminants of concern (COC) within the Made Ground will be short term and any potential risks are likely to be mitigated using appropriate personal protective equipment and working practices. Confirmation of the ground conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low
		Future site occupants	A significant volume of Made Ground (Slag), which is likely to contain potential COC and may represent an unacceptable risk to human health, has been deposited within the site and may represent a source of contamination. The site will have a commercial end use and there is a high likelihood that it will be largely covered in hard standing which will reduce the potential for dermal contact, ingestion and inhalation of any contaminated material. Confirmation of the ground conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low/Medium
	Direct Entry	Controlled waters	During the construction phase, soils will be disturbed and could directly impact the adjacent surface water bodies. However, appropriate working practices and adopting best practice should mitigate any risks.	Low
	Leaching	Surface water Secondary A Aquifer (Superficial deposits)	Given the potential for contamination to exist within the Made Ground and the current lack of hard standing, infiltration, leaching and migration of contamination cannot be discounted. However, the proposed development is likely to include the placement of hard standing which will significantly reduce infiltration and potential mobilisation of contaminants. Although part of the site is underlain by a Secondary A Aquifer which may be able to support local water supplies there are no groundwater abstractions or SPZs in the vicinity of the site. Any impacts to surface water/groundwater as a result of this pollutant linkage are unlikely to represent an unacceptable risk. Confirmation of the ground conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low/Medium
		Secondary B Aquifer (Bedrock)		

Preliminary Risk Assessment

Source	Pathway	Receptor	Discussion of Pollutant Linkage	Risk
Impacted Groundwater (as a result of on-site and off-site impacts)	Lateral Migration	Surface waters	Due to the previous site use there is the potential for contaminated shallow groundwater to be present at the site which could impact surface waters such as the River Tees, Dabholm Gut, Fleet Beck, various drains, a pond and the Bran Sands Lagoon (the majority of which is off-site). The historical and current off-site operations and the adjacent former landfill/lagoon may also have contributed to groundwater contamination. Monitoring undertaken by the Environment Agency indicates that the chemical status for the Tees Estuary is 'good' (with the exception of tributyltin compounds which are likely to be associated with shipping operations), and may indicate that any current contaminant inputs via groundwater do not represent an unacceptable risk. However, construction of the Harbour facilities will require some degree of earthworks and piled foundations which could result in the creation of preferential pathways although this would be minimised through the adoption of the most appropriate piling technique. Confirmation of the groundwater conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low/Medium
Ground Gas (Made Ground, Landfill & Industrial Activities)	Inhalation	Site workers (during construction)	Any potential risk to construction workers will be short term and are likely to be mitigated using appropriate personal protective equipment and working practices. Confirmation of the ground gas conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low/Medium
	Migration through permeable strata into confined spaces within buildings	Future site users and infrastructure	Gas generated by degradation of fill materials presents the following risks: • Human health (toxic effects) • Asphyxiation risks through accumulation of gases in buildings; and • Explosion risks through accumulation of gases in buildings The extent of ground gas risks relates to the nature, quantity and age of fill materials and the efficacy of the existing gas management system associated with the adjacent landfill. Furthermore, as discussed above the site is likely to be covered with hard standing which will minimise exposure to ground gases. However, depending on ground gas concentrations and flow rates it may be necessary to install additional gas mitigation measures. Confirmation of the ground gas conditions would be required to provide further clarification of the risks and to ensure potential risks are mitigated.	Low/Medium

3 SITE CHARACTERISATION

3.1 Ground Investigation Scope

Dunelm was commissioned by FWS acting on behalf of YPL to carry out a ground investigation of land at the proposed Harbour facility. Geotechnical supervision was provided by RHDHV with additional support from RHDHVs land quality team.

The objectives of the investigation were as follows:

- To investigate the superficial and bedrock geology and to obtain soil samples and rock cores of specific strata.
- To install standpipes at specific soil horizons for long term monitoring of groundwater levels and groundwater quality.
- To determine the chemical and geotechnical properties of the near surface soils and of the rock.

Fieldwork was carried out between 22 July and 26 August 2014 and focussed on the embankment located between the Bran Sands lagoon and the Tees Estuary.

Five cable boreholes, denoted BHP2 to BHP6, were advanced to a maximum depth of 27.20mbgl, these boreholes were then continued using rotary core drilling to a maximum depth of 44.50mbgl. A water flush was used to produce core samples of nominally 107mm diameter. BHP4 and BHP5 were terminated on obstructions, repositioned and advanced as BHP4A, BHP5A and BHP5B, respectively.

BHP1 was not progressed as information from historical investigations was available for this location.

Groundwater standpipes were installed in three of the exploratory holes (BHP2, BHP3 and BHP6).

Dunelm's factual ground investigation report is contained within **Appendix A**, and **Figure 1** presents the location of the exploratory holes.

3.2 Laboratory Analysis

Laboratory analysis was undertaken by Derwentside Environmental Testing Services (DETS), a UKAS and MCERTS accredited laboratory and comprised the following:

3.2.1 Soil

- Asbestos
- Metals
- pH
- Cyanide
- FOC
- SOM
- Total Petroleum Hydrocarbons (TPH)
- Polycyclic Aromatic Hydrocarbons (PAH)
- Phenols
- Volatile Organic Compounds (VOC)
- Semi-Volatile Organic Compounds (SVOC)

3.2.2 Leachate

A number of samples were scheduled for leachability analysis (NRA Leachate Preparation) of a range of potential COC as summarised below to determine the mobility of potential COC:

- Metals.
- pH.
- Sulphate.
- (TPH.

3.2.3 Groundwater

- Metals.
- Conductivity.
- pH.
- Hydroxide Alkalinity.
- BOD.
- COD.
- Cyanide.
- Ammoniacal Nitrogen.
- Chloride.
- Nitrate.
- Nitrite.
- Sulphate.
- Sulphide.
- TPH.
- PAH.
- Phenols.
- VOC.
- SVOC.

The laboratory results are contained within the Dunelm factual ground investigation report.

3.3 Groundwater and Ground Gas Monitoring

Groundwater monitoring was carried out by Dunelm on 5 September 2014. Samples were recovered from two locations (BHP2 and BHP3); BHP6 was dry at the time of testing.

Ground gas monitoring was not undertaken.

3.4 Ground Conditions

3.4.1 Proven Ground Conditions

The ground conditions are summarised in **Table 3.1** and draw upon information from the Dunelm investigation.

Table 3.1 Summarised Ground Conditions

Unit	Max Depth Range (mbgl*)	Description
Made Ground	0-9.30	Brown/Black/Grey silty, sandy gravel and cobble, gravels and cobbles are fine to coarse slag with occasional brick, sandstone and concrete.
Tidal Flat Deposits	7.10-22.80	Brown/grey fine to medium sand occasionally gravelly (fine to medium sandstone) and frequent shell fragments.
Mercia Mudstone	14.25-44.50 – depth not proven	Weak reddish brown Mudstone.
*mbgl – meters below ground level		

3.4.2 Visual Observations of Contamination

No visual or olfactory evidence of contamination was recorded in the exploratory hole logs other than the Made Ground, which contained slag (see **Table 3.1**).

3.4.3 Groundwater Observations

Water strikes were encountered in six out of the seven exploratory holes advanced, within the Made Ground deposits. Water was added to each of the boreholes, once these had been advanced below the Made Ground (to assist with core removal), making it difficult for the site team to identify further groundwater strikes below the Made Ground. The recorded groundwater strikes are summarised in **Table 3.2**.

Site Characterisation

Table 3.2 Summarised Groundwater Strikes

Location	Strike	Rising to	Strata	Installation	Response Zone (mbgl)
BHP2	n/a	n/a	Made Ground	Yes	1-7.5
BHP3	3.10	3.05		Yes	1.5-6.0
BHP4	3.90	-		No	-
BHP4A	4.8	4.75		No	-
BHP5	4.20	4.00		No	-
BHP5B	5.10	4.70		No	-
BHP6	3.80	3.60		Yes	1.5-6.0

4 RISK ASSESSMENT

4.1 Human Health Assessment

4.1.1 Methodology

Laboratory test results for soils have been compared against RHDHV generic screening values, known herein as Generic Assessment Criteria (GAC), for a commercial/ industrial end use. The GAC were derived by RHDHV utilising the deterministic CLEA v1.06 model, and adopting the standard model settings. Soil Guideline Values (SGV) developed by the Environment Agency have also been used, where available.

SGVs for lead have been withdrawn and there is currently considerable debate over the derivation of a suitable threshold value for lead. The test results have therefore been screened against a GAC calculated using the provisional Category 4 Screening Level (C4SL) values published by Defra. The C4SLs are used to categorise land that should not be determined as Contaminated Land under Part 2A of the Environmental Protection Act (1990), land which is within Category 4 is defined by the Part 2A Statutory Guidance (Defra, 2012). The C4SLs provide an upper and lower level range for the Category 4 classification, the GAC used in this assessment reflects the lower range value as a conservative approach.

Asbestos is not currently risk assessed in the same way as chemical contaminants, but is assessed on a presence or absence basis.

4.1.2 Soil Assessment Results

A conservative approach has been adopted for the data assessment by utilising the GAC to screen the laboratory results associated with each sample. The data assessment is presented in **Appendix B** and a summary of the exceedances is presented in **Table 4.1**.

Table 4.1 Summary of exceedances for human health data assessment (soils)

Potential COC	Number of samples analysed	Number of exceedances >GAC/ >LOD	GAC (mg/kg)	Max (mg/kg)	Summary of assessment results
Asbestos	12	1	Presence	Presence	Amosite and Chrysotile asbestos was encountered in the Made Ground at BHP5B at a depth of 1.5mbgl. Asbestos was described as “board debris”.

The majority of the laboratory results did not exceed the LLOD; where the LLOD was exceeded, the results did not exceed the GAC for the potential COC analysed.

4.2 Controlled Waters Assessment

4.2.1 Methodology

The assessment of risks to controlled waters has comprised a GQRA in which dissolved phase contaminant concentrations have been compared to appropriate water quality standards (WQS).

For the purpose of undertaking the controlled waters risk assessment the surface waters have been considered to be the critical receptor based on the following rationale:

- Groundwater in the shallow aquifer is considered to be of poor quality.
- There are no groundwater abstractions in the vicinity of the site.

Risk Assessment

- The site does not fall within a Source Protection Zone.
- There is significant water bird use of both Bran Sands Lagoon and Dabholm Gut by a variety of bird species associated with the nearby Teesmouth and Cleveland Coast Special Protection Area (SPA) and Ramsar site.

EQS for transitional and coastal waters are, therefore considered to represent the most appropriate screening value. For those potential COC which do not have a published EQS value for transitional and coastal waters, other EQS values/ the UK Drinking Water Standards (DWS) have been used as an alternative. Water hardness (Calcium carbonate ($CaCO_3$)) was recorded at concentrations of <10mg/l, therefore EQS were selected based on this concentration, where appropriate.

4.2.2 Leachate Assessment Results

The data assessment is presented in **Appendix B** and a summary of the exceedances is presented in **Table 4.2**. The majority of the laboratory results did not exceed the LLOD; where the LLOD was exceeded the results did not exceed the WQS for the majority of the potential COC analysed.

Table 4.2 Summary of exceedances for controlled waters data assessment (leachate)

Potential COC	Number of samples analysed	Number of exceedances >WQS	WQS (µg/l)	Max conc (µg/l)	Summary of assessment results
Chromium	12	1	4.7*	5	BHP5/0.5mbgl
*assumes Chromium III					

4.2.3 Groundwater Assessment Results

The data assessment is presented in **Appendix B** and a summary of the exceedances is presented in the **Table 4.3**.

Table 4.3 Summary of exceedances for controlled waters data assessment (groundwater within the Made Ground)

Potential COC	Number of samples analysed	Number of exceedances >WQS	WQS (µg/l)	Max conc (µg/l)	Summary of assessment results
Chromium	2	2	4.7*	35	BHP2, BHP3
Copper	2	1	5	33	BHP2
Zinc	2	2	40	820	BHP2, BHP3
*assumes Chromium III					

The majority of the laboratory results did not exceed the LLOD, where the LLOD was exceeded the results did not exceed the WQS for the majority of the potential COC analysed. It should be noted that the laboratory limit of detection for benzo(ghi)perylene and indeno(123cd)pyrene exceeded the WQS, however the recorded results did not exceed the LLOD.

5 RISK EVALUATION

5.1 Introduction

The revised CSM is based upon the initial CSM presented in **Section 2** and the information obtained as a result of the ground investigation works. The CSM also includes a qualitative assessment to demonstrate the degree of impact any active pollutant linkage may have. The risk terminology is described in **Table 5.1** and the CSM is presented in **Table 5.2**.

Table 5.1 Contamination Risk Rating Terminology

Contamination risk rating terminology	
Risk Rating	Description
High risk	Contaminants very likely to represent an unacceptable risk to identified receptors Site probably not suitable for proposed use Enforcement action possible Urgent action required
Medium risk	Contaminants likely to represent an unacceptable risk to identified receptors Site probably not suitable for proposed use Action required in the medium term
Low risk	Contaminants may be present but unlikely to create unacceptable risk to identified receptors Site probably suitable for proposed use Action unlikely to be needed whilst site remains in current use
Negligible risk	If contamination sources are present they are considered to be minor in nature and extent Site suitable for proposed use No further action required

5.2 Revised Conceptual Model

Table 5.2 presents the revised CSM following the GQRA. Based on the assessment undertaken, a number of potentially unacceptable risks have been identified associated with on-site contamination sources. The following table provides further evaluation of the risks in the context of the current and proposed site use.

Risk Evaluation

Table 5.2 Revised CSM

Source	Pathway	Receptor	Discussion of Pollutant Linkage	Risk/Action
Made Ground (On-site Slag deposits)	Dermal contact, Ingestion & Inhalation	Site workers (during construction)	Asbestos was encountered in one exploratory hole, and appears to be associated with Made Ground deposits, and is considered to represent an unacceptable risk to human health. However, such risks can be mitigated through the adoption of appropriate working practices and personal protective equipment.	High Develop asbestos management strategy to mitigate risks associated with asbestos Inform the CDM hazard log
		Future site occupants	Asbestos was encountered in one exploratory hole, and appears to be associated with Made Ground deposits, and is considered to represent an unacceptable risk to human health. However, the asbestos was encountered at depth and during normal site operation exposure to buried asbestos will be unlikely. Maintenance or further redevelopment work that results in disturbance of the Made Ground could, however result in exposure, although such risks can be mitigated as noted above.	Low – High (due to the potential for disturbing asbestos in the Made Ground during maintenance/ redevelopment works) Develop and maintain an asbestos register
	Direct Entry	Controlled waters	During the construction phase, soils will be disturbed and could directly impact the adjacent surface water bodies. However, appropriate working practices and adopting best practice should mitigate any risks.	Low Adopt best practice to mitigate potential risk
	Leaching	Surface water, superficial and bedrock aquifers	The data assessment has indicated that, although potential COC were recorded in the Made Ground they were generally not mobile at concentrations exceeding the WQS. Chromium was indicated to be mobile at a concentration above the WQS, however the exceedance was marginal.	Low

Risk Evaluation

Source	Pathway	Receptor	Discussion of Pollutant Linkage	Risk/Action
Impacted Groundwater (as a result of on-site and off-site impacts)	Migration	Surface waters and the bedrock aquifer	Due to the previous site use and the industrial nature of the area there is the potential for contaminated shallow groundwater to be present at the site which could impact surface waters and the bedrock aquifer as result of earthworks and piled foundations. The data assessment has indicated that, although potential COC were recorded in the shallow groundwater the majority of the potential COC were not recorded at concentrations greater than the LLOD. However, chromium, copper and zinc were recorded above the WQS in BHP2 and chromium and zinc was also recorded above the WQS in BHP3. It is likely that there is a degree of connectivity between the shallow groundwater and the surface waters, and the concentrations recorded in the shallow groundwater are likely to be indicative of the background concentrations. The risk to surface water is, therefore considered to be low. Piled foundations which are likely to extend into the bedrock aquifer could result in the creation of the preferential pathways which could result in contaminates present in the shallow groundwater impacting the bedrock aquifer. However, these risks can be mitigated through the adoption of appropriate piling techniques. Furthermore, it should be noted that there are no groundwater abstraction in the vicinity of the site and the site does not fall with a groundwater source protection zone.	Low Undertake a piling risk assessment Adopt best practice to mitigate potential risks
Ground Gas (Made Ground, Landfill & Industrial Activities)	Inhalation	Site workers (during construction)	Gas generated by degradation of fill materials presents the following risks: • Human health (toxic effects) • Asphyxiation risks through accumulation of gases in buildings; and • Explosion risks through accumulation of gases in buildings The extent of ground gas risks relates to the nature, quantity and age of fill materials and the efficacy of the existing gas management system associated with the adjacent landfill. Any potential risk to construction workers will be short term and are likely to be mitigated using appropriate personal protective equipment and working practices. Ground gas monitoring is undertaken as required by the Environmental Permit for the Bran Sands Landfill. A review of this data confirms that significantly elevated gas concentrations have been recorded adjacent to the landfill, although a monitoring well adjacent to the proposed quay did not exhibit elevated ground gas concentrations. However, the monitoring data does not present gas flows or a gas risk assessment.	Low/Medium Undertake gas monitoring Incorporate mitigation measures informed by the gas monitoring

Risk Evaluation

Source	Pathway	Receptor	Discussion of Pollutant Linkage	Risk/Action
	Migration through permeable strata into confined spaces within buildings	Future site users and infrastructure	Monitoring of the ground gas regime is required including the monitoring of gas flow rates.	

Conclusions and Recommendations

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Risk to Human Health

Asbestos was detected in the Made Ground and is considered to represent a high risk to construction workers and any operatives undertaking works that would result in disturbance of the Made Ground. However, risks associated with asbestos can be mitigated through appropriate working practices and personal protective equipment.

6.2 Risk Associated with Ground Gas

Ground gas monitoring is undertaken as required by the Environmental Permit for the Bran Sands Landfill. Significantly elevated gas concentrations have been recorded adjacent to the landfill, although a monitoring well adjacent to the proposed quay did not exhibit elevated ground gas concentrations. However, the monitoring data does not present gas flows or a gas risk assessment.

6.3 Risk to Controlled Waters

Based on the data presented in this report it would appear that although potential COC are present in the Made Ground, they are not leachable at concentrations that would represent an unacceptable risk to controlled waters.

A limited number of potential COC have been recorded in the shallow groundwater at concentrations exceeding the WQS, however it is considered likely that the concentrations are indicative of the background concentrations in the area and would not represent an unacceptable risk to the surface waters. Whilst piling will be undertaken at the site as part of the works, and could create preferential pathways to the bedrock aquifer the risk of this would be managed through the use of appropriate techniques determined by a piling risk assessment

6.4 Recommendations

An asbestos management plan for the proposed works should be developed and implemented. The asbestos management plan should set out the procedures to be adopted to mitigate potential risks to human health e.g. further sampling, measures to prevent fibre generation, monitoring requirements, disposal options etc.

The CDM hazard log/ Safety File for the site should be informed and updated.

A piling risk assessment should be carried out to ensure potential risks to controlled waters as a result of the piling activities are mitigated.

A Materials Management Plan will also be required in accordance with the Waste Regulations to ensure soils are assessed, re-used or disposed of correctly and in agreement with the waste hierarchy.

Monitoring of the ground gas regime is required to establish gas flow rates and to inform mitigation measures.

It should be noted that shallow groundwater at the site is impacted by a range of determinands at concentrations that exceed their respective WQS. It is likely that dewatering of the excavations will be required to facilitate construction of the proposed Harbour Facility. Abstracted groundwater will need to be stored on-site tested and disposed of appropriately. Liaison with the Environment Agency or the local water utility company will be required to establish an appropriate disposal location and methodology. It should be noted that any abstracted groundwater may require pre-treatment prior to discharge.

References

7 REFERENCES

Royal HaskoningDHV. 2014. York Potash Facility Land Quality Report, Preliminary Risk Assessment.

Dunelm. 2014. Factual Report on Site Investigation for Bran Sands Quayside Investigation.

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FIGURE 1

Exploratory Hole Location Plan

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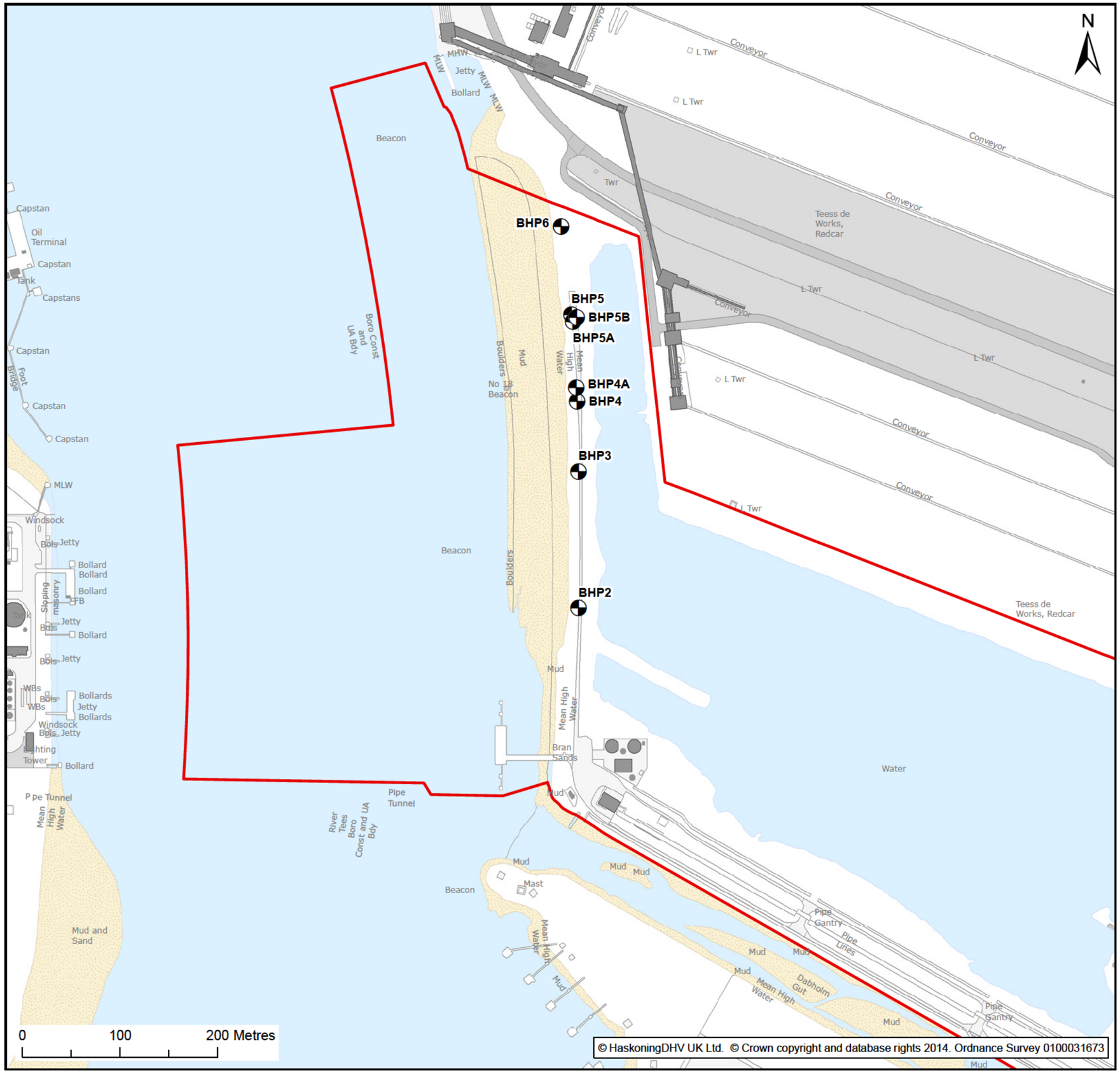

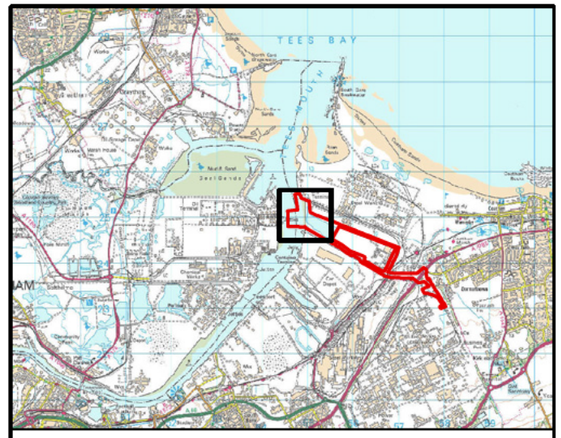

Legend:

- DCO Order Limits
- Dunelm Exploratory Boreholes

DCO Order Limits as of 24/02/15

Client:	Project:
York Potash Limited	York Potash Project Harbour Facilities

Title:

Port GI Interpretative Report:
Exploratory Hole Locations

Part:	Figure:	Drawing No:
HF	1	9Y0989-HF-TC-6-001

Rev:	Date:	Drawn:	Checked:	Size:	Scale:
1	06/03/2015	GC	SR	A3	1:4,000
0	11/12/2014	GC	SR	A3	1:4,000

Co-ordinate system: British National Grid

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APPENDIX A

DuneIm Factual Report

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REPORT: D6340
September 2014

FACTUAL REPORT on SITE INVESTIGATION
for
BRAN SANDS QUAYSIDE INVESTIGATION
Prepared for
YORK POTASH LIMITED

Revision No	Written by	Date	Checked By	Date
0	JH	15/09/2014	GD	19/09/2014
Signed		19/09/2014		19/09/2014

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FACTUAL REPORT on SITE INVESTIGATION
FOR
BRAN SANDS QUAYSIDE INVESTIGATION

CONTENTS

1.0 INTRODUCTION

1.1 Scope of Works

Dunelm Geotechnical and Environmental Ltd (Dunelm) were commissioned by FWS Consultants Ltd, acting on behalf of York Potash Limited (YPL), to carry out a site investigation of land at Bran Sands, Teesside. Geotechnical supervision of the project was provided by Royal HaskoningDHV (RHDHV).

The objectives of the investigation were as follows:

- To investigate the superficial and bedrock geology of the proposed Bran Sands Marine Export Facility, and to obtain soil samples and rock cores of specific strata.
- To install standpipes at specific horizons for long term monitoring of groundwater levels and groundwater quality
- To determine the chemical and geotechnical properties of the near surface soils and of the rock.

Fieldwork was undertaken generally as specified in the contract documents provided by RHDHV. The fieldwork was carried out between 22nd July and 26th August 2014.

Following the completion of the fieldwork selected soil, water and rock samples were submitted for a range of geotechnical and chemical testing.

This report presents the factual information obtained during the investigation; interpretation of these data was outside the remit of this report.

1.2 General

Guidance contained in the following Standards has been followed during the investigation work as appropriate: BS5930:1999 incorporating Amendment 2:2010, BS10175:2001; BS1377:1990; BS EN ISO 14688:2004 and BS EN ISO 14689:2003 and Approach 4.

The information contained in this report is limited to the site boundary, as indicated on the site plan shown in Appendix A, and the areas accessible during the ground investigation.

This report is for the exclusive use of YPL and their agents. No third party may rely upon, or reproduce, the contents of this report without the written approval of Dunelm.

This report is based on the data obtained from the exploratory holes and from the subsequent tests carried out. There is always a possibility of variation in the ground conditions between boreholes. Responsibility cannot be accepted for conditions not revealed by the investigation. Any diagram or opinion of the possible configuration of the findings is conjectural and given for guidance only, and confirmation of intermediate ground conditions should be considered if deemed necessary.

2.0 SITE LOCATION & FEATURES

The site is located within the boundary of the Wilton International Site, 8km north east of the town of Middlesbrough, at National Grid Reference 454970, 525060.

A site location plan is presented as Drawing No. D6340/01 in Appendix A to this report.

The site comprises a generally flat, grass covered, elongate, roughly rectangular shaped area of land which forms a bund running in a north/south direction. The area of the site to the west is the navigable channel of the River Tees, with the eastern side comprising a lagoon. The northern boundary of the site is bound by an operational coal offloading and storage plant with the southern part of the site bound by the Dabholme Gut.

3.0 FIELDWORK

3.1 Introduction

The fieldwork comprised the following:

- Ground penetrating radar was deployed prior to boring and drilling to check for the presence of buried services.
- Five cable percussive boreholes denoted BHP2 to BHP6 inclusive, were advanced to a maximum depth of 27.20mbgl. BHP4 and P5 were terminated on obstructions, repositioned and advanced as BHP4A, P5A and P5B, respectively.
- The boreholes were continued using rotary core drilling to a maximum depth of 44.50m bgl, using a using a water flush to produce core samples of nominally 107mm diameter.
- Monitoring of water levels within the River Tees navigable channel and the instrumentation installed in the boreholes over a tidal cycle.

3.2 Exploratory Hole Locations

The locations of each of the above exploratory holes were recorded by survey following the completion of the works. The locations are shown on Drawing No. D6340/02 in Appendix A.

The ground elevations and co-ordinates of each of the exploratory holes determined from the survey are shown on the exploratory hole records.

3.3 Strata Description

Descriptions of the strata encountered in each of the exploratory holes are presented on the exploratory hole record sheets in Appendix B to this report. Strata descriptions are based on an examination of the strata, together with consideration of the in-situ testing results and laboratory test data.

Strata descriptions have been completed in accordance with BS5930:1999, BS EN ISO 14688:2004 and BS EN ISO 14689:2003 as appropriate.

3.4 Sampling

Samples were recovered during the investigation works in general accordance with the contract specification.

Samples of soil for chemical analysis were placed into suitable containers as specified by the chemical testing laboratory. Samples of soil for geotechnical testing were recovered in accordance with the principles of BS1377-1:1990.

Samples of made ground were scanned immediately after placement in the container using a Photo Ionisation Detector (PID) to check for the presence of volatile organic compounds. The results are presented in Appendix G.

Selected sub-samples of rock core were extracted where suitable intact and unfractured lengths were present. The samples were preserved in cling film, foil and several coatings of wax to preserve their moisture content before being transported to the laboratory for testing.

3.5 In-situ Testing

In-situ Standard Penetration Tests (SPTs) were carried out in the cable percussion and rotary boreholes.

SPT tests were carried out in accordance with BS EN ISO 22476-3 +A1:2011 in order to determine the relative density of the granular soils and an indication of the undrained shear strength of cohesive soils. The results of these tests are shown as 'N' values on the exploratory hole records, with the blow counts for each increment shown in brackets.

Hand shear vane testing was carried out on the top and base of U100 where suitable, in accordance with the contract specification. Results of these tests are presented in Appendix G.

3.6 Monitoring Wells

On completion of drilling, monitoring wells were installed in selected boreholes to enable subsequent gas and groundwater monitoring. The construction of the wells was as specified during the works by RHDHV. Details of the installations are shown on the exploratory hole records and summarised within a table in Appendix B.

Each well consisted of a lower slotted section of 50mm diameter HDPE standpipe surrounded by single size non-calcareous gravel, with an upper section of plain HDPE pipe surrounded by a bentonite and bentonite cement seal.

Each of the wells was fitted with a suitable bung and gas tap to allow for gas and groundwater monitoring, and a protective, raised, steel cover to prevent damage to the installation. Boreholes where no well was installed were backfilled with bentonite cement grout.

4.0 LABORATORY TESTING

4.1 Geotechnical

Geotechnical laboratory testing, as scheduled by RHDHV, was carried out on selected samples in accordance with techniques in BS 1377:1990 and ISRM. The testing was undertaken by a UKAS accredited laboratory and the results are presented in Appendix D. The list below summarises the testing carried out:

- 46 No Moisture content tests – Appendix D.1
- 21 No Atterberg limits – Appendix D.1
- 33 No Particle size distributions (both sieve and sedimentation) – Appendix D.2
- 1 No Oedometers – Appendix D.3
- 6 No Undisturbed undrained triaxial compression tests – Appendix D.4
- 8 No pH and sulphate contents – Appendix D.5
- 3 No Consolidated undrained triaxial compression tests – Appendix D.6
- 11 No Point load tests – D.7
- 5 No Unconfined compressive strength tests – Appendix D.8

4.2 Chemical

Samples as scheduled by RHDHV were tested for a range of contaminants by an MCERTS-accredited laboratory. The results of these tests are presented in Appendix E. The list below summarises the testing carried out:

- 12 No Suite E : Metals (As,B,Cd,Cr,Cr (VI),Cu,Fe,Mn,Pb,Hg,Ni,Se,Zn), Cyanide – Total, Cyanide – Free, H, Water Soluble Sulphate, Fraction of Organic Content, TPH CWG Carbon Banded and Aliphatic/Aromatic Split, PAH 16, Phenol, Asbestos, Volatile Organic Compounds, Semi-Volatile Organic Compounds.
- 12 No Leachate (NRA Preparation) Suite : Metals (As,B,Cd,Cr,Cu,Pb,Hg,Ni,Se,Zn), pH, Water Soluble Sulphate, BTEX, TPH CWG Carbon Banded and Aliphatic/Aromatic Split.
- 2 No Suite F : Metals (As,B,Cd,Cr,Cu,Pb,Hg,Ni,Se,Zn), Chloride, Nitrite, Nitrate, Sulphate, BOD, COD, Electrical Conductivity, Ammoniacal Nitrogen, Sulphide, Calcium, Sodium, Potassium, Magnesium, Alkalinity, pH, TPH CWG Carbon Banded and Aliphatic/Aromatic Split, Phenol, Cyanide – Total, Volatile Organic Compounds, Semi-Volatile Organic Compounds

5.0 GROUNDWATER SURACE WATER MEASUREMENTS

5.1 Introduction

At the end of the investigation works a Dunelm Engineer and Technician temporarily installed pressure transducers in each standpipe to record the water levels over a full tidal cycle. A pressure transducer was also installed within the navigable channel of the River Tees the location which is shown on Drawing No D6340/02 in Appendix B. The data recovered is presented in Appendix F.

5.2 Groundwater Monitoring Procedure

Measurements of groundwater level (in metres below ground level) were recorded in each borehole using a standard dipmeter during fieldwork.

5.3 Groundwater Sampling Procedure

Prior to groundwater sampling being commenced, each monitoring well was developed to the requirements of the specification. The purged water was tested for dissolved oxygen, electrical conductivity, pH value, temperature and redox potential. The results of the water testing are presented in Appendix G.

Samples of groundwater were recovered and despatched to an appropriate laboratory for testing. The testing of the water samples was scheduled by RHDHV and the results are presented in Appendix E.

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Appendix A

Drawings

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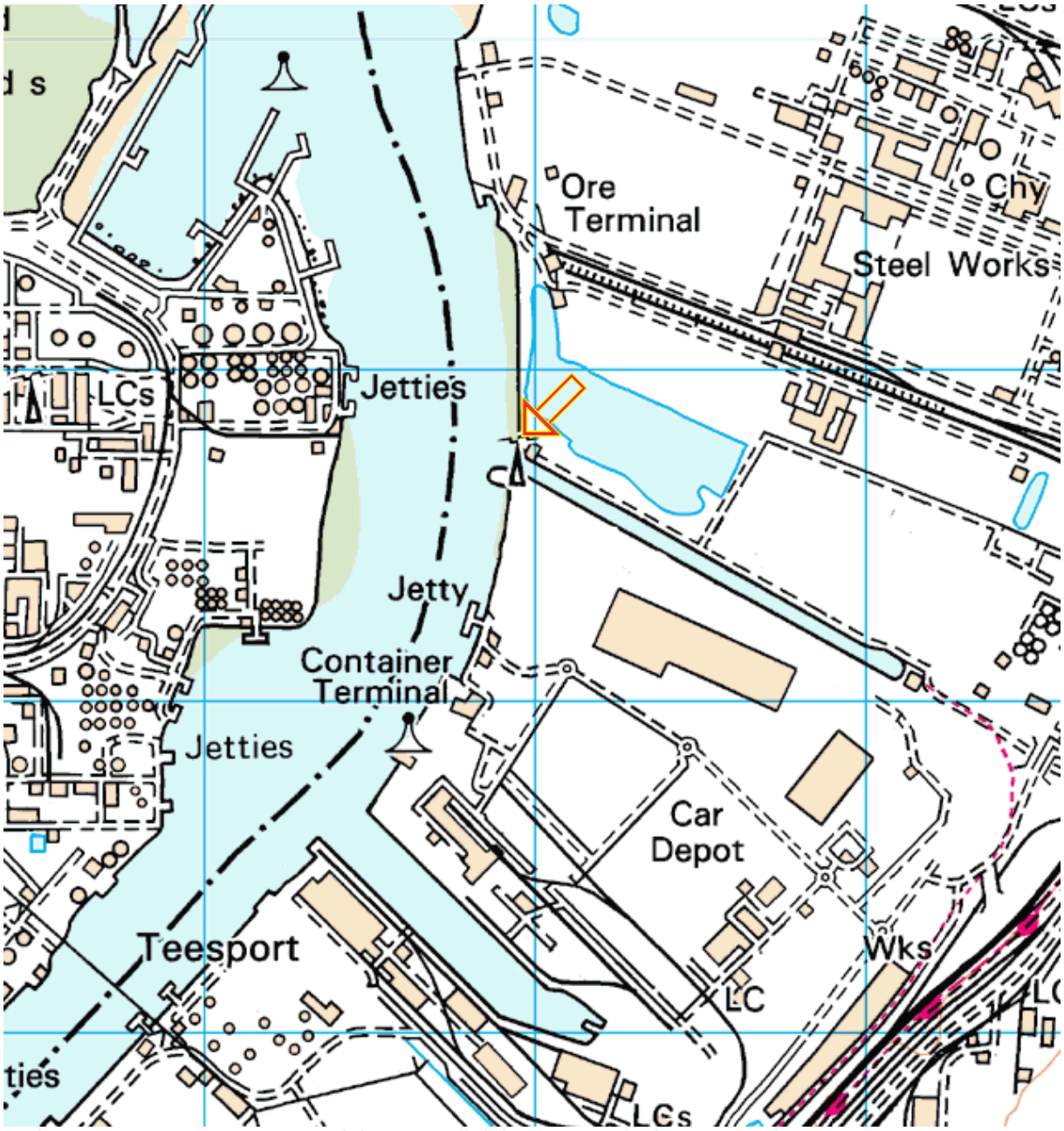

DUNELM GEOTECHNICAL & ENVIRONMENTAL	**Contract: Bran Sands Quayside Investigation**			**Contract No: D6340**
	Client: York Potash Limited			
TEL: 0191 378 3151 **FAX: 0191 378 3157**	**Drawing Title:** **Site Location Plan**			
Drawing No: **D6340/1**	**Date:** **September 2014**	**Scale:** **NTS**	**Status:** **Final**	**Drawn by:** **JT**

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Appendix B

Exploratory Hole Records

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INFORMATION GENERALLY RELATING TO ALL EXPLORATORY HOLE RECORDS

GENERAL

Borehole/Trial Pit No
The exploratory hole identity number used throughout the report.

Site
The ground investigation project name.

Client
Client's name responsible for funding the ground investigation project.

Method
Represents the drilling, excavation or boring method(s) or equipment used.

Ground Level and Location
The precise ground level in meters above Ordnance Datum at the exploratory hole location from which the reduced level for each stratigraphic boundary is calculated. The exploratory hole position is given as either national grid-coordinates or local grid as specified.

ABBREVIATIONS

Samples

B Bulk disturbed sample generally representative of the soil type for cohesive and fine granular soils.

D Small disturbed tub sample normally taken at intermediate depth between other sampling or testing operations. The sample is stored in an airtight container.

ES Sample of potentially contaminated materials. Sample may consist of several containers depending on the analysis required

U 100mm diameter undisturbed thick walled sample (OS-TK/W)

UT 100mm diameter undisturbed thin walled sample (OS-T/W)

UF An attempted but failed 100mm undisturbed sample.

W Water sample.

In-situ Testing

SWP Self Weight Penetration.

CBR California Bearing Ratio mould sample or test.

SPT Standard Penetration Test (SPT) using the split barrel sampler (shoe). The corresponding 'N' value is given in the test result column.

Rock Quality and Core Recovery

TCR Total core recovery - The length of the recovered core expressed as a percentage of the length of core run.

SCR Solid Core Recovery - The sum length of all core pieces (measured along the centre of the core), expressed as a percentage of the length core run.

RQD Rock Quality Designation- The sum length of all core pieces that are 100mm or longer (measured along the centre of the core), expressed as a percentage of the length of core run.

FI Fracture Index- The number of fractures per 1000mm length of solid core.

NI Non-intact- The material recovered in a non-intact state.

NR No recovery from the core run.

AZCL Assessed Zone of Cone Loss.

COBBLE CONTENT

Low <10%, medium 10 – 20%, high >20%

Exploratory Hole Log Legend

BOREHOLE LEGEND:

TOPSOIL

MADE GROUND

CLAY

SAND

SILT

GRAVEL

PEAT

MUDSTONE

SILTSTONE

SANDSTONE

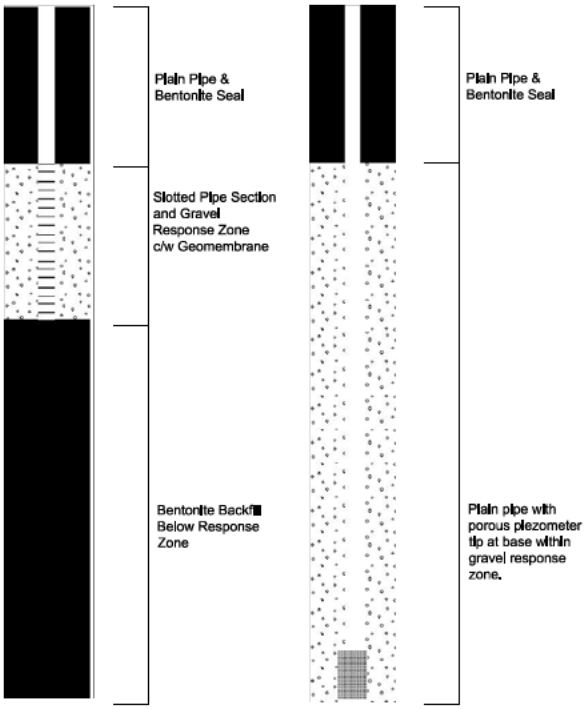
LIMESTONE

CHALK

COAL

BENTONITE

MONITORING INSTALLATION LEGEND:



NB Where strata consists of material of more than one soil or rock type the legends are appropriately combined.

DUNELM GEOTECHNICAL & ENVIRONMENTAL

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BH No	BH Final Depth	Response Zone Top Depth	Response Zone Bottom Depth	Piezometer Diameter	Surface Protection	Date Installed	Waterra Tubing Installed	Remarks
BHP2	38.70m	1.00m	7.50m	50mm	Raised Cover	7/8/14	No	
BHP3	27.80m	1.50m	6.50m	50mm	Raised Cover	31/7/14	No	
BHP6	33.90m	1.50m	6.00m	50mm	Raised Cover	24/7/14	No	

DUNELM GEOTECHNICAL & ENVIRONMENTAL	**Contract:** **Bran Sands Quayside Investigation**			**Contract No:** **D6340**
	Drawing Title: **Installation Summary Table**			
Table No: **D6340/1**	**Date:** **September 2014**	**Scale:** **N/A**	**Status:** **Final**	**Drawn by:** **JH**

Appendix B.1

Borehole Logs

BOREHOLE RECORD

Borehole BHP2

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.50 **Scale 1:50**

Easting: 454964.20 **Northing:** 524966.70

Client: York Potash Ltd

Sheet: 1 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 28/07/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS Type	Depth From - To(m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D	0.10			MADE GROUND: Brown grey black, very sandy gravel with a medium to high cobble content. Gravel is subangular to subrounded, fine to coarse of slag with rare brick and concrete. Cobbles are subangular to subrounded of slag.				
ES	0.10 - 0.20							
B	0.30							
D	0.30 - 0.60							
ES								
B								
B	0.80 - 1.20							
D	1.00		1					
ES								
B	1.20		(1 00) Dry					
	1.20 - 1.65	N=27 (4,5,5,6, 7,9)						
D	1.80							
ES								
B	2.00		2 (2 00) Dry					
	2.00 - 2.45	N=26 (3,4,6,6, 7,7)						
D	2.80							
ES								
B	3.00		3 (3 00) Dry					
	3.00 - 3.45	N=24 (2,3,5,5, 7,7)						
D	3.80		28/07/2014 1730 (4.00) Dry					
ES								
B	4.00		30/07/2014 0800 (4.00) Dry					
	4.00 - 4.35	50/200mm (8,11,13, 15,22)	(4 00) Dry					
D	4.80							
ES								
B	5.00		5 (5.00) 3.70					
	5.00 - 5.15	50/40mm (16,9,50)						
D	5.80							
ES								
B	6.00		6 (6.00) 3.50					
	6.00 - 6.45	50/170mm (5,8,14,1 7,19)						
D	6.80							
ES								
B	7.00		7 (7.00) 3.90					
	7.00 - 7.40	50/190mm (10,11,15 ,16,19)						
D	7.50							
ES								
B	7.70		(7.50) 2.50	MADE GROUND: Grey black, silty, gravelly sand. Gravel is angular to subrounded, fine to coarse of slag.	7 60	-3.10		
D	7.70 - 8.15	N=15 (2,2,3,3, 3,6)						
D	7.80		8 (8.00) 2.80					
ES	8.00	N=13						
B	8.00 - 8.45	(3,3,3,4, 3,3)						
D	8.80							
ES								
B	9.00		9 (9.00) 2.20					
	9.00 - 9.45	N=12 (2,3,2,3, 4,3)						
				Medium dense brown grey fine to medium SAND.	9 30	-4.80		
D	9.80							
ES				Continued next sheet				

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.60m and 14.00m.
				4.00	7.60	2.5	250	8.00	250	8.00	
									200	16.15	
									146	38.70	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP2

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.50 **Scale 1:50**

Easting: 454964.20 **Northing:** 524966.70

Client: York Potash Ltd

Sheet: 2 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 28/07/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater
B D	10 00 10.00 - 10.45	N=22 (3,4,5,5, 6,6)					(10.00) 2.00
D ES B D	10.80 11 00 11.00 - 11.45	N=21 (2,3,4,5, 6,6)					11 (11.00) 2.80
D ES B	11.80 12 00 12.00 - 12.45	N=25 (2,3,5,5, 7,8)					12 (12.00) 2.50 30/07/2014 1730 (13.50) 12.30 31/07/2014 0800 (13.50) 4.10
D ES B D	12.80 13 00 13.00 - 13.45	N=30 (1,1,7,7, 8,8)					13 (13.00) 2.50
D ES B D	13.80 14 00 14.00 - 14.45	N=47 (2,3,4,10 ,16,17)					14 (14.00) 9.20
D ES B D	14.80 15 00 15.00 - 15.10 15.00 - 15.45	50/40mm (25,50)					15
D D	15.80 16 00 16.00 - 16.15	50/40mm (25,50)					16 31/07/2014 1730 (16.00) 12.30 01/08/2014 0800 (16.00) 3.50
	16.45-17 85		100	7	0	NI	17
D	17 85	50/65mm (25,50)				0	
	17.85-19 35		100	24	0	NI	18
						15	19
						NI	
						20	

STRATA RECORD

Description	Depth (m)	Level (m AOD)	Legend	Well Backfill
Medium dense brown grey fine to medium SAND.				
Dense brown grey silty, predominantly fine to medium SAND with high shell content.	12.70	-8.20		
Extremely weak, reddish brown grey MUDSTONE recovered as gravel size fragments and locally decomposed to a very stiff clay.	14 25	-9.75		
Extremely weak to weak locally to wholly decomposed reddish brown and locally grey MUDSTONE. Interlocking fractures throughout core causing it to be recovered as non intact. 16.45m-17.65m: NI. Recovered as gravel and very stiff clay.	16.45	-11 95		
18.05m-19.20m: 3no closely spaced planar bedding fractures, undulating and smooth. Dip: 0-15°.				
18.84m-18.96m: Subvertical joint, stepped and smooth, closed and clean. Dip: 50°. Fresh weak reddish brown mudstone. Discontinuities are closely spaced, subhorizontal, planar, smooth. 19.10m-19.20m: Subvertical joint, stepped and rough. 2-4mm clay infill. Dip: 80°.				

Continued next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water level	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
14.25	16.00	3.75

Casing Depths

Diameter (mm)	Depth (m)
200	16 00

Hole Diameter

Diameter (mm)	Depth (m)
250	8.00
200	16.15
146	38.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 8.60m and 14.00m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP2

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.50 **Scale 1:50**

Easting: 454964.20 **Northing:** 524966.70

Client: York Potash Ltd

Sheet: 3 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 28/07/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
	19.35-20 65		100	42	0	NI 15 NI		Extremely weak to weak locally to wholly decomposed reddish brown and locally grey MUDSTONE. Interlocking fractures throughout core causing it to be recovered as non intact. 20.15m-20.45m: 3no undulating to smooth planar bedding fractures, 0-10mm, clear to clay infill. Dip: 0-5°.				
	20.65-22 20		100	0	0	AZCL NI	21					
	22 20	50/55mm (25,50)					22					
	22.20-23.40		100	17	0	NI 10	23	23.05m-23.25m: Weak reddish brown mudstone.				
	23.40-24 20		100	0	0		24					
	24.20-25 20		100		0	NI	25					
	25.20-26 60		100	36	0	10 NI 10	26	25.73m-25.83m: Weak reddish brown mudstone with closely spaced discontinuities. 26.10m-26.50m: 2no closely spaced undulating bedding fractures, closed and clear. Dip: 0-15°. 26.30m-26.40m: Subvertical joint, planar and smooth, 2mm with clay inffill. Dip: 50°. 26.60m-28.10m: Weak reddish brown mudstone with closely spaced discontinuities.				
	26.60-28.15		100	0	0	NI	27 100% Mud 16.45 - 38.70					
	28.15-29.15		100	0	0	8 NI	28 05/08/2014 1730 (15.00) 4.40 06/08/2014 0800 (15.00) 3.52	28.10m-28.15m: Weak reddish brown mudstone.				
	29.15-29.75		100	0	0	NI AZCL	29					

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water leve	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.60m and 14.00m.
									250	8.00	
									200	16.15	
									146	38.70	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP2

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.50 **Scale 1:50**

Easting: 454964.20 **Northing:** 524966.70

Client: York Potash Ltd

Sheet: 4 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 28/07/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater
	29.75-31 20		100	0	0		
	31.20-32.70		100	0	0	NI	06/08/2014 1730 (15.00) 4.20
	32.70-34 20		100	0	0		07/08/2014 0800 (15.00) 4.30
	34.20-35.70		140	6	0	AZCU NI 1	
	35.70-37 20		100	0	0	NI	
	37.20-38.70		100	57	0	6 NI	07/08/2014 1730 (15.00)

STRATA RECORD

Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
Extremely weak to weak locally to wholly decomposed reddish brown and locally grey MUDSTONE. Interlocking fractures throughout core causing it to be recovered as non intact.				
33.70m-33.80m: Mudstone is grey, recovered as gravel.				
35.00m-35.09m: Weak reddish brown mudstone with locally spaced discontinuities. 35.04m: 1no planar bedding fracture, smooth and undulating, closed and clear. Dip: 5°. 35.34m-35.37m: Wholly decomposed to clay.				
36.61m-36.66m: Wholly decomposed to clay.				
Weak reddish brown MUDSTONE. Discontinuties are closely spaced subhorizontal, undulose and smooth. Locally infilled with clay up to 2mm.	37.73	-33 23		
38.19m-38.43m: Subvertical joint, undulating, smooth, closed, clay infill. Dip: 65°. 38.45m-38.51m: Subvertical joint, undulating, smooth, closed, clay infill. Dip: 70°.	38 60	-34.10		
Extremely weak to weak wholly decomposed reddish brown and occasioanlly grey MUDSTONE.	38.70	-34 20		
End of Borehole at 38.70 m				

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water leve	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
250	8.00
200	16.15
146	38.70

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 8.60m and 14.00m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP3

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.68 **Scale 1:50**

Easting: 454964.40 **Northing:** 525106.60

Client: York Potash Ltd

Sheet: 1 of 3

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS Type	Depth From - To(m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D ES	0.10			MADE GROUND: Black brown grey slightly silty, very sandy gravel with a high cobble/boulder content. Sand is fine to coarse. Gravel is angular to subrounded, fine to coarse of slag with rare brick and sandstone. Cobbles are angular to subrounded of slag.				
B D ES	0.30 - 0.50 0.30							
B	0.80 - 1.20							
D ES	1.00		1					
B	1.20 1.20 - 1.65	N=31 (11,15,10 ,7,7,7)						
D ES	1.80							
B	2.00 2.00 - 2.30	50/115mm (8,15,21, 29)	2 (2.00) Dry					
D ES	2.80							
B	3.00 3.00 - 3.35	58/180mm (5,11,18, 20,20)	3 (3.00) Dry					
D ES	3.80							
D B	4.00 4.00 - 4.45	N=49 (7,10,11, 11,13,14)	4 (4.00) 3.50					
D ES	4.80							
B	5.00 5.00 - 5.35	50/180mm (8,10,19, 15,16)	22/07/2014 1730 (5.00) 3.40 23/07/2014 0800 (5.00) 3.00					
D ES	5.80							
	6.00	50/295mm (7,8,11,1 4,18,7)	6 (6.00) 5.00					
D ES	6.80							
B	7.00 7.00 - 7.45	N=17 (5,6,7,4, 3,3)	7 (7.00) 6.00					
				Dark brown grey black silty, gravelly SAND. Gravel is subangular fine to medium of sandstone and mudstone.	7.30	-2.62		
D ES UT	7.80 7.80 - 8.25		8					
				Firm locally soft reddish brown sandy slightly gravelly CLAY of intermediate plasticity. Sand is fine to coarse. Gravel is angular to subrounded, fine to medium of sandstone, limestone and mudstone.	8.10 8.60	-3.42 -3.92		
D ES	8.40							
B	9.00 9.00 - 9.45	N=11 (2,1,2,3, 3,3)	9 (9.00) 0.00	Medium dense grey sligh ly gravelly SAND. Sand is predominantly fine to medium. Gravel is angular to subangular, fine to medium of sandstone and mudstone. Frequent shell fragments.				
D ES	9.80							

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.60m and 16.70m.
3.10	3.00	3.05	-	0.20	5.00	5.15	250	7.50	250	7.50	
				5.00	7.30	2.45			200	22.00	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP3

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.68 **Scale 1:50**

Easting: 454964.40 **Northing:** 525106.60

Client: York Potash Ltd

Sheet: 2 of 3

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS Type	Depth From - To(m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
B	10 00 10.00 - 10.45	N=19 (1,2,3,4, 5,7)	(10.00) 0.00	Medium dense grey sligh ly gravelly SAND. Sand is predominantly fine to medium. Gravel is angular to subangular, fine to medium of sandstone and mudstone. Frequent shell fragments.				
D	10.80							
ES								
B	11 00 11.00 - 11.45	N=20 (2,2,3,4, 5,8)	11 (11.00) 0.00					
				Medium dense becoming dense brown grey black silty gravelly to very gravelly SAND with medium cobble content. Gravel is subangular to rounded, fine to medium of sandstone, mudstone and limestone. Cobbles are subrounded to rounded of sandstone and limestone.	11 50	-6.82		
D	11.80							
ES								
B	12 00 12.00 - 12.45	N=10 (2,1,1,2, 2,5)	12 (12.00) 0.00					
D	12.80							
ES								
B	13 00 13.00 - 13.45	N=5 (1,1,0,1, 1,3)	13 (13.00) 0.00					
D	13.50							
D	13 80		(13.80) 0.00					
B	13.80 - 14.10	50/105mm (8,10,14, 36)	14					
D	14.80							
B	15 00 15.00 - 15.45	N=26 (3,3,4,7, 7,8)	15 (15.00) 0.00					
D	15.80							
	16 00	N=39 (4,7,8,10 ,10,11)	23/07/2014 1730 (16.00) 4.40 16 24/07/2014 0800 (16.00) 4.40					
B	16.50 - 16.60							
D	16.50							
B	16.80 - 17.00			Stiff reddish brown sandy sligh ly gravelly CLAY of intermediate plasticity and high streng h. Gravel is subangular to subrounded, fine to medium of sandstone, limestone and coal.	16.70	-12 02		
D	16.80							
UT	17.00 - 17.45		17					
D	17.45							
D	18 00 18.00 - 18.45	N=19 (4,4,4,5, 5,5)	18 (18.00) 16 30					
				Firm thinly laminated grey brown sandy CLAY of intermediate to high plasticity. Frequent thin laminae of fine to medium sand.	18 20	-13 52		
D	18.80							
UT	19.00 - 19.45		19					
D	19.45							

Continued next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
13.80	14.10	0.5

Casing Depths

Diameter (mm)	Depth (m)
200	16 00

Hole Diameter

Diameter (mm)	Depth (m)
250	7.50
200	22.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 8.60m and 16.70m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP3

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.68 **Scale 1:50**

Easting: 454964.40 **Northing:** 525106.60

Client: York Potash Ltd

Sheet: 3 of 3

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater
D B	20 00 - 20.45	N=22 (4,5,5,5, 6,6)					(20.00) 16 30
	20.70	50/40mm (18,7,50)					24/07/2014 1730 (20.50) 16.30 25/07/2014 0800 (20.50) 16.30 (20.50) 17 20
	21 50	50/40mm (20,5,50)					(21.50) 16.40
	22.10	50/30mm (10,15,50)					25/07/2014 1730 (22.00) 18.70 29/07/2014 0800 (22.10) 4.50
	22.30-23.10		100	0	0	NI	
	23.10	75/90mm (19,6,75)					
	23.10-24 30		100	53	20	12	
						NI	29/07/2014 1730 (22.10) 2.10
						0	30/07/2014 0800 (22.10) 4.80
						NI	50% Water 23.10 - 25.40
	24.30-25.40		100	39	0	10	
						NI	
						NI	
						0	
	25.40-26 50		100	0	0	NI	30/07/2014 1730 (22.10) 18.50 31/07/2014 1000 (22.10) 4.05
	26.50-27 80		100	73	38	8	20% Water 25.40 - 28.80
	27 80	75/180mm (10,15,25 ,30,20)					31/07/2014 (22.10)

STRATA RECORD

Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
Firm thinly laminated grey brown sandy CLAY of intermediate to high plasticity. Frequent thin laminae of fine to medium sand.				
Very weak partially decomposed red brown mot led grey MUDSTONE. Recovered as gravel size fragments and occasionally weathered to a very stiff clay.	20 50	-15 82		
Extremely weak, wholly decomposed, reddish brown mottled grey MUDSTONE. Recovered as very stiff to hard clay and angular fine to coarse gravel.	22.10	-17.42		
Very weak reddish brown MUDSTONE. Discontinuities are subhorizontal closely to medium spaced, planar, smoo h, occasionally polished. 23.50 - 24.05m, interconnecting incipient joints noted throughout core sections.	23 50	-18 82		
Extremely weak, reddish brown and grey MUDSTONE. Locally decomposed to a s iff clay. 24.64 - 24.74m subvertical incipient joint planar closed. 25.40 - 26.50m wholly decomposed to as firm clay.	24 30	-19 62		
Weak reddish brown MUDSTONE. Discontinuities are subhorizontal, closely spaced, planar, rough, locally infilled with clay (upto 6mm). 27.00 - 27.92m, subvertical joint, stepped, planar with no infill.	27 00	-22 32		
End of Borehole at 27.80 m	27 80	-23.12		

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
20.50	20.70	1.00

Casing Depths

Diameter (mm)	Depth (m)
200	22.10

Hole Diameter

Diameter (mm)	Depth (m)
250	7.50
200	22.00

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 8.60m and 16.70m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP4

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.60 **Scale 1:50**

Easting: 454962.90 **Northing:** 525178.90

Client: York Potash Ltd

Sheet: 1 of 2

Method: Cable Percussion

Dates: 01/08/2014-19/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS Type	Depth From - To(m)	Insitu Testing	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D ES B D ES D ES B D ES B	0.10 0.10 - 0.50 0.30 0.50 0.50 - 1.00 1.00 1.20 1.20 - 1.55	 50/275mm (5,7,8,9, 31,2)	1 (1 20) Dry	MADE GROUND: Black grey green, silty, sandy gravel with high cobble content. Gravel is subangular to subrounded, fine to coarse of slag and concrete. Cobbles are subangular to subrounded of slag.				
B D ES B	1.80 - 2.00 1.80 2.00 2.00 - 2.45	 N=19 (2,3,3,2, 3,11)	2 (2 00) Dry	MADE GROUND: Black red grey, sligh ly sandy slightly gravelly clay of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of sandstone, mudstone and slag.	1.70	2 90		
UF B	2.60 - 3.05 2.60 - 3.00	36 blows	3	MADE GROUND: Black grey green, sandy gravel with a high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.	2 60	2 00		
B	3.20 3.20 - 3.65	50/230mm (5,8,11,1 5,21,3)	(3 20) Dry					
D ES B	3.80 4.00 4.00 - 4.45	 50/230mm (9,9,12,1 6,20,2)	▽ 4 (4 00) Dry					
D ES B	4.80 5.00 5.00 - 5.25	 50/105mm (1,4,12,3 8)	01/08/2014 1730 (5.00) Dry 04/08/2014 0800 (5.00) 4.85 (5.00) 0.00					
D ES	5.80 6.00	 50/30mm (3,9,50)	6 (6.00) 0.00					
D ES B	6.80 7.00 7.00 - 7.45	 50/230mm (5,8,11,2 ,30,7)	7 (7.00) 0.00					
D ES D	7.80 8.00 8.00 - 8.45	 N=11 (1,1,2,4, 4)	8 (8.00) 0.00	MADE GROUND: Black green, silty very sandy gravel with a high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.	7.70	-3.10		
D ES	8.50			MADE GROUND: Reddish brown grey, sandy, gravelly clay. Gravel is subangular to subrounded, fine to coarse of slag and sandstone.	8 30 8 65	-3.70 -4.05		
D B D ES	9.00 9.00 - 9.45 9.50 9.80	 N=7 (1,1,1,2, 2,2)	9 (9.00) 0.00	MADE GROUND: Brown gravelly sand with a high shell content. Gravel is angular to subrounded, fine to coarse of mudstone and sandstone. Obstruction at 10.30m with one piece of wood recovered measuring 10cm x 2cm x 3m.				

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 5mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 5.00 - 10.00m. 3. Unable to advance borehole below 10.30m due to wood obstruction. See BHP4A.
3.90	-	-	-	5.00	7.70	3.33	250	8.00	250	8.00	
							200	10 00	200	10.30	

Log last updated: 24/09/2014

BOREHOLE RECORD

Borehole BHP4

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.60 **Scale 1:50**

Easting: 454962.90 **Northing:** 525178.90

Client: York Potash Ltd

Sheet: 2 of 2

Method: Cable Percussion

Dates: 01/08/2014-19/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
	10 00	50/30mm (1,0,50)	(10.00) 0.00 04/08/2014 1730 (10.00) 6.10	MADE GROUND: Brown gravelly sand with a high shell content. Gravel is angular to subrounded, fine to coarse of mudstone and sandstone. Obstruction at 10.30m with one piece of wood recovered measuring 10cm x 2cm x 3m. End of Borehole at 10.30 m	10 30	-5.70		

11

12

13

14

15

16

17

18

19

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water leve after 5mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
				10.30	10.30	1.5	200	10 00	250	8.00
									200	10.30

Log last updated: 24/09/2014

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 5.00 - 10.00m.
3. Unable to advance borehole below 10.30m due to wood obstruction. See BHP4A.

DUNELM GEOTECHNICAL & ENVIRONMENTAL

BOREHOLE RECORD

Borehole BHP4A

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.63 **Scale 1:50**

Easting: 454961.90 **Northing:** 525193.00

Client: York Potash Ltd

Sheet: 1 of 4

Method: Cable Percussion Boring with Rotary Coring Follow On

Dates: 05/08/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
				MADE GROUND: Brown sandy very gravelly topsoil. Gravel is angular to subangular, fine to coarse of sandstone and slag.	0.10	4 53		
				MADE GROUND: Grey black sandy gravel with medium to high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.				
			1					
			2					
			3					
			4					
			5					
			05/08/2014 1730 (5.80) 0.00 06/08/2014 0800 (5.80) 3.30					
			6					
				MADE GROUND: Black silty sandy gravel with medium to high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.	6.10	-1.47		
			7					
			8					
				Firm reddish brown sandy slightly gravelly CLAY. Gravel is subangular to subrounded, fine to coarse of mudstone, silt and limestone.	8 05	-3.42		
				Medium dense brown gravelly SAND with medium to high shell content. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and limestone. Locally varies to a very sandy gravel.	8 50	-3.87		
			9					

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added from 4.75m.
4.80	4.80	4.75	-	4.30	4.70	1.45	250	9.00	250	9.00	
									200	19.00	
									150	23.80	

Log last updated: 25/09/2014

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BDA BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BHP4A

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.63 **Scale 1:50**

Easting: 454961.90 **Northing:** 525193.00

Client: York Potash Ltd

Sheet: 2 of 4

Method: Cable Percussion Boring with Rotary Coring Follow On

Dates: 05/08/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD			
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend / Well Backfill
				Medium dense brown gravelly SAND with medium to high shell content. Gravel is subangular to rounded, fine to coarse of sandstone, mudstone and limestone. Locally varies to a very sandy gravel.			
D	10.80						
ES							
B	11 00 11.00 - 11.45	N=16 (2,3,3,4, 4,5)	1(11.00) 0.00				
D	11.80						
ES							
B	12 00 12.00 - 12.45	N=22 (3,6,6,5, 5,6)	1(12.00) 0.00				
			06/08/2014 1700 (12.00) 0.00				
			07/08/2014 0800 (12.00) 5.20				
D	12.80						
ES							
B	13 00 13.00 - 13.45	N=23 (1,2,3,5, 7,8)	1(13.00) 0.00				
D	13.80						
ES							
B	14 00 14.00 - 14.45	N=18 (1,3,3,5, 5,5)	1(14.00) 0.00				
D	14.80						
ES							
B	15 00 15.00 - 15.45	N=19 (1,2,3,4, 5,7)	1(15.00) 0.00				
D	15.80						
ES							
B	16 00 16.00 - 16.45	N=24 (2,2,5,5, 7,7)	1(16.00) 0.00				
D	16.80						
ES							
B	17 00 17.00 - 17.45	N=25 (2,2,4,5, 7,9)	1(16.00) 0.00				
D	17.80						
ES							
B	18 00 18.00 - 18.45	N=20 (1,3,3,4, 6,7)	1(18.00) 0.00				
D	18.80						
ES							
B	19.00 - 19.10		19		18 90	-14 27	
D	19.00 19.10 - 19.55	41 blows		Firm thinly laminated reddish brown slightly sandy CLAY of high plasticity and medium strength. Sand occurs in laminations, bands up to 50mm hickness.			
ES							
UT							
			07/08/2014 1730 (19.00) 7.30				
D	19.55		08/08/2014 0800 (19.00) 6.30				

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added from 4.75m.
							200	19 00	250	9.00	
									200	19.00	
									150	23.80	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP4A

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.63 **Scale 1:50**

Easting: 454961.90 **Northing:** 525193.00

Client: York Potash Ltd

Sheet: 3 of 4

Method: Cable Percussion Boring with Rotary Coring Follow On

Dates: 05/08/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI
D B	20 00 20.00 - 20.45	N=15 (2,2,3,3, 4,5)				
D ES B	20.50 20.70 - 21.00					
UT	21.00 - 21.45	58 blows				
D	21.45					
UT	22.00 - 22.45	51 blows				
B ES	22.45 - 23.00 22.50					
D	23 00 23.00 - 23.35	50/225mm (5,7,10,1 5,25)				
D	23.45 23.45 - 23.80	50/160mm (10,15,15 ,23,12)				NI
	23.80-24 30		100	0	0	
	24.30-25 50		83	0	0	AZCL NI
	25.50-27 05		100	0	0	NI
	27.05-28 55		79	0	0	AZCL NI
	28.55-30.10		100	0	0	NI

(Casing) Groundwater

(20.00) 5.40

(23.00) 4.50

(23.00) 5.80

08/08/2014 1700 (23.80) 10.30
14/08/2014 0800 (23.80) 3.20

14/08/2014 1730 (25.00) 2.80
15/08/2014 0800 (3.70) 25.00

STRATA RECORD

Description	Depth (m)	Level (m AOD)
Firm thinly laminated reddish brown slightly sandy CLAY of high plasticity and medium strength. Sand occurs in laminations, bands up to 50mm hickness.		
Stiff red sligh ly sandy very gravelly CLAY of intermediate plasticity. Gravel is angular to subangular, fine to coarse of mudstone.	20 60	-15 97
Extremely weak, partially decomposed, reddish brown grey MUDSTONE. Recovered as gravel size fragments, locally weathered to a stiff clay of low plas icity and high strength.	21 80	-17.17
Extremely weak locally wholly decomposed reddish brown MUDSTONE. Recovered as gravel size fragments and locally weathered to a stiff clay.	23 80	-19.17
25.20-25.35m: Grey mudstone. Recovered as gravel.		

Legend

Well Backfill

Continued next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water leve after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
21.80	23.00	1.25
23.00	23.80	1

Casing Depths

Diameter (mm)	Depth (m)
150	23 00

Hole Diameter

Diameter (mm)	Depth (m)
250	9.00
200	19.00
150	23.80

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added from 4.75m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP4A

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.63 **Scale 1:50**

Easting: 454961.90 **Northing:** 525193.00

Client: York Potash Ltd

Sheet: 4 of 4

Method: Cable Percussion Boring with Rotary Coring Follow On

Dates: 05/08/2014-07/08/2014

Driller: ID

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI
	30.10-31.10		90	0	0	NI

(Casing) Groundwater

16/08/2014 1730 (25.00)

STRATA RECORD

Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
Extremely weak locally wholly decomposed reddish brown MUDSTONE. Recovered as gravel size fragments and locally weathered to a stiff clay.				
End of Borehole at 31.10 m	31.10	-26.47		

31 32 33 34 35 36 37 38 39

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)

Casing Depths

Diameter (mm)	Depth (m)

Hole Diameter

Diameter (mm)	Depth (m)
250	9.00
200	19.00
150	23.80

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added from 4.75m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP5

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.57 **Scale 1:50**

Easting: 454956.70 **Northing:** 525267.50

Client: York Potash Ltd

Sheet: 1 of 1

Method: Cable Percussion

Dates: 05/08/2014

Driller: DL

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D	0.10			MADE GROUND: Black grey green, sandy gravel with a high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag. Obstruc ion at 4.6m of suspected slag boulder.				
ES	0.50							
D								
B			1					
D	1.20	50/125mm (6,8,16,3 4)	(1.10) Dry					
B								
D	1.50							
ES								
D	2.00	N=34 (4,3,5,8, 10,11)	2 (1 90) Dry					
B								
ES	2.50							
D								
D	3.00	N=14 (4,5,3,4, 3,4)	3 (2 90) Dry					
B								
ES	3.50							
D								
D	4.00	50/50mm (3,9,50)	4 (4 00) Dry					
B								
W	4.20							
ES	4.50		05/08/2014 (4.60) Dry					
				End of Borehole at 4.60 m	4 60	-0.03		
			5					
			6					
			7					
			8					
			9					

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)
4.20	4.10	4.00	-

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
1.20	1.40	0.50
2.60	2.80	0.50
4.20	4.90	2.5

Casing Depths

Diameter (mm)	Depth (m)
250	4.60

Hole Diameter

Diameter (mm)	Depth (m)
250	4.60

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Unable to advance borehole below 4.60m due to obstruction. See BHP5A.

Log last updated: 10/09/2014

BOREHOLE RECORD

Borehole BHP5A

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.54 **Scale 1:50**

Easting: 454958.40 **Northing:** 525260.40

Client: York Potash Ltd

Sheet: 1 of 1

Method: Cable Percussion Boring

Dates: 05/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
				MADE GROUND: Black grey green sandy gravel with high cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.				
			05/08/2014 (4.70) Dry	End of Borehole at 4.70 m	4.70	-0.16		

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water leve	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
0.80	1.00	0.75
2.00	2.20	1
3.70	4.00	0.75
4.50	4.70	1.5

Casing Depths

Diameter (mm)	Depth (m)
250	4.70

Hole Diameter

Diameter (mm)	Depth (m)
250	4.70

General Remarks

1. Borehole terminated at 4.7m due to obstruction. See BHP5B.
2. No groundwater encountered.

Log last updated: 18/08/2014

BOREHOLE RECORD

Borehole BHP5B

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.52 **Scale 1:50**

Easting: 454962.30 **Northing:** 525264.80

Client: York Potash Ltd

Sheet: 1 of 5

Method: Cable Percussion Boring and Rotary Follow On

Dates: 05/08/2014-07/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
				MADE GROUND: Black grey green, sandy gravel with high cobble content. Gravel is subangular to subrounded, fine to coarse of slag with rare brick and concrete. Cobbles are subangular to subrounded of slag.				
D	1.20				1.20	3.32		
ES D B	1.50 1.50 - 1.95	N=8 (1,2,2,2, 2,2)	(1.30) Dry	MADE GROUND: Brown black, slightly sandy sligh ly gravelly clay of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of brick and slag. Fragments of wood noted hroughout.				
ES D B	2.50 2.50 - 2.95	N=1 (1,1,0,1, 0,0)	(2.10) Dry					
ES D	3.50 3.50 - 3.95	N=5 (1,1,2,1, 1,1)	(3.10) Dry					
B	3.95							
ES D B	4.50 4.50 - 4.95	N=9 (1,2,2,2, 2,3)	(4.10) Dry					
W D	5.10			MADE GROUND: Black grey green, silty gravel with medium cobble content. Gravel is subangular to subrounded, fine to coarse of slag. Cobbles are subangular to subrounded of slag.	5.10	-0.58		
ES D	5.50	N=9 (1,0,1,2, 2,4)	(5.40) 4.10					
D	6.00							
ES D	6.50	SWP=150mm N=4 (1,0,1,1, 1,1)	(6.40) 3.50					
D	7.10			Very soft black slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of sandstone and mudstone.	7.10	-2.58		
D	7.30							
ES D	7.50	SWP=150mm N=4 (1,0,1,1, 1,1)	05/08/2014 1730 (7.60) 3.00 06/08/2014 0830 (7.60) 3.50 (7.50) 2.00					
D	8.00							
ES D	8.20							
D B	8.50 8.50 - 8.95	N=3 (1,1,0,1, 1,1)	(8.40) 2.00					
D	9.00							
ES D D	9.20 9.30 9.50	N=5 (1,1,2,1, 1,1)	(9.40) 2.50	Loose brown clayey gravelly SAND. Gravel is subangular to subrounded, fine to coarse of sandstone and mudstone. Clay occurs in	9.30	-4.78		
				Continued next sheet				

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 0.00-17.60m.
5.10	4.80	4.70	-	0.70	1.00	0.75	250	8.30	250	8.30	
									200	19.00	
									150	25.15	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP5B

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.52 **Scale 1:50**

Easting: 454962.30 **Northing:** 525264.80

Client: York Potash Ltd

Sheet: 2 of 5

Method: Cable Percussion Boring and Rotary Follow On

Dates: 05/08/2014-07/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D	10.00			bands/pockets, less than 100mm thick/diameter.				
ES	10.20							
D								
D	10.40				10.40	-5.88		
	10 50	N=40 (4,7,8,10 ,10,12)	(10.40) 2.00	Dense becoming medium dense brown gravelly SAND with to low medium cobble content and medium shell content. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and limestone. Cobbles are subangular to subrounded of sandstone and limestone.				
D	11.00		11					
ES	11.20							
D								
	11 50	N=37 (4,5,8,9, 10,10)	(11.40) 1.50					
D	12.00		12					
ES	12.20							
D								
	12 50	N=22 (2,3,4,5, 6,7)	(12.40) 2.00					
D	13.00		13					
ES	13.20							
D								
	13 50	N=22 (2,2,3,5, 7,7)	(13.40) 2.20					
D	14.00		14					
ES	14.20							
D								
	14 50	N=24 (2,3,5,4, 6,9)	(14.40) 0.00					
D	15.00		15					
ES	15.20							
D								
	15 50	N=20 (1,2,4,5, 5,6)	(15.40) 0.00					
D	16.00		16					
D	16.20							
ES								
	16 50	N=21 (2,2,3,5, 6,7)	(16.40) 0.00					
D	17.00		17					
ES	17.20							
D								
	17 50	N=23 (1,2,3,5, 7,8)	(17.40) 0.00					
D	17.60			Stiff reddish brown sandy sligh ly gravelly CLAY of high plasticity and high streng h. Sand occurs in laminations. Gravel is subangular fine to medium of sandstone and mudstone.	17 60	-13 08		
UT	18.00 - 18.45	50 blows	18					
ES	18.20							
D								
D	18.45 - 18.65							
D	19 00		19 (18.90) 5.50					
B	19.00 - 19.45	N=19 (3,3,4,5, 5,5)						
ES	19.20							
D								

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 0.00-17.60m.
							200	19 00	250	8.30	
									200	19.00	
									150	25.15	

Log last updated: 25/09/2014

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BDA BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BHP5B

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.52 **Scale 1:50**

Easting: 454962.30 **Northing:** 525264.80

Client: York Potash Ltd

Sheet: 3 of 5

Method: Cable Percussion Boring and Rotary Follow On

Dates: 05/08/2014-07/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI
UT	20.00 - 20.45	50 blows				
ES	20.20					
D						
D	20.45 - 20.65					
D	21 00	N=16 (2,2,2,5, 4,5)				
B	21.00 - 21.45					
ES	21.20					
D						
UT	22.00 - 22.45	50 blows				
ES	22.20					
D						
D	22.45 - 22.65					
D	22.80					
D	23 00	N=46 (4,3,4,9, 13,20)				
B	23.00 - 23.45					
ES	23.20					
D						
D	24 00	50/150mm (4,9,12,3 8)				
B	24.00 - 24.30					
ES	24.20					
D						
ES	24.90					
D	25 00	50/50mm (15,10,50)				
D	25.00 - 25.15					
	24.80-25 80		0			AZCL
D	25 80	100/264mm (1,2,17,8 ,40,35)				
	25.80-27.10		0			NI
	27.10-27 60		0			AZCL
D	27 60	N=52 (1,1,2,9, 17,24)				
	27.60-28 50		84			NI
	28.50-29 30		94			AZCL NI
	29.30-30 30		100	30	30	NI

(Casing) Groundwater

06/08/2014 1730 (19.00) 20.80
07/08/2014 0800 (19.00) 3.50
(20.90) 4.00
(22.90) 8.20
24 9.30
25/08/2014 1730 (25.00) 10.80

STRATA RECORD

Description	Depth (m)	Level (m AOD)
Stiff reddish brown sandy sligh ly gravelly CLAY of high plasticity and high streng h. Sand occurs in laminations. Gravel is subangular fine to medium of sandstone and mudstone.		
Extremely weak locally wholly decomposed reddish brown grey MUDSTONE. Recovered as gravel size fragments and locally weathered to a very stiff clay of low plas icity.	22 80	-18 28
Extremely weak to weak wholly disintegrated to locally decomposed reddish brown and locally grey MUDSTONE.	25.15	-20 63

Continued next sheet

Legend: Well Backfill

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water leve after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
23.50	23.80	1
24.60	25.00	1

Casing Depths

Diameter (mm)	Depth (m)
150	25 00

Hole Diameter

Diameter (mm)	Depth (m)
250	8.30
200	19.00
150	25.15

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 0.00-17.60m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP5B

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.52 **Scale 1:50**

Easting: 454962.30 **Northing:** 525264.80

Client: York Potash Ltd

Sheet: 4 of 5

Method: Cable Percussion Boring and Rotary Follow On

Dates: 05/08/2014-07/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
								Very strong reddish brown grey MUDSTONE with veins of gypsum throughout, up to 3mm in width. Gympsum nodules noted - 20mm diameter, thinly laminated. Closely spaced discontinuities, subvertical and subvertical joints. Bedding is thinly laminated, 1-6mm undulating, 15° Dip.	30 00	-25.48		
	30.30-31 50		100	100	79		31	30.00m-32.95m: 4 closely to medium spaced undulating bedding fractures. Clean. Dip: 0-30°. 31.24m-31.34m: Subvertical joint, undulating and rough. 5mm. Clean. Dip: 50°.				
						3						
	31.50-33 00		100	97	97		32					
						NI	33	32.95m-33.00m: recovered as clayey gravel. 33.00m-35.65m: 7 closely spaced bedding fractures, planar and smooth to undulating and rough. Clean to clay gravel infill. Dip: 0-15°.				
							34					
	33.00-36 00		100	90	90	5						
							100% Water 24 80 - 44.50					
							35	34.78m-34.90m: Subvertical joint, undulating and rough, 0-8mm, clayey gravel infill. Dip: 60°.				
								35.47m-35.56m: Subvertical joint, stepped and rough, 2-8mm, clayey gravel infill. Dip: 70°.				
						NI			35 65	-31.13		
							36	Extremely weak to weak reddish brown and locally grey MUDSTONE.				
						AZCL						
								Very strong reddish brown grey MUDSTONE with veins of gypsum throughout. Closely spaced discon inuities, subhorizontal and subvertical joints.	36.40	-31 88		
	36.00-38 00		75	45	24	10	37	36.40m-37.40m: 7 undulating to rough, smooth to planar, closed to 10mm bedding fractures wi h clean to gravel infill. Dip: 0-10°. 36.68m-36.74m: Subvertical joint, planar and smooth, 10mm. Clean. Dip: 85°. 37.00m-37.07m: Subvertical joint, undulating and rough, 2-8mm with gravel infill. Dip: 80°. 37.30m-37.42m: Subvertical joint, undulating and rough, 2-20mm with gravel infill. Dip: 70°.	37.40	-32 88		
						NI						
D	38 00	75/42mm (25,75)				AZCL	38					
						NI		Extremely weak to weak wholly decomposed reddish brown and locally grey MUDSTONE.	38.44	-33 92		
	38.00-39 00		66	59	36	1		Very strong reddish brown and grey MUDSTONE with veins of gypsum hroughout. Closely spaced discon inuities, subhorizontal and subvertical joints.				
	39 00	50/3mm (25,50)				AZCL	39	39.04m-40.00m: 10 undulating smooth bedding fractures, 0-10mm, clean to clay gravel infill. Dip: 0-5°.				
	39.00-40 00		96	96	21	10						

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water leve after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 0.00-17.60m.
									250	8.30	
									200	19.00	
									150	25.15	

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP5B

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.52 **Scale 1:50**

Easting: 454962.30 **Northing:** 525264.80

Client: York Potash Ltd

Sheet: 5 of 5

Method: Cable Percussion Boring and Rotary Follow On

Dates: 05/08/2014-07/08/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI
	40.00-41 80		84	84	46	AZCL 8
	41.80-43 00		96	96	53	AZCL 6
	43.00-44 50		100	100	37	

(Casing) Groundwater

STRATA RECORD

Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
Very strong reddish brown and grey MUDSTONE with veins of gypsum hroughout. Closely spaced discon inuities, subhorizontal and subvertical joints. 40.28m-41.80m: 12 undulating smooth bedding fractures, 2-4mm. Clean. Dip: 0-5°. 41.85m-44.50m: 15 undulating to stepped smooth bedding fractures, 0-10mm with clean to clay gravel infill. Dip: 0°. 42.37m-42.42m: Subvertical joint, undulating and smooth, 2mm. Clean. Dip: 40°.				
End of Borehole at 44.50 m	44 50	-39 98		

41 42 43 44 45 46 47 48 49

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter	
Depth Struck (m)	Casing Depth (m)	Water leve after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)
									250	8.30
									200	19.00
									150	25.15

Log last updated: 25/09/2014

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 0.00-17.60m.

BOREHOLE RECORD

Borehole BHP6

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.56 **Scale 1:50**

Easting: 454946.30 **Northing:** 525358.10

Client: York Potash Ltd

Sheet: 1 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D	0.10			MADE GROUND: Black grey silty sandy gravel with high cobble content. Gravel is subangular to subrounded, fine to coarse of slag with mudstone, concrete and brick. Cobbles are subangular to subrounded of slag.				
ES	0.50							
B	0.50 - 1.00							
D	0.50							
			1					
B	1.20	N=36 (3,6,7,6, 9,14)	(1.10) Dry					
D	1.20 - 1.65							
	1.20							
ES	1.50							
D								
D	2.00	50/200mm (4,11,9,1 2,29)	2 (1 90) Dry					
B	2.00 - 2.35							
			30/07/2014 1730 (2.20) Dry					
ES	2.50		31/07/2014 0800 (2.20) Dry					
D								
B	3.00	N=36 (3,4,9,9, 7,11)	3 (2 90) Dry					
D	3.00 - 3.45							
	3.00							
ES	3.50							
D								
W	3.80							
D	4.00	50/150mm (6,7,17,3 3)	4 (4.00) 3.60					
B	4.00 - 4.30							
D	4.50							
ES								
D	5.00	N=25 (4,4,5,7, 6,7)	5 (4.90) 3.20					
B	5.00 - 5.45							
ES	5.50							
D								
D	6.00	N=9 (1,3,4,3, 2,0)	6 (5.90) 3.00					
B	6.00 - 6.45			MADE GROUND: Black silty gravel. Gravel is subangular to subrounded, fine to coarse of slag.	6 00	-1.44		
ES	6.50							
D								
D	7.00	SWP=300mm N=4 (1,1,1,1, 2)	7 (6.90) 3.50					
B	7.00 - 7.50							
D	7.30			Very soft locally firm reddish brown sandy gravelly CLAY of intermediate plasticity. Gravel is subangular to subrounded, fine to coarse of slag.	7 30	-2.74		
ES	7.50							
D								
D	7.70				7.70	-3.14		
D	8.00	SWP=250mm N=3 (1,1,1,1, 1)	8 (7.90) 3.00	Very loose brown grey silty SAND.				
B	8.00 - 8.55							
D	8.50 - 8.55			Brown silty very gravelly SAND with medium to high cobble and/or boulder content. Gravel is subangular to subrounded, fine to medium of sandstone and mudstone. Cobbles are subangular to subrounded of sandstone.	8 50	-3.94		
ES	8.50							
D	9.00	N=23 (3,4,4,4, 6,9)	9 (8.90) 2.00		9 00	-4.44		
B	9.00 - 9.45			Medium dense brown fine to medium SAND.				
D	9.50							
ES								

Continued next sheet

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.50m and 19.6m.
3.80	3.60	3.60	-	0.60	1.10	2.00	250	8.30	250	8.30	
				1.50	1.70	1.25			200	27.20	
				2.30	2.50	1.5					
Log last updated: 25/09/2014				4.30	4.70	2.00					

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BDA BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BHP6

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.56 **Scale 1:50**

Easting: 454946.30 **Northing:** 525358.10

Client: York Potash Ltd

Sheet: 2 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS			(Casing) Groundwater	STRATA RECORD				
Type	Depth From - To(m)	Insitu Testing		Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
D B	10 00 10.00 - 10.45	N=25 (2,3,5,5, 7,8)	(9.90) 2.50	Medium dense brown fine to medium SAND.				
D ES	10.50							
D B	11 00 11.00 - 11.45	N=20 (2,4,4,5, 5,6)	1(10.90) 3.00					
D ES D	11.50							
D B	12 00 12.00 - 12.45	N=34 (3,4,7,8, 9,10)	1(11.90) 3.50					
D ES	12.50							
D B	13 00 13.00 - 13.45	N=25 (2,4,5,5, 7,8)	1(12.90) 2.10					
D	13.50							
D B	14 00 14.00 - 14.54	N=26 (2,2,5,6, 7,8)	1(13.90) 2.00					
D	14.50							
D B	15 00	N=27 (2,3,4,6, 8,9)	1(14.90) 2.00					
D	15.50		31/07/2014 1730 (15.80) 3.20 01/08/2014 0800 (15.60) 3.80					
D B	16 00 16.00 - 16.45	N=26 (3,4,5,6, 7,8)	1(15.90) 0.00					
D	16.50		31/07/2014 0800					
D B	17 00 17.00 - 17.45	N=28 (4,4,5,6, 8,9)	1(16.90) 0.00					
D	17.50							
D B	18 00 18.00 - 18.45	N=17 (2,3,5,4, 3,5)	1(17.90) 0.00					
D	18.50			Medium dense locally loose brown silty slightly gravelly predominantly fine to medium SAND. Gravel is subangular to subrounded, fine to medium of sandstone, mudstone and limestone.	18 00	-13.44		
D B	19 00 19.00 - 19.45	SWP=150mm N=7 (,1,2,2,2)	1(18.90) 0.00					
D D	19.50 19.60			Soft becoming firm brown grey orange slightly	19 60	-15 04		
				Continued next sheet				

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.50m and 19.6m.
									250	8.30	
									200	27.20	

Log last updated: 25/09/2014

DUNELM GEOTECHNICAL & ENVIRONMENTAL — BDA BRITISH DRILLING ASSOCIATION

BOREHOLE RECORD

Borehole BHP6

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.56 **Scale 1:50**

Easting: 454946.30 **Northing:** 525358.10

Client: York Potash Ltd

Sheet: 3 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI
UT	20.00 - 20.45	20 blows				
D	20.45 - 20.65					
D	20.80					
B	21 00					
	21.00 - 21.45	N=17 (2,2,3,3, 4,7)				
D	21.50					
D	21.80					
UT	22.00 - 22.45	60 blows				
D	22.45 - 22.65					
D	22.80					
B	23 00					
	23.00 - 23.45	N=26 (3,3,4,5, 8,9)				
D	23.20					
D	23.80					
B	24 00					
	24.00 - 24.45	N=40 (4,5,8,10 ,10,12)				
D	24.80					
D	25 00					
B		N=48 (3,4,8,10 ,10,20)				
D	25.80					
D	26 00					
B		50/145mm (4,14,23, 27)				
D	26.70					
D	27 00					
		50/65mm (5,18,50)				
	27.40-28 90		7	0	0	AZCL
D	28 90	50/50mm (15,10,50)				NI
	28.90-29 90		0	0	0	AZCL
D	29 90	50/70mm				

(Casing) Groundwater

(20.90) 7.50

(22.00) 8.90

01/08/2014 1730 (22.00) 12.00

04/08/2014 0800 (22.00) 4.10

(24.90) 7.50

(25.90) 9.00

04/08/2014 1730 (25.90)

12/08/2014 0800 (27.20) 2.80

STRATA RECORD

Description	Depth (m)	Level (m AOD)
sandy gravelly CLAY of intermediate plasticity and medium strength. Small fragments of wood and organic material throughout. Becoming firm below 20.00m.		
Firm grey silty sandy CLAY of intermediate plasticity wi h psuedofibrous peat lenses/pockets and fragments of wood throughout.	20 80	-16 24
Stiff thinly laminated fissured brown slightly gravelly sligh ly sandy CLAYof intermediate plasticity and high strength. Gravel is subangular to subrounded fine to medium of sandstone and mudstone.	21 80	-17 24
Extremelly weak locally wholly decomposed reddish brown grey MUDSTONE. Recovered as gravel size fragments, locally decomposed to a very stiff clay of low plasticity.	23 20	-18 64
Extremely weak locally wholly decomposed reddish brown grey MUDSTONE. Recovered as gravel size fragments and stiff clay. NI zones recovered as gravel and s iff clay.	27.40	-22 84

Legend — Well Backfill

Continued next sheet

Ground Water (m)

Depth Struck (m)	Casing Depth (m)	Water leve after 20mins	Water sealed (m)

Chiselling/ Hard Strata

From (m)	To (m)	Time (hr)
26.60	27.00	1.00

Casing Depths

Diameter (mm)	Depth (m)
200	25 90

Hole Diameter

Diameter (mm)	Depth (m)
250	8.30
200	27.20

General Remarks

1. Hand dug inspection pit to 1.20m.
2. Water added between 8.50m and 19.6m.

Log last updated: 25/09/2014

BOREHOLE RECORD

Borehole BHP6

Contract No. D6340

Site: Bran Sands Quayside Investigation

GL (m AOD) 4.56 **Scale 1:50**

Easting: 454946.30 **Northing:** 525358.10

Client: York Potash Ltd

Sheet: 4 of 4

Method: Cable Percussion with Rotary Coring Follow On

Dates: 22/07/2014-24/07/2014

Driller: DC

Logged By: IN Checked By: JH

SAMPLE DETAILS

Type	Depth From - To(m)	N (cu)	TCR (%)	SCR (%)	RQD (%)	FI	(Casing) Groundwater	STRATA RECORD Description	Depth (m)	Level (m AOD)	Legend	Well \Backfill
		(21,4,50)				AZCL		Extremely weak locally wholly decomposed reddish brown grey MUDSTONE. Recovered as gravel size fragments and stiff clay.				
	29.90-30 90		50	0	0							
						NI	50% Mud 27.40 - 33.90					
D	30 90	50/62mm (25,50)					31					
	30.90-31 90		20	0	0	AZCL						
						NI						
D	31 90	50/50mm (25,50)					32					
	31.90-32 90		10	0	0	AZCL						
						NI	04/08/2014 1700 (27.20) 4.08					
D	32 90	50/45mm (18,7,50)					13/08/2014 0800 (27.20) 3.20 33					
	32.90-33 90		10	0	0	AZCL						
						NI	13/08/2014 1800 (27.20) 2.60					
D	33 90	50/42mm (25,50)					34	End of Borehole at 33.90 m	33 90	-29 34		
							35					
							36					
							37					
							38					
							39					

Ground Water (m)				Chiselling/ Hard Strata			Casing Depths		Hole Diameter		General Remarks
Depth Struck (m)	Casing Depth (m)	Water level after 20mins	Water sealed (m)	From (m)	To (m)	Time (hr)	Diameter (mm)	Depth (m)	Diameter (mm)	Depth (m)	1. Hand dug inspection pit to 1.20m. 2. Water added between 8.50m and 19.6m.
									250	8.30	
									200	27.20	

Log last updated: 25/09/2014

Appendix B.2

Fracture Logs

SITE LOCATION: Bran Sands						BOREHOLE NUMBER: BHP2			GEOLOGIST: IJN			DATE: 08/08/2014
REF. NO.	SET	TOP DEPTH (m)	BASE DEPTH (m)	TYPE bedding/ joint/ fault etc.	PERSISTENCE very low to very high etc.	ROUGHNESS MEDIUM SCALE planar/ stepped/ undulating	ROUGHNESS SMALL SCALE rough/ smooth	SURFACE APPEARANCE polished/ striated	APERTURE OBSERVATION closed/ infilled (mm)	INFILLING clean/ clay/ calcite/ quartz/ gouge/ breccia/ surface staining	DIP	REMARKS
1		18.84	18.96	Joint		Stepped	Stepped		Closed	Clean	50	
2		19		Bedding		Undulating	Stepped		Closed	Clay	15	
3		19.1		Bedding		Undulating	Stepped		2-10mm	Clay	5	
4		19.1	19.2	Joint		Stepped	Rough		2-4mm	Clay	80	
5		19.22		Bedding		Undulating	Stepped		Closed	Clean	0	
6		19.97		Joint		Undulating	Stepped		Closed	Clean	20	
7		20.16		Bedding		Stepped	Rough		2-10mm	Clay	0	
8		20.2		Joint		Undulating	Stepped		1mm	Clean	80	
9		20.27		Bedding		Undulating	Stepped		Closed	Clean	5	
10		20.3		Bedding		Undulating	Stepped		Closed	Clay	0	
11		23.15		Bedding		Undulating	Stepped		4mm	Clay Gravel	15	
12		23.2		Bedding		Undulating	Stepped		Closed	Clean	0	
13		25.79		Bedding		Undulating	Stepped		Closed	Clean	0	
14		26.19		Bedding		Undulating	Stepped		Closed	Clean	5	
15		26.29		Joint		Undulating	Stepped		Closed	Clean	35	
16		26.3	26.4	Joint		Planar	Stepped		2mm	Clay	50	
17		26.43		Bedding		Undulating	Stepped		Closed	Clay	15	
18		27.77		Bedding		Planar	Undulating		Closed	Clean	0	
19		27.8	27.92	Joint		Planar	Undulating		Closed	Clean	45	
20		35.04		Bedding		Planar	Stepped		Closed	Clean	5	
21		37.73	38.36	Joint		Stepped	Rough		0-2mm	Clay	45-70	
22		37.95	38	Joint		Undulating	Stepped		40mm	Gravel	5	
23		38.04	38	Joint		Undulating	Stepped		20mm	Gravel	5	
24		38.19	38.43	Joint		Undulating	Stepped		Closed	Clay	65	
25		38.45	32.51	Joint		Undulating	Stepped		Closed	Clay	70	
26		38.57		Bedding		Undulating	Stepped		2mm	Clay	10	

SITE LOCATION: Bran Sands						BOREHOLE NUMBER: BHP3			GEOLOGIST: IJN			DATE: 08/08/2014
REF. NO.	SET	TOP DEPTH (m)	BASE DEPTH (m)	TYPE bedding/ joint/ fault etc.	PERSISTENCE very low to very high etc.	ROUGHNESS MEDIUM SCALE planar/ stepped/ undulating	ROUGHNESS SMALL SCALE rough/ smooth	SURFACE APPEARANCE polished/ striated	APERTURE OBSERVATION closed/ infilled (mm)	INFILLING clean/ clay/ calcite/ quartz/ gouge/ breccia/ surface staining	DIP	REMARKS
1	1	23.5	23.66	Joint		Undulating	Smooth	Polished	2-10mm	Clean	75	
2	1	23.53		Bedding		Undulating	Smooth		Closed		0	
3	1	23.58		Bedding		Undulating	Smooth		Closed		0	
4	1	23.62		Bedding		Undulating	Smooth		Closed		0	
5	1	23.73	23.77	Joint		Undulating	Smooth		20mm	Clay Gravel	10	
6	1	23.88		Bedding		Undulating	Rough		Closed	Clean	5	
7	1	24.07	24.1	Bedding		Undulating	Rough		20mm	Clay Gravel	5	
8	1	23.93		Joint		Undulating	Rough		Closed	Clean	10	Insipient
9	1	23.95		Joint		Undulating	Rough		Closed	Clean	5	Insipient
10	1	23.92	24	Joint		Undulating	Rough		Closed	Clean	70	Insipient
11	2	24.69		Bedding		Undulating	Planar		Closed	Clean	0	
12	2	24.7	24.74	Joint		Undulating	Smooth		Closed	Clean		Insipient
13	3	27.2		Bedding		Undulating	Rough		5mm	Clay	15	
14	3	27.64		Bedding		Undulating	Rough		2mm	Clay	0	
15	3	27.68		Bedding		Undulating	Rough		3mm	Clay	25	
16	3	27.7		Bedding		Undulating	Rough		5mm	Clay	40	
17	3	27.73	27.83	Joint		Undulating	Rough		Closed	Clean	75	Insipient
18	3	27.82	27.88	Joint		Undulating	Rough		Closed	Clean	60	Insipient
19	3	27.88		Joint		Stepped	Planar		6mm	Clean	45	

SITE LOCATION: Bran Sands						BOREHOLE NUMBER: BHP5B			GEOLOGIST: IJN			DATE: 2708/08/2014
REF. NO.	SET	TOP DEPTH (m)	BASE DEPTH (m)	TYPE bedding/ joint/ fault etc.	PERSISTENCE very low to very high etc.	ROUGHNESS		SURFACE APPEARANCE polished/ striated	APERTURE OBSERVATION closed/ infilled (mm)	INFILLING clean/ clay/ calcite/ quartz/ gouge/ breccia/ surface staining	DIP	REMARKS
						MEDIUM SCALE planar/ stepped/ undulating	SMALL SCALE rough/ smooth					
1	1	30.78	30.8	Joint		Undulating	Smooth		4	Clean	15	
2	1	30.8	30.86	Joint		Stepped	Rough		0-6	Clay	30	
3	1	30.88		Bedding		Stepped	Rough		1	Clay	0	
4	1	31.17		Bedding		Undulating	Smooth		1-8	Clean	10	
5	1	31.24	31.34	Joint		Stepped	Rough		3	Clean	80	
6	1	31.34	31.36	Bedding		Undulating	Rough		5	Clean	30	
7	1	31.71		Bedding		Undulating	Rough		Closed	Clean	2	
8	1	32.06		Joint		Undulating	Smooth		2	Clean	5	
9	1	32.53	32.56	Joint		Stepped	Rough		2-6	Clean	20	
10	2	31.1		Bedding		Planar	Smooth		10	Clean	0	
11	2	33.25	33.34	Joint		Undulating	Rough		Closed	Clean	45	Insipient
12	2	33.53	33.55	Bedding		Planar	Smooth		20	Clean	0	
13	2	33.6		Bedding		Planar	Smooth		4	Clean	10	
14	2	33.77		Bedding		Undulating	Smooth		10	Clean	0	
15	2	34.65		Bedding		Undulating	Smooth		4	Clean	15	
16	2	34.78	34.9	Joint		Undulating	Rough		0-8	Clay gravel	60	
17	2	34.93		Bedding		Undulating	Smooth		3-6	Clean	0	
18	2	35.2	35.26	Koint		Stepped	Rough		40	Gravel	0	
19	2	35.37		Bedding		Stepped	Smooth		5	Clean	0	
20	2	35.47	34.56	Joint		Stepped	Rough		2-8	Clay gravel	70	
21	3	36.47		Bedding		Planar	Smooth		2	Clean	0	
22	3	36.47		Bedding		Undulating	Smooth		8	Clean	0-5	
23	3	36.68	36.74	Joint		Planar	Smooth		10	Clean	15	
24	3	36.74		Bedding		Undulating	Smooth		2	Clean	0	
25	3	36.83		Bedding		Undulating	Smooth		2-5	Clean	0	
26	3	37	39.9	Joint		Undulating	Rough		Open	Clean	80	
27	3	37.02		Bedding		Undulating	Rough		2-8	Gravel	10	
28	3	37.1		Bedding		Undulating	Smooth		1-8	Clean	5	
29	3	37.23		Bedding		Planar	Smooth		1-10	Clean	5	
30	3	33.3	37.42	Joint		Undulating	Rough		2 to 20	Gravel	70	
31	4	38.72		Bedding		Planar	Smooth		1-4	Clay gravel	0	
32	5	39.12		Bedding		Undulating	Smooth		0-8	Clean	0	
33	5	39.23		Bedding		Undulating	Smooth		2-4	Clean	0	
34	5	39.3		Bedding		Undulating	Smooth		3	Clean	0	
35	5	39.4		Bedding		Undulating	Smooth		3	Clean	0	

SITE LOCATION: Bran Sands						BOREHOLE NUMBER: BHP5B			GEOLOGIST: IJN			DATE: 2708/08/2014
REF. NO.	SET	TOP DEPTH (m)	BASE DEPTH (m)	TYPE bedding/ joint/ fault etc.	PERSISTENCE very low to very high etc.	ROUGHNESS		SURFACE APPEARANCE polished/ striated	APERTURE OBSERVATION closed/ infilled (mm)	INFILLING clean/ clay/ calcite/ quartz/ gouge/ breccia/ surface staining	DIP	REMARKS
						MEDIUM SCALE planar/ stepped/ undulating	SMALL SCALE rough/ smooth					
36	5	39.5		Bedding		Undulating	Smooth		2-10	Clean	0	
37	5	39.59		Bedding		Undulating	Smooth		3	Clean	0	
38	5	39.65		Bedding		Undulating	Smooth		4	Clay gravel	0	
39	5	39.73		Bedding		Undulating	Smooth		2	Clean	0	
40	5	39.82		Bedding		Undulating	Smooth		5	Clean	5	
41	5	39.85		Bedding		Undulating	Smooth		5	Clean	5	
42	6	40.34		Bedding		Undulating	Smooth		2	Clean	0	
43	6	40.39		Bedding		Undulating	Smooth		2	Clean	5	
44	6	40.42		Bedding		Undulating	Smooth		2	Clean	5	
45	6	40.53		Bedding		Undulating	Smooth		4	Clean	5	
46	6	40.62		Bedding		Undulating	Smooth		2	Clean	0	
47	6	40.73		Bedding		Undulating	Smooth		2	Clean	0	
48	6	40.85		Bedding		Undulating	Smooth		2	Clean	0	
49	6	40.96		Bedding		Undulating	Smooth		2	Clean	0	
50	6	41.05		Bedding		Undulating	Smooth		2	Clean	0	
51	6	41.25		Bedding		Undulating	Smooth		2	Clean	0	
52	6	41.52		Bedding		Undulating	Smooth		2	Clean	0	
53	6	41.6		Bedding		Undulating	Smooth		2	Clean	0	
54	7	42.64		Bedding		Undulating	Smooth		3	Clean	0	
55	7	42.13		Bedding		Stepped	Smooth		10	Clean	0	
56	7	42.24		Bedding		Stepped	Smooth		10	Clean	0	
57	7	42.3		Bedding		Undulating	Smooth		2	Clean	0	
58	7	42.37	42.42	Joint		Undulating	Smooth		2	Clean	40	
59	7	42.58		Bedding		Undulating	Smooth		Closed	Clay	5	
60	7	43.07		Joint		Stepped	Smooth		4	Clean	30	
61	7	43.16		Bedding		Undulating	Smooth		2	Clean	0	
62	7	43.17		Bedding		Undulating	Smooth		2	Clean	0	
63	7	43.33		Bedding		Undulating	Smooth		4	Clean	0	
64	7	43.39		Bedding		Undulating	Smooth		5	Clay	0	
65	7	43.57		Bedding		Undulating	Smooth		2	Clay	0	
66	7	43.67		Bedding		Stepped	Smooth		4	Clean	0	
67	7	43.75		Bedding		Stepped	Rough		5	Clay gravel	0	
68	7	43.92		Bedding		Undulating	Planar		2	Clean	0	
69	7	44.24		Bedding		Stepped	Planar		2	Clean	0	
70	7	44.3		Bedding		Stepped	Planar		2	Clean	0	

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Appendix C

Core Photographs

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BHP2 - 16.45m - 17.85m

BHP2 - 17.85m - 19.35m

BHP2 - 19.35m-20.65m

BHP2 - 20.65m - 22.00m

BHP2 - 22.20m - 23.40m

BHP2 - 23.40m - 24.20m

BHP2 - 24.20m - 25.20m

BHP2 - 25.20m - 26.60m

BHP2 - 26.60m - 28.15m

BHP2 - 28.15m - 29.15m
BHP2 - 29.15m - 29.75m

BHP2 - 29.75m - 31.20m

BHP2 - 31.20m - 32.70m

BHP2 - 32.70m - 34.20m

BHP2 - 34.20m - 35.70m

BHP2 - 35.70m - 37.20m

BHP2 - 37.20m - 38.70m

BHP3 - 22.10m - 23.10m

BHP3 - 23.10m - 24.30m

BHP3 - 24.30m - 25.40m

BHP3 - 25.40m - 26.50m

BHP4A - 23.00m - 24.30m

BHP4A - 24.30m - 25.50m

BHP4A - 25.50m - 27.05m

BHP4A - 27.05m - 28.55m

BHP4A - 28.55m - 30.10m

BHP4A - 30.10m - 31.10m

BHP5B - 25.80m - 27.10m

BHP5B - 27.60m - 29.30m

BHP5B - 29.30m - 30.30m

BHP5B - 30.30m - 31.50m

BHP5B - 31.50m - 33.00m

BHP5B - 33.00m - 36.00m

BHP5B - 36.00m - 38.00m

BHP5B - 38.00m - 39.00m

BHP5B - 39.00m - 40.00m

BHP5B - 40.00m - 41.80m

BHP5B - 41.80m - 43.00m

BHP5B - 43.00m - 44.50m

BHP6 - 27.40m - 33.90m

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Appendix D

Geotechnical Laboratory Results

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Appendix D.1

Classification Results

Summary of Classification Tests

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole	Depth Top m	Depth Base m	Type	w %	Oven temp. °c	w_a %	P_a %	P_r %	w_L %	w_P %	I_P %	I_L	Plasticity class	Preparation method
BHP2	4.00	4.35	B	11*	105									
BHP2	8.00	8.45	B	24*	105									
BHP2	11.00	11.45	B	24*	105									
BHP2	13.00	13.45	B	11*	105									
BHP2	15.00	15.10	B	17	105								NP	
BHP3	1.20	1.65	B	14*	105									
BHP3	7.80		D	32*	105									
BHP3	8.40		D	35	105	36	98	2	49-s	22	27	0.519	CI	Tested after >425µm removed by hand
BHP3	11.00	11.45	B	25*	105									
BHP3	15.00	15.45	B	10*	105									
BHP3	16.80	17.00	B	14*	105	17*	83	17	42-s	19*	23*	-0.087*	CI	Tested after >425µm removed by hand
BHP3	17.00	17.45	U	23*	105									
BHP3	18.80		D	29	105	29	99	1	48-s	20	28	0.321	CI	Tested after >425µm removed by hand
BHP3	20.00	20.45	B	31	105	33	93	7	54-s	20	34	0.382	CH	Tested after >425µm removed by hand
BHP4	1.20	1.55	B	7.4*	105									
BHP4	2.00	2.45	B	18*	105	23*	77	23	46-s	22	24	0.042	CI	Tested after >425µm removed by hand
BHP4	7.80		D	13*	105									
BHP4	8.50		D	18	105									
BHP4A	12.00	12.45	B	10	105									
BHP4A	17.00	17.45	B	6.3	105									

All tests found in Solmek UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
w_a	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
w_L	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
w_P	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
P_a	Percentage passing 425um sieve			
P_r	Percentage retained 425um sieve			
I_P	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
I_L	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	HM
Approval date	18/09/2014 10:25
Date report generated	
Report Number	

Summary of Classification Tests

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole	Depth		Type	w	Oven temp.	w_a	P_a	P_r	w_L	w_P	I_P	I_L	Plasticity class	Preparation method
	Top m	Base m		%	°c	%	%	%	%	%	%			
BHP4A	19.00	19.10	B	31	105	31	100	0	59-s	25	34	0.176	CH	Tested after >425µm removed by hand
BHP4A	20.70	21.00	B	33	105	34	98	2	45-s	18	27	0.593	CI	Tested after >425µm removed by hand
BHP4A	22.45	23.00	B	16	105	19	84	16	29-s	16	13	0.231	CL	Tested after >425µm removed by hand
BHP5B	1.50	1.95	B	34	105	44	77	23	46-s	-57.4*	103*	0.984*	CI	Tested after >425µm removed by hand
BHP5B	4.50	4.95	B	21	105	33	63	37	43-s	19	24	0.583	CI	Tested after >425µm removed by hand
BHP5B	8.50	8.95	B	27	105									
BHP5B	11.00		D	20	105									
BHP5B	15.00		D	24	105									
BHP5B	19.00	19.45	B	36	105	37	98	2	57-s	24*	33*	0.394*	CH	Tested after >425µm removed by hand
BHP5B	21.00	21.45	B	35	105	35	99	1	55-s	23*	32*	0.375*	CH	Tested after >425µm removed by hand
BHP5B	23.00	23.45	B	25	105	45	55	45	28-s	16*	12*	2.417*	CL	Tested after washing to remove >425µm
BHP5B	24.00	24.30	B	24	105	44	55	45	27-s	17	10	2.700	CL	Tested after washing to remove >425µm
BHP6	2.00		D	21*	105									
BHP6	5.00	5.45	B	12*	105									
BHP6	7.50		B	46	105	94	49	51	36-s	24	12	5.833	CI	Tested after washing to remove >425µm
BHP6	8.00	8.55	D	28*	105									
BHP6	11.00	11.45	B	27*	105									
BHP6	16.00	16.45	B	26*	105									
BHP6	19.00	19.45	B	23*	105									
BHP6	20.00	20.45	U	33*	105									

All tests found in Solmek UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
w_a	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
w_L	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
w_P	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
P_a	Percentage passing 425um sieve			
P_r	Percentage retained 425um sieve			
I_P	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
I_L	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	HM
Approval date	18/09/2014 10:25
Date report generated	
Report Number	

Summary of Classification Tests

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
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lab@solmek.com

UKAS TESTING
7607

Hole	Depth Top m	Depth Base m	Type	w %	Oven temp. °c	w_a %	P_a %	P_r %	w_L %	w_P %	I_P %	I_L	Plasticity class	Preparation method
BHP6	20.45	20.65	D	20*	105	22*	89	11	46-s	18	28	0.143	CI	Tested after >425µm removed by hand
BHP6	21.00	21.45	B	43*	105	43*	99	1	44-s	21	23	0.957	CI	Tested after >425µm removed by hand
BHP6	22.00	22.45	U	28*	105									
BHP6	22.45	22.65	D	23*	105	23*	98	2	42-s	20*	22*	0.136*	CI	Tested after >425µm removed by hand
BHP6	24.00	24.45	B	20	105	21	97	3	31-s	17	14	0.286	CL	Tested after >425µm removed by hand
BHP6	26.00		D	22	105	22	99	1	33-s	18	15	0.267	CL	Tested after >425µm removed by hand

All tests found in Solmek UKAS Schedule of Accreditation are tested to standard unless otherwise indicated

Key	Description		Category	BS Test Code
w	Moisture content			BS 1377:1990 Part 2 Clause 3.2
w_a	Equivalent moisture content passing 425µm sieve			BS 1377:1990 Part 2 Clause 3.2
w_L	Liquid limit	Single point	-s	BS 1377:1990 Part 2 Clause 4.4
		Four point	-f	BS 1377:1990 Part 2 Clause 4.3
w_P	Plastic limit			BS 1377:1990 Part 2 Clause 5.2
P_a	Percentage passing 425um sieve			
P_r	Percentage retained 425um sieve			
I_P	Plasticity index			BS 1377:1990 Part 2 Clause 5.4
I_L	Liquidity index			BS 1377:1990 Part 2 Clause 5.4
	Suffix indicating test is "Not UKAS Accredited"		*	

Approved by	HM
Approval date	18/09/2014 10:25
Date report generated	
Report Number	

Appendix D.2

Particle Size Distribution Tests

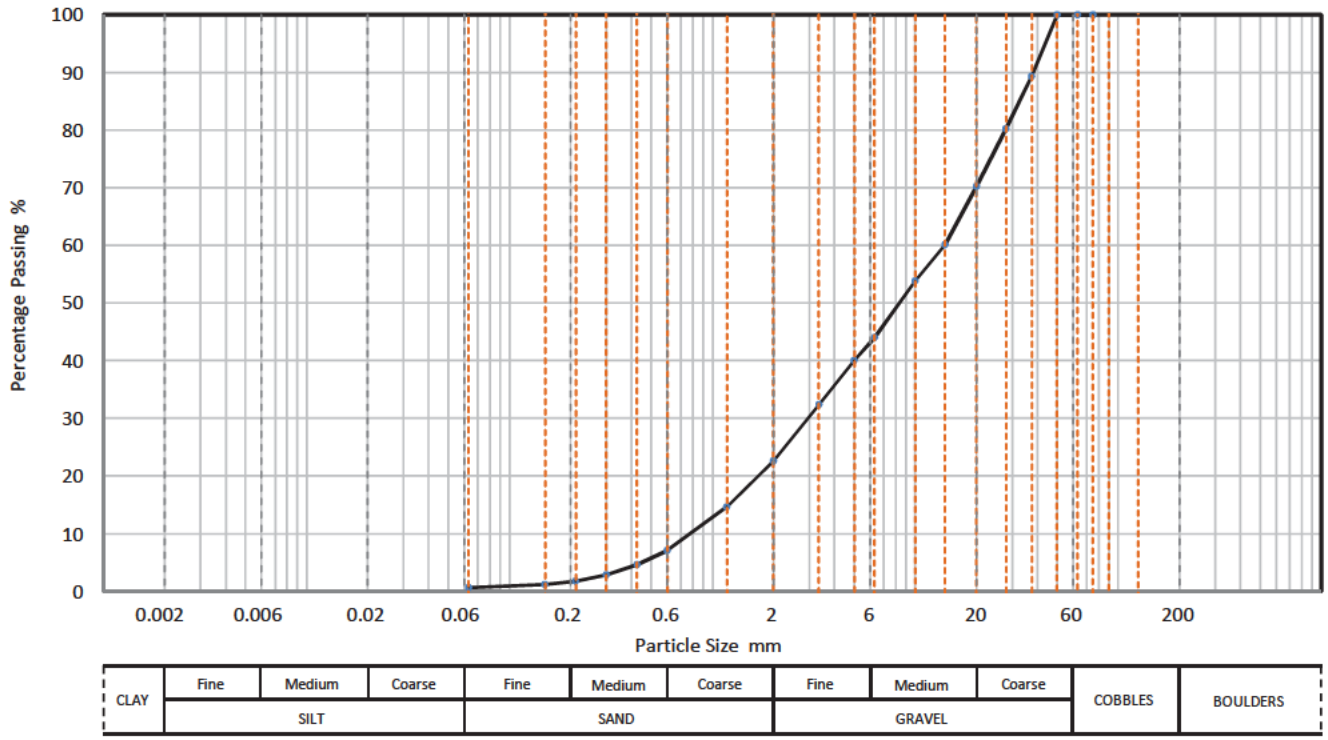
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP2	Lab sample ID	SLMK201409022
Depth (Top)	m	4.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	4.35	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	89		
28	80		
20	70		
14	60		
10	54		
6.3	44		
5	40		
3.35	32		
2	23		
1.18	15		
0.6	7		
0.425	5		
0.3	3		
0.212	2		
0.15	1		
0.063	1		

Dry Mass of sample, g	4109

Sample Proportions	% dry mass
Very coarse	0
Gravel	77
Sand	22
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	13.9
D_{30}	mm	2.95
D_{10}	mm	0.778
Uniformity Coefficient		18
Curvature Coefficient		0.8

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 10:55

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
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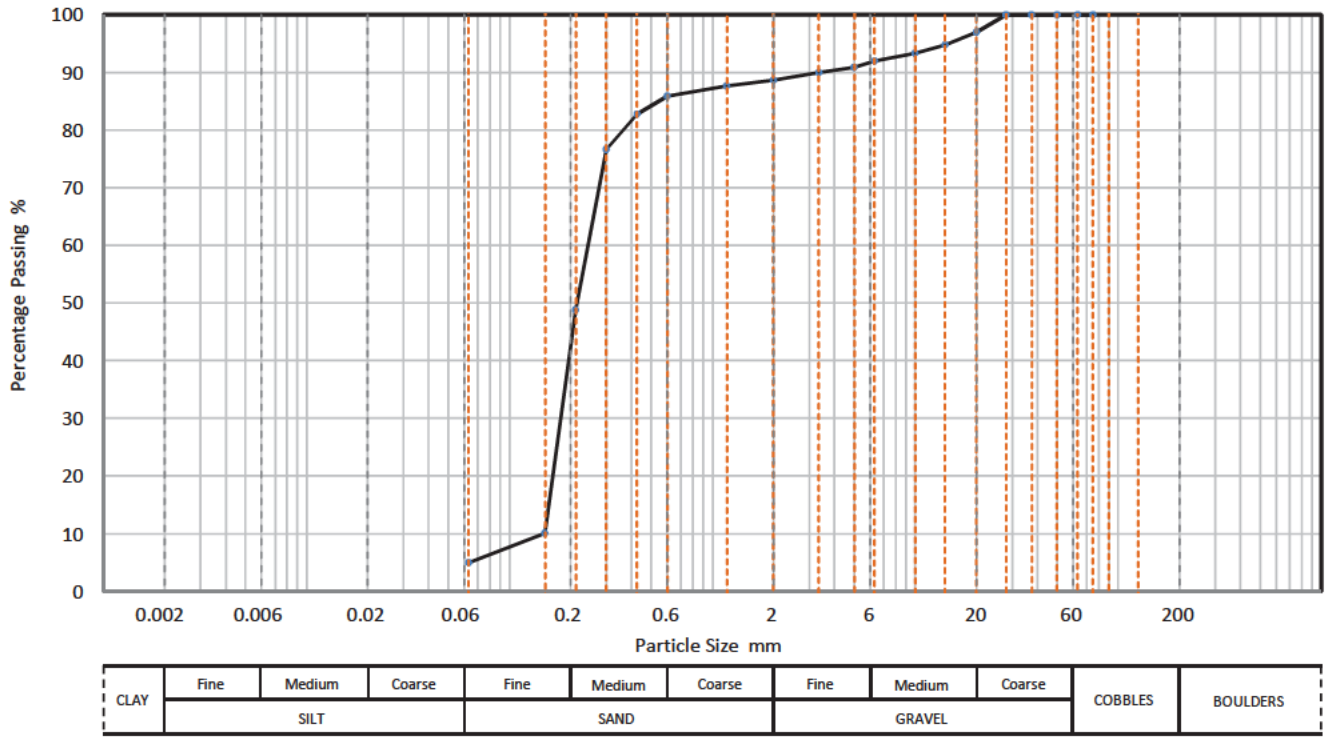
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP2	Lab sample ID	SLMK201409023
Depth (Top)	m	8.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	8.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	97		
14	95		
10	93		
6.3	92		
5	91		
3.35	90		
2	89		
1.18	88		
0.6	86		
0.425	83		
0.3	77		
0.212	49		
0.15	10		
0.063	5		

Dry Mass of sample, g	885

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	84
Fines <0.063mm	5

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.244
D_{30}	mm	0.179
D_{10}	mm	0.148
Uniformity Coefficient		1.6
Curvature Coefficient		0.89

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 10:55

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
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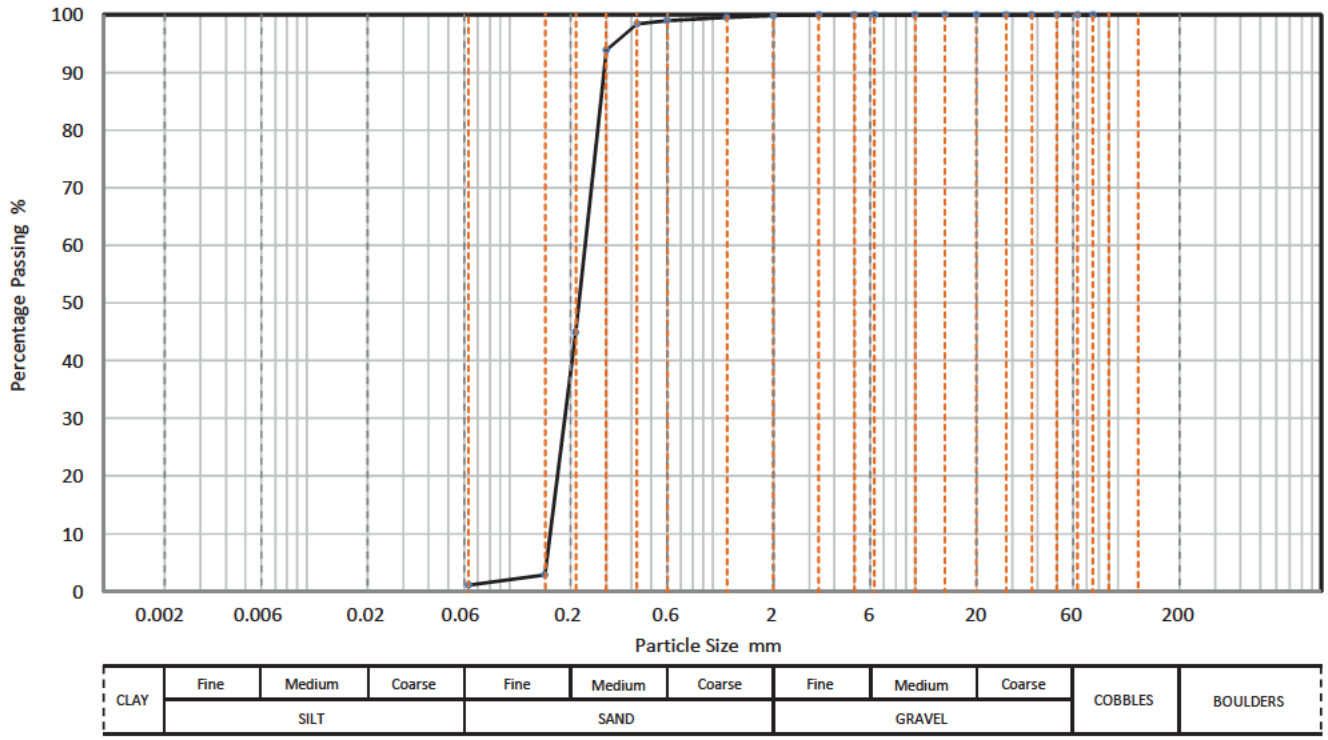
UKAS TESTING
7607

Hole		BHP2	Lab sample ID	SLMK201409024
Depth (Top)	m	11.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	11.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	100		
0.6	99		
0.425	98		
0.3	94		
0.212	45		
0.15	3		
0.063	1		

Dry Mass of sample, g	589

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	99
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.236
D_{30}	mm	0.188
D_{10}	mm	0.159
Uniformity Coefficient		1.5
Curvature Coefficient		0.94

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 10:55

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

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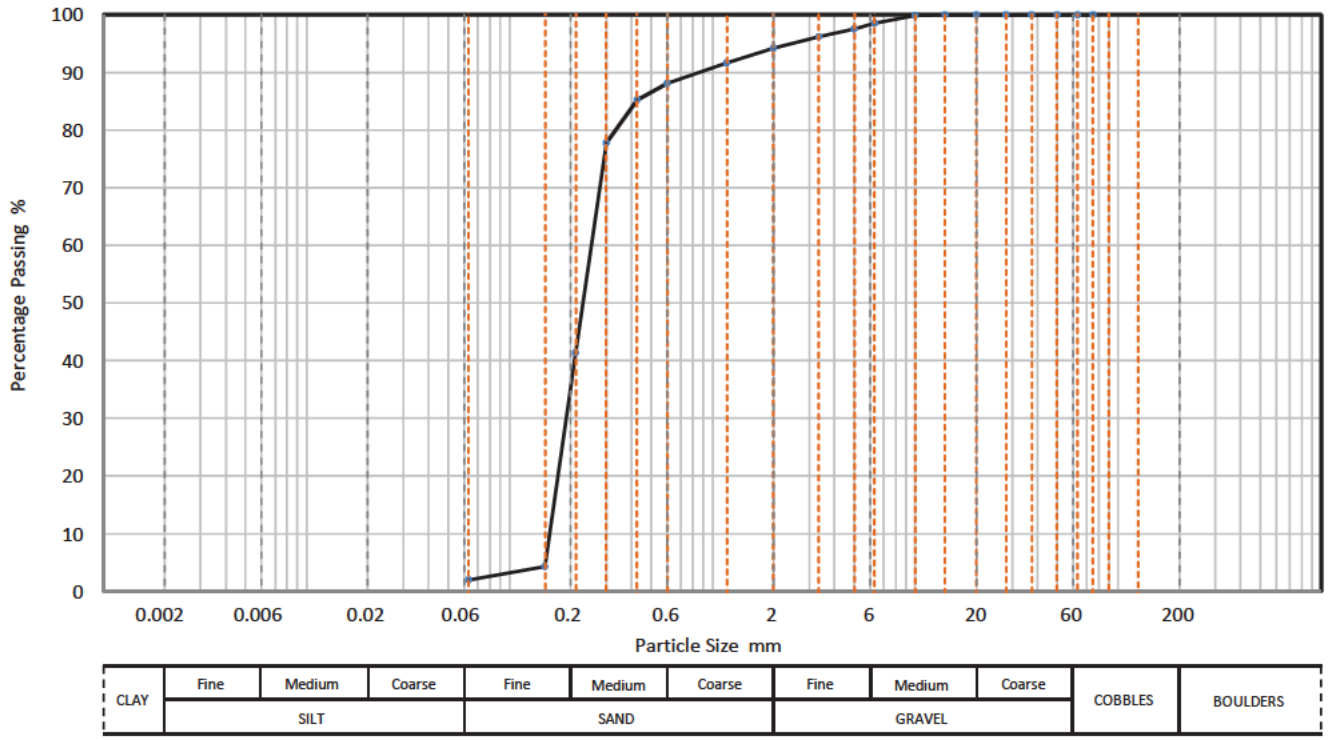
UKAS TESTING
7607

Hole		BHP2	Lab sample ID	SLMK201409025
Depth (Top)	m	13.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	13.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	98		
3.35	96		
2	94		
1.18	92		
0.6	88		
0.425	85		
0.3	78		
0.212	41		
0.15	4		
0.063	2		

Dry Mass of sample, g	769

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	92
Fines <0.063mm	2

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.253
D_{30}	mm	0.191
D_{10}	mm	0.158
Uniformity Coefficient		1.6
Curvature Coefficient		0.91

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 10:55

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

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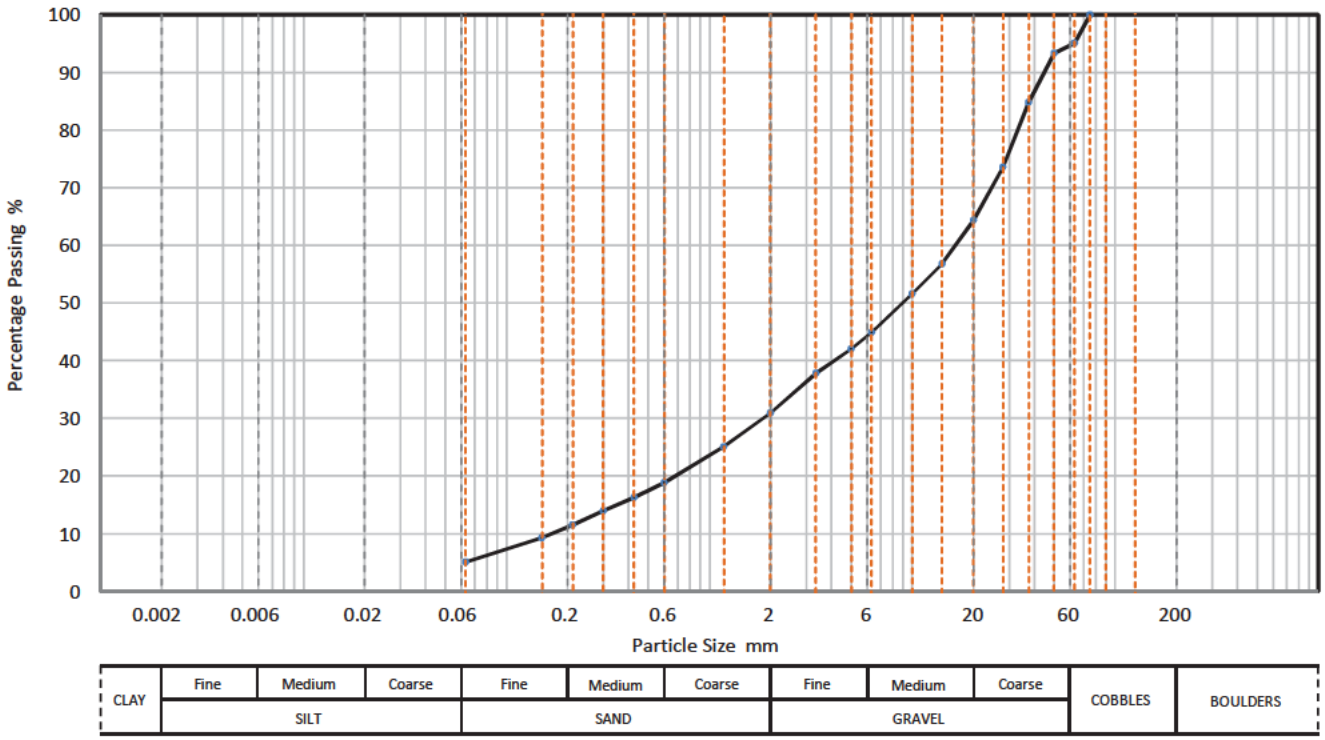
UKAS TESTING
7607

Hole		BHP3	Lab sample ID	SLMK201409027
Depth (Top)	m	1.20	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	1.65	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	95		
50	93		
37.5	85		
28	74		
20	64		
14	57		
10	52		
6.3	45		
5	42		
3.35	38		
2	31		
1.18	25		
0.6	19		
0.425	16		
0.3	14		
0.212	12		
0.15	9		
0.063	5		

Dry Mass of sample, g	7861

Sample Proportions	% dry mass
Very coarse	5
Gravel	64
Sand	26
Fines <0.063mm	5

Grading Analysis		
D_{100}	mm	75
D_{60}	mm	16.3
D_{30}	mm	1.85
D_{10}	mm	0.168
Uniformity Coefficient		97
Curvature Coefficient		1.2

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 12:06

PARTICLE SIZE DISTRIBUTION

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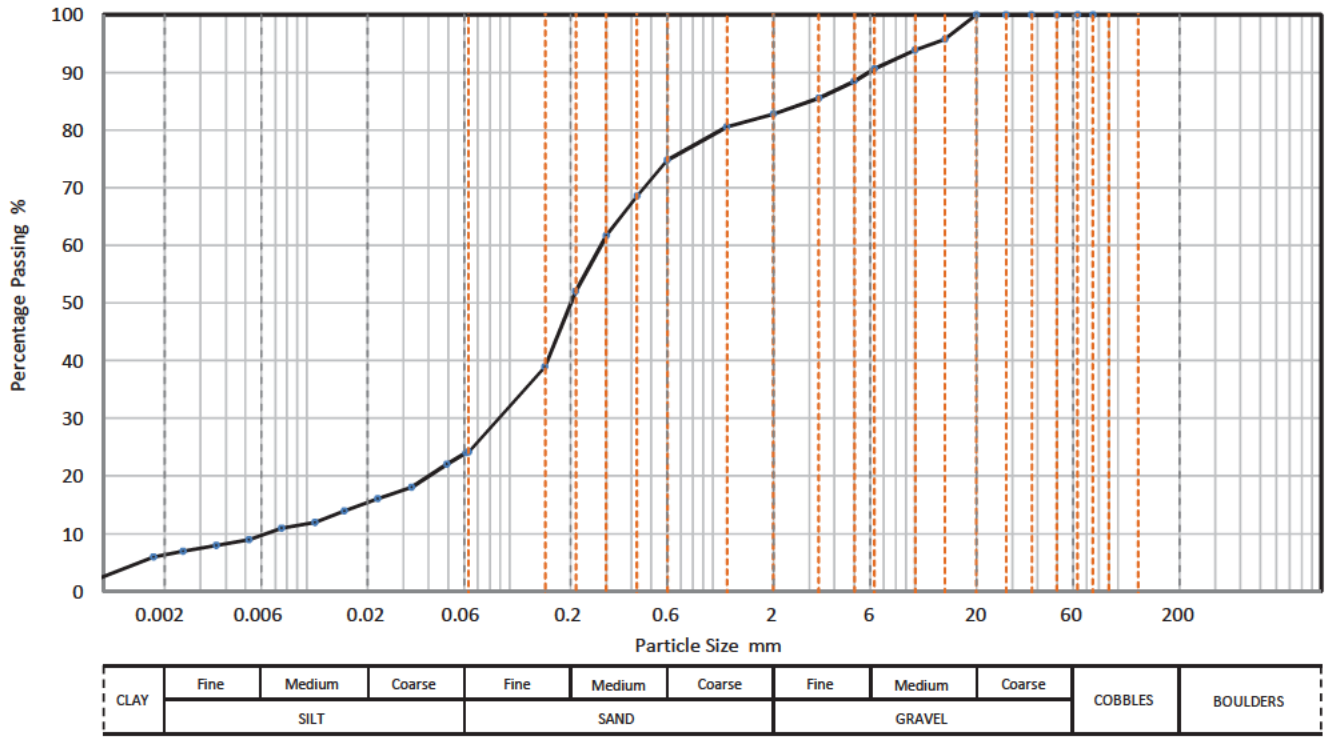
UKAS TESTING 7607

Site name	Job number
Bran Sands Quayside Investigation	D6340

Hole		BHP3	Lab sample ID		SLMK2014090212
Depth (Top)	m	7.80	Test Method		BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m		Soil Description		Soft dark brown slightly sandy slightly gravelly CLAY.
Sample type		D			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0612	24
		0.0492	22
75	100	0.0330	18
63	100	0.0225	16
50	100	0.0154	14
37.5	100	0.0110	12
28	100	0.0076	11
20	100	0.0052	9
14	96	0.0036	8
10	94	0.0025	7
6.3	91	0.0018	6
5	88	0.0009	2
3.35	86		
2	83		
1.18	81		
0.6	75	Particle density	(assumed)
0.425	69	2.65	Mg/m3
0.3	62		
0.212	52		
0.15	39		
0.063	24		

Dry Mass of sample, g: 282

Sample Proportions	% dry mass
Very coarse	0
Gravel	17
Sand	59
Silt	18
Clay	6

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.283
D_{30}	mm	0.0889
D_{10}	mm	0.00621
Uniformity Coefficient		45
Curvature Coefficient		4.5

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 11:07

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
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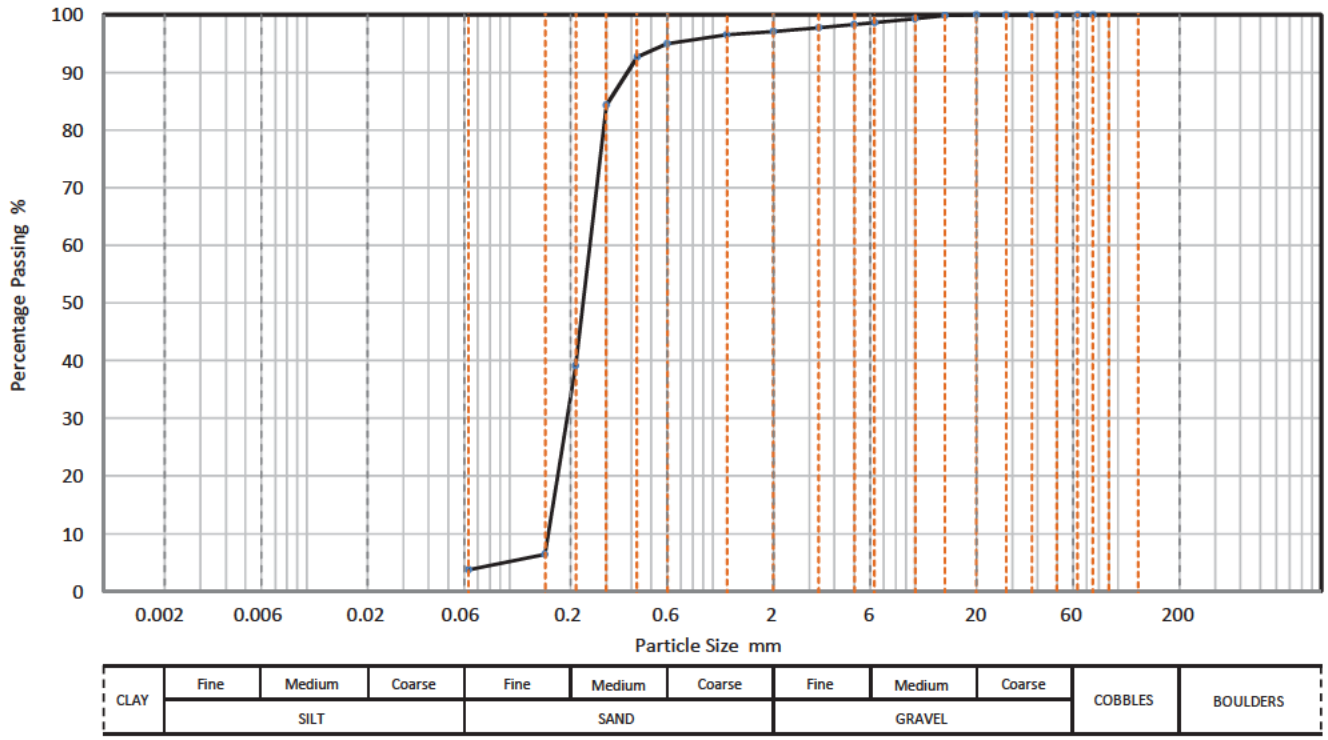
UKAS TESTING
7607

Hole		BHP3	Lab sample ID	SLMK201409029
Depth (Top)	m	11.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	11.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	98		
3.35	98		
2	97		
1.18	97		
0.6	95		
0.425	93		
0.3	84		
0.212	39		
0.15	6		
0.063	4		

Dry Mass of sample, g	673

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	93
Fines <0.063mm	4

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.249
D_{30}	mm	0.193
D_{10}	mm	0.156
Uniformity Coefficient		1.6
Curvature Coefficient		0.96

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 12:10

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

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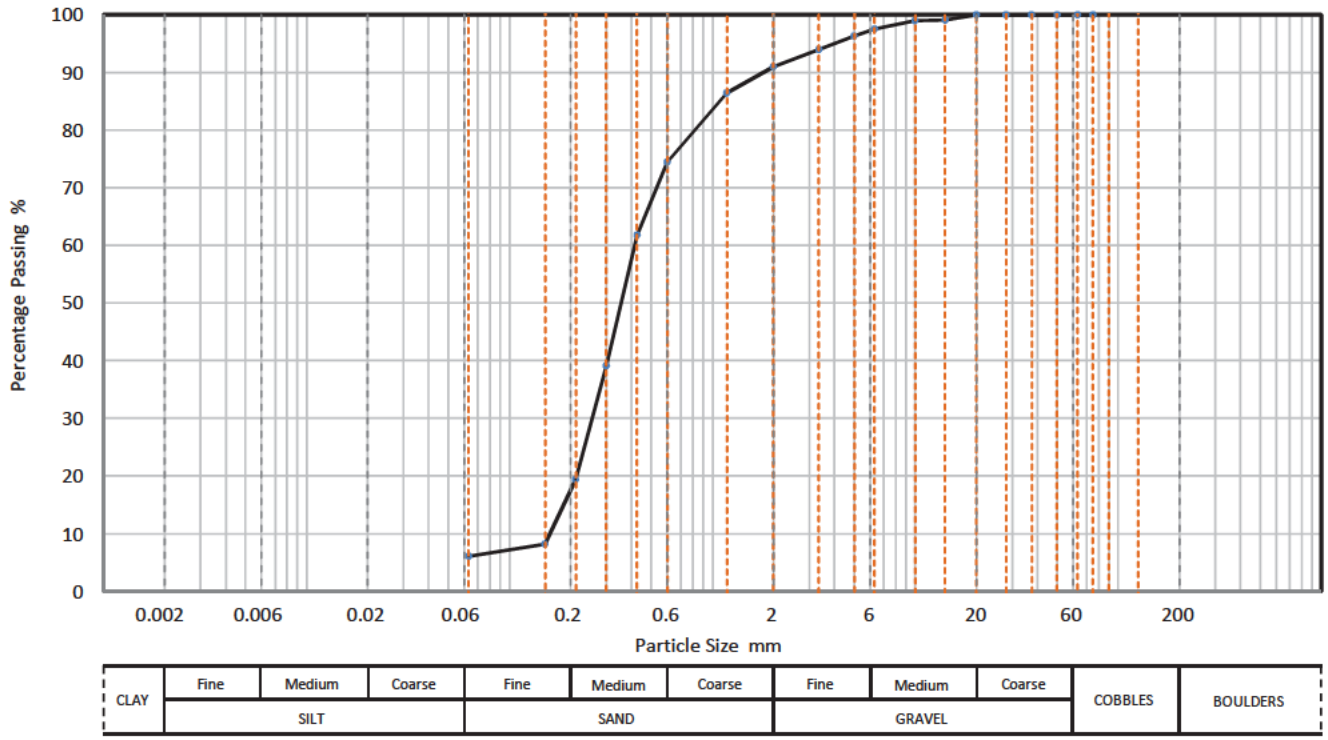
UKAS TESTING
7607

Hole		BHP3	Lab sample ID	SLMK2014090210
Depth (Top)	m	15.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	15.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	99		
10	99		
6.3	98		
5	96		
3.35	94		
2	91		
1.18	86		
0.6	74		
0.425	62		
0.3	39		
0.212	19		
0.15	8		
0.063	6		

Dry Mass of sample, g	994

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	85
Fines <0.063mm	6

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.413
D_{30}	mm	0.256
D_{10}	mm	0.159
Uniformity Coefficient		2.6
Curvature Coefficient		1

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 12:07

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
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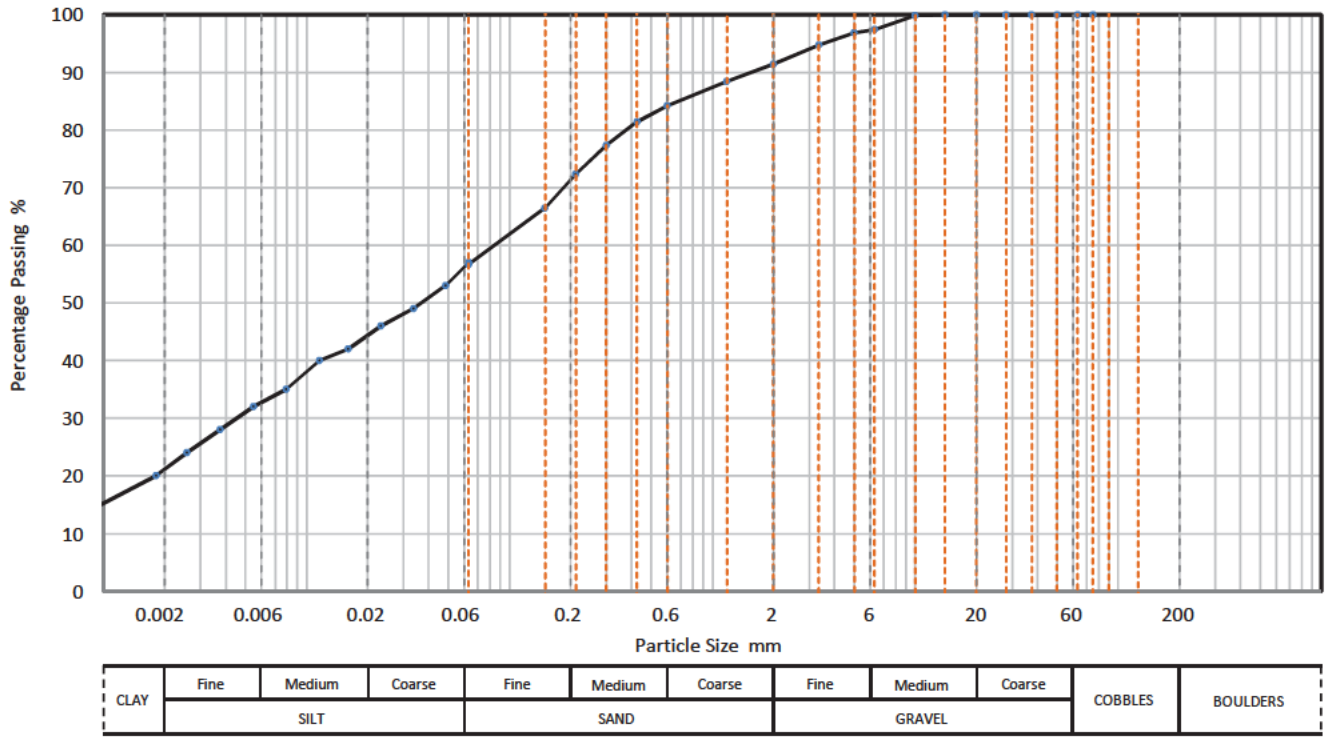
UKAS TESTING
7607

Hole	BHP3	Lab sample ID	SLMK2014090211
Depth (Top) m	16.80	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base) m	17	Soil Description	Soft brown slightly sandy slightly gravelly CLAY.
Sample type	B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	57
		0.0486	53
75	100	0.0337	49
63	100	0.0233	46
50	100	0.0161	42
37.5	100	0.0116	40
28	100	0.0079	35
20	100	0.0055	32
14	100	0.0037	28
10	100	0.0026	24
6.3	97	0.0018	20
5	97	0.0010	15
3.35	95		
2	91		
1.18	88		
0.6	84	Particle density	(assumed)
0.425	81	2.65	Mg/m3
0.3	77		
0.212	72		
0.15	66		
0.063	57		

Dry Mass of sample, g	748

Sample Proportions	% dry mass
Very coarse	0
Gravel	9
Sand	35
Silt	35
Clay	21

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0846
D_{30}	mm	0.00457
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 11:07

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
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Stockton on Tees,
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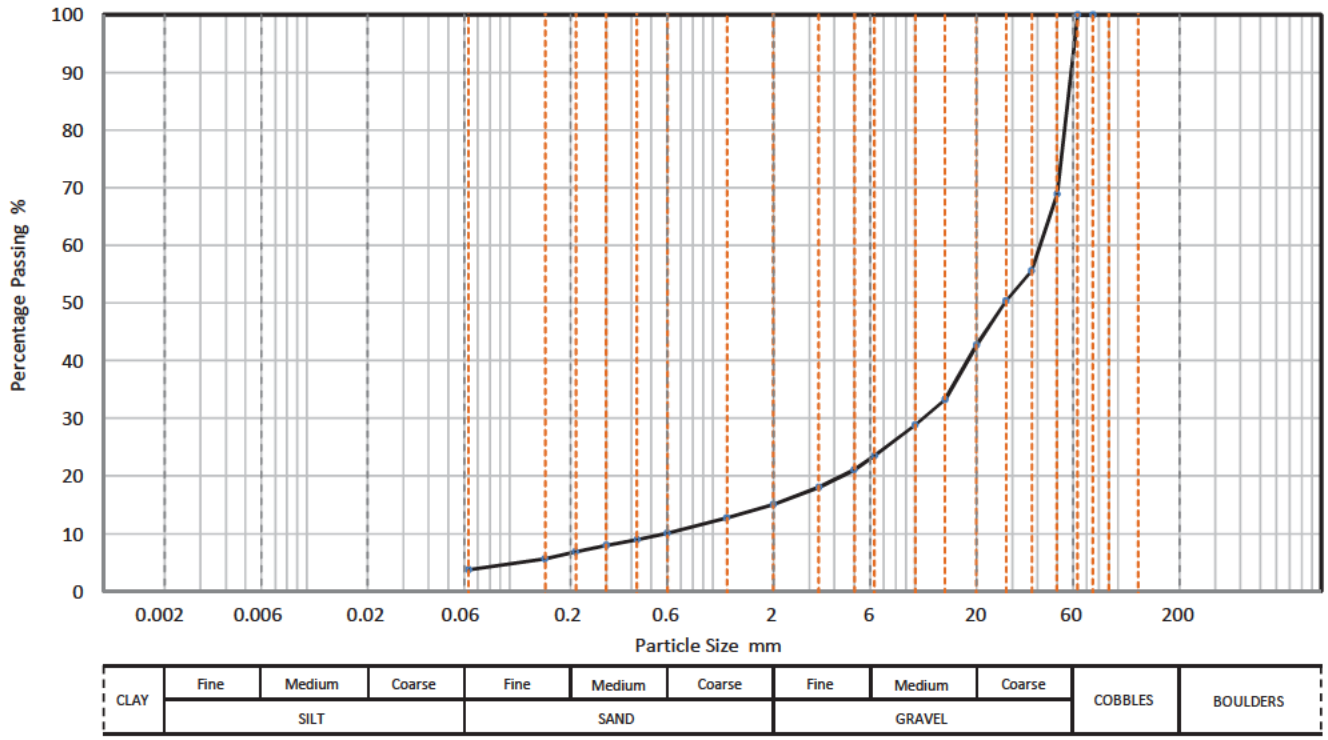
UKAS TESTING
7607

Hole		BHP4	Lab sample ID	SLMK2014090219
Depth (Top)	m	1.20	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	1.55	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	69		
37.5	56		
28	50		
20	43		
14	33		
10	29		
6.3	24		
5	21		
3.35	18		
2	15		
1.18	13		
0.6	10		
0.425	9		
0.3	8		
0.212	7		
0.15	6		
0.063	4		

Dry Mass of sample, g	2267

Sample Proportions	% dry mass
Very coarse	0
Gravel	85
Sand	11
Fines <0.063mm	4

Grading Analysis		
D_{100}	mm	
D_{60}	mm	41.2
D_{30}	mm	11
D_{10}	mm	0.584
Uniformity Coefficient		71
Curvature Coefficient		5

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 14:29

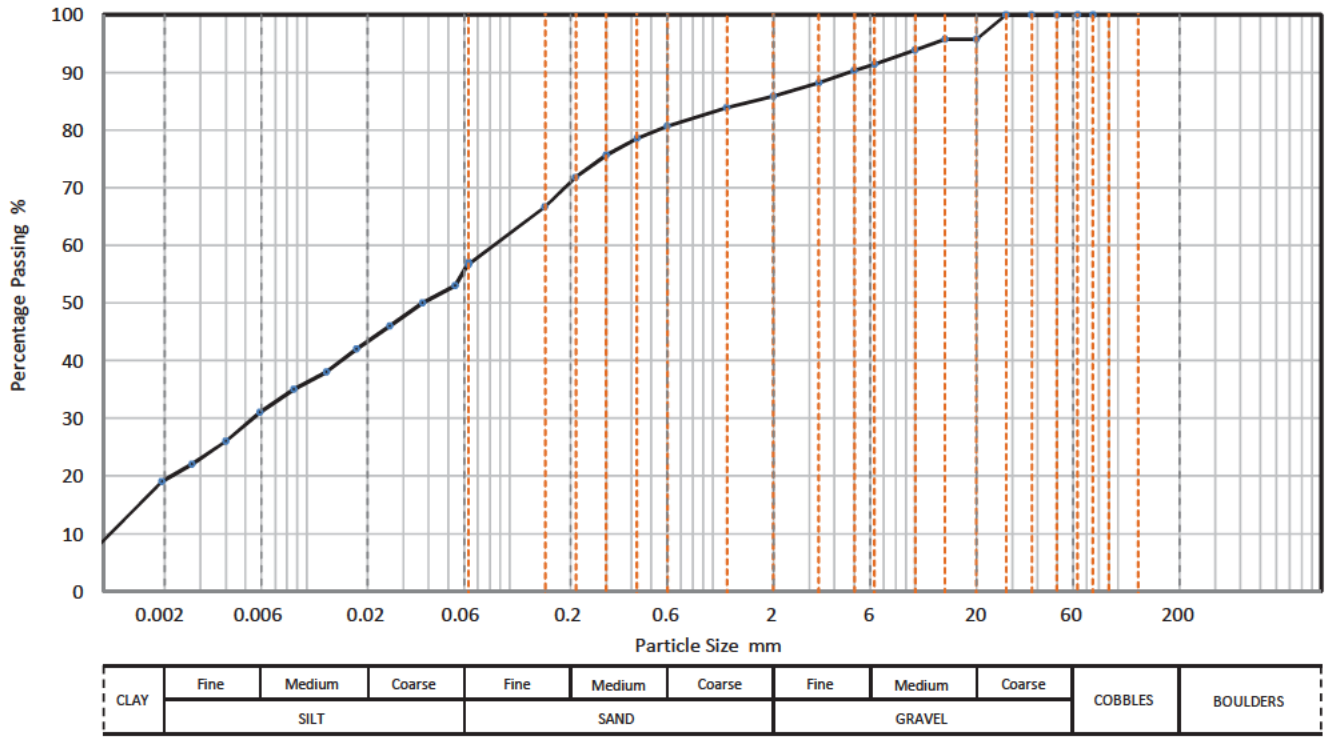
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP4	Lab sample ID	SLMK2014090220
Depth (Top)	m	2.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m	2.45	Soil Description	Soft brown slightly sandy slightly gravelly CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	57
		0.0540	53
75	100	0.0374	50
63	100	0.0258	46
50	100	0.0177	42
37.5	100	0.0126	38
28	100	0.0086	35
20	96	0.0059	31
14	96	0.0040	26
10	94	0.0027	22
6.3	91	0.0019	19
5	90	0.0009	8
3.35	88		
2	86		
1.18	84		
0.6	81	Particle density	(assumed)
0.425	79	2.73	Mg/m3
0.3	76		
0.212	72		
0.15	67		
0.063	57		

Dry Mass of sample, g	673

Sample Proportions	% dry mass
Very coarse	0
Gravel	14
Sand	29
Silt	37
Clay	20

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0837
D_{30}	mm	0.00564
D_{10}	mm	0.00107
Uniformity Coefficient		78
Curvature Coefficient		0.36

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 14:41

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
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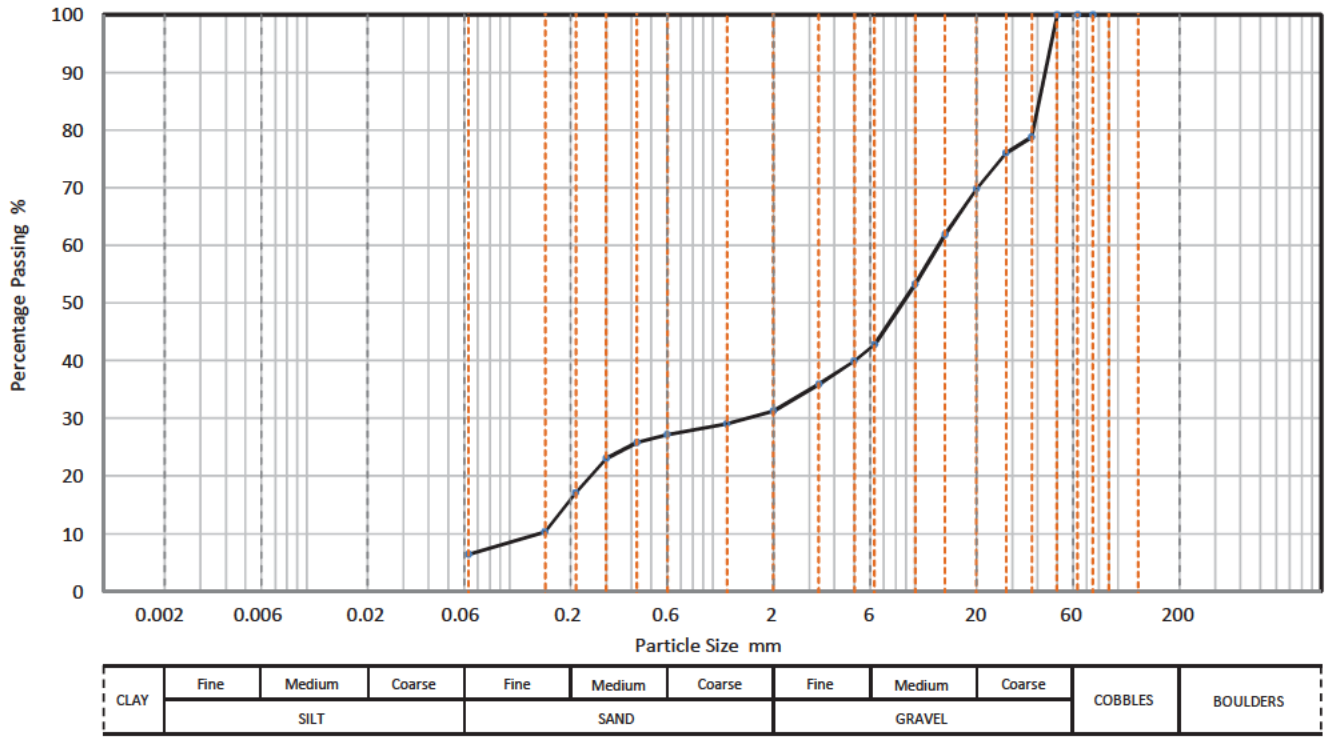
UKAS TESTING
7607

Hole		BHP4	Lab sample ID	SLMK2014090222
Depth (Top)	m	7.80	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m		Soil Description	. Brown clayey SAND AND GRAVEL. Gravel sized shell fragments noted.
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	79		
28	76		
20	70		
14	62		
10	53		
6.3	43		
5	40		
3.35	36		
2	31		
1.18	29		
0.6	27		
0.425	26		
0.3	23		
0.212	17		
0.15	10		
0.063	6		

Dry Mass of sample, g	1167

Sample Proportions	% dry mass
Very coarse	0
Gravel	69
Sand	25
Fines <0.063mm	6

Grading Analysis		
D_{100}	mm	
D_{60}	mm	13
D_{30}	mm	1.49
D_{10}	mm	0.141
Uniformity Coefficient		92
Curvature Coefficient		1.2

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 14:41

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP4A

Solmek
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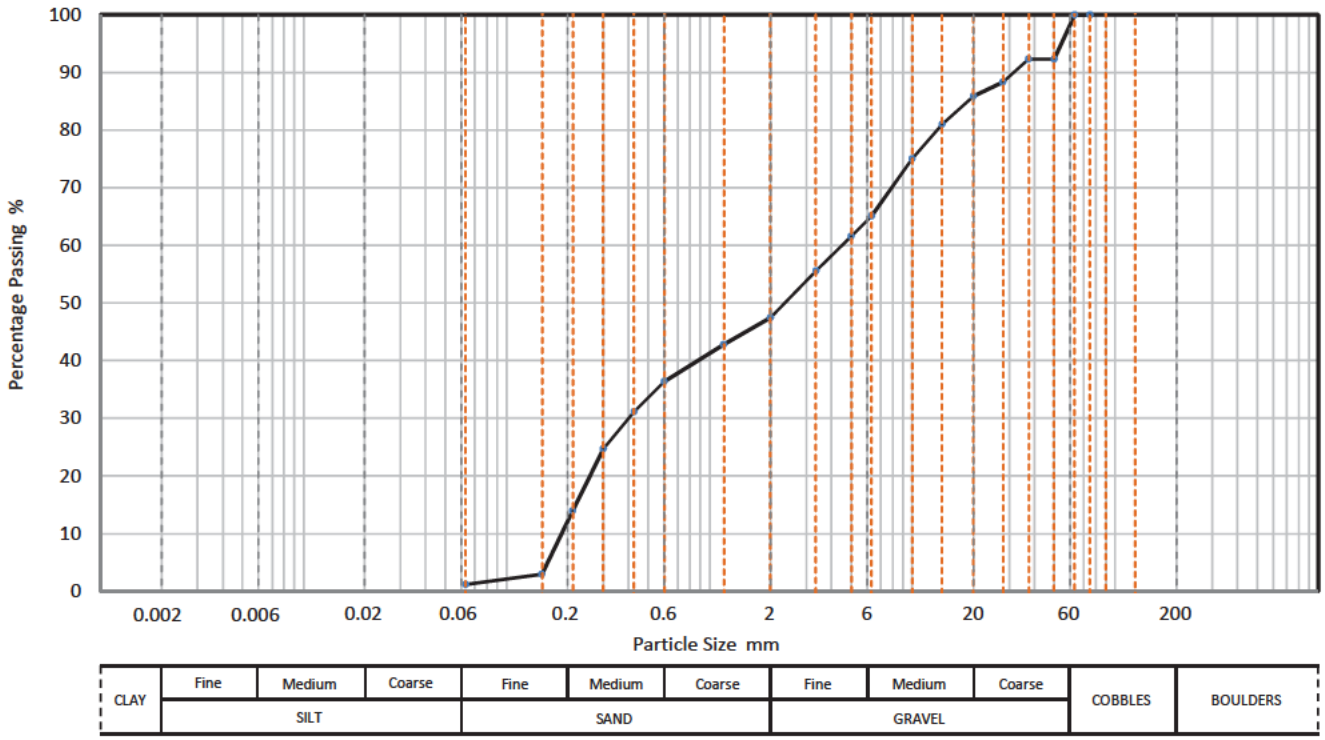
UKAS TESTING
7607

Hole		BHP4A	Lab sample ID	SLMK201409180
Depth (Top)	m	12.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	12.45	Soil Description	Brown slightly gravelly SAND.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	92		
37.5	92		
28	88		
20	86		
14	81		
10	75		
6.3	65		
5	62		
3 35	56		
2	48		
1.18	43		
0.6	36		
0.425	31		
0.3	25		
0.212	14		
0.15	3		
0.063	1		

Dry Mass of sample, g	2797

Sample Proportions	% dry mass
Very coarse	0
Gravel	53
Sand	46
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	4.51
D_{30}	mm	0.398
D_{10}	mm	0.187
Uniformity Coefficient		24
Curvature Coefficient		0.19

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 10:17

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP4A

Solmek
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UKAS TESTING
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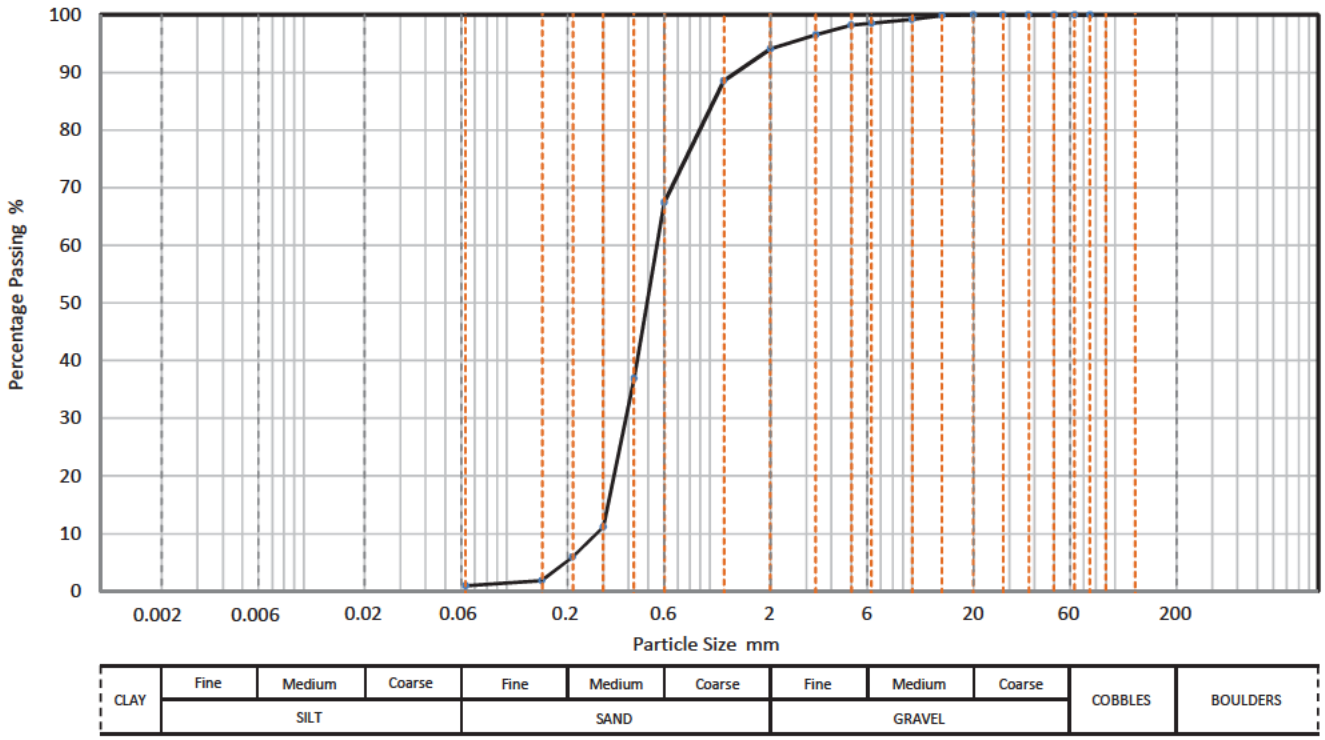
Hole		BHP4A	Lab sample ID	SLMK201409181
Depth (Top)	m	17.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	17.45	Soil Description	Grey SAND.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	99		
6.3	99		
5	98		
3 35	97		
2	94		
1.18	89		
0.6	67		
0.425	37		
0.3	11		
0.212	6		
0.15	2		
0.063	1		

Dry Mass of sample, g	823

Sample Proportions	% dry mass
Very coarse	0
Gravel	6
Sand	93
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.552
D_{30}	mm	0.387
D_{10}	mm	0.277
Uniformity Coefficient		2
Curvature Coefficient		0.98

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 10:17

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP4A

Solmek
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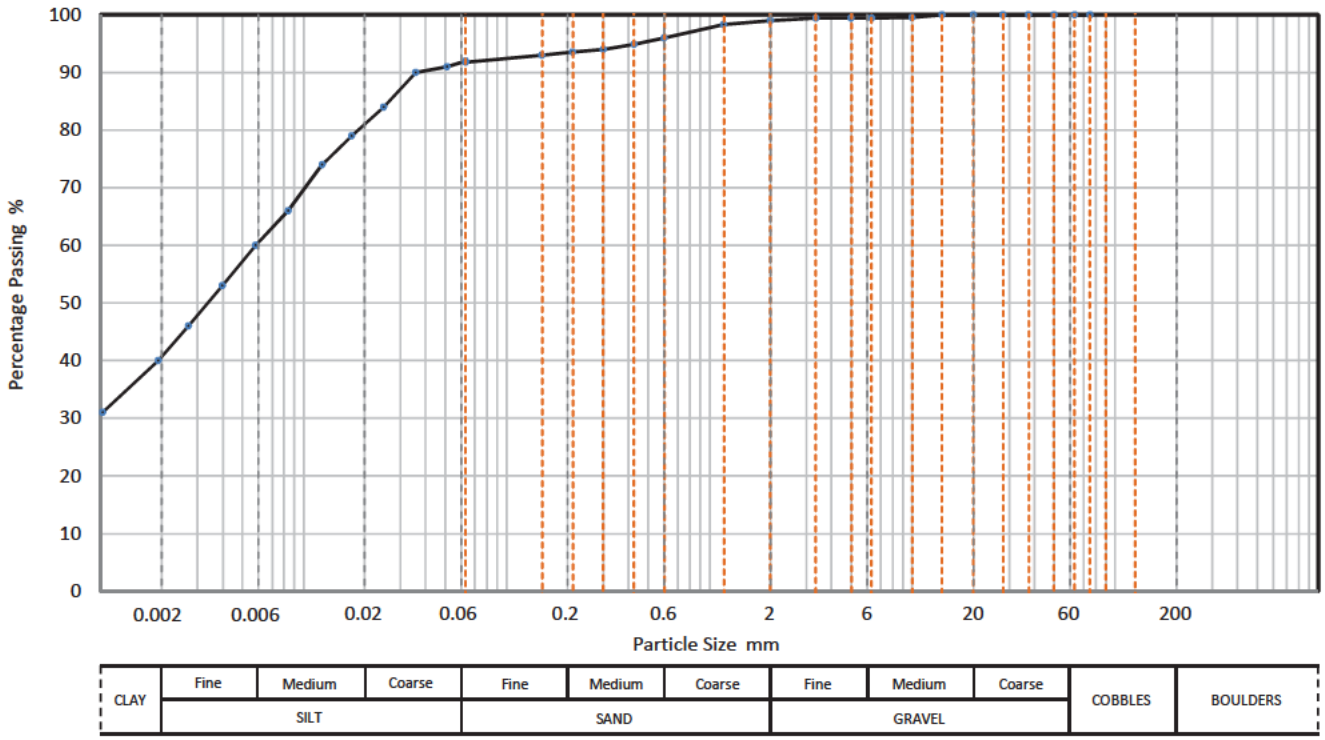
UKAS TESTING
7607

Hole		BHP4A	Lab sample ID	SLMK201409182
Depth (Top)	m	19.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	19.1	Soil Description	Soft brown slightly sandy slightly silty CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	92
		0.0509	91
75	100	0.0359	90
63	100	0.0248	84
50	100	0.0172	79
37.5	100	0.0123	74
28	100	0.0085	66
20	100	0.0058	60
14	100	0.0040	53
10	100	0.0027	46
6.3	99	0.0019	40
5	99	0.0010	31
3 35	99		
2	99		
1.18	98		
0.6	96	Particle density	(assumed)
0.425	95	2.65	Mg/m3
0.3	94		
0.212	94		
0.15	93		
0.063	92		

Dry Mass of sample, g	418

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	7
Silt	51
Clay	41

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.00594
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 10:17

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP4A

Solmek
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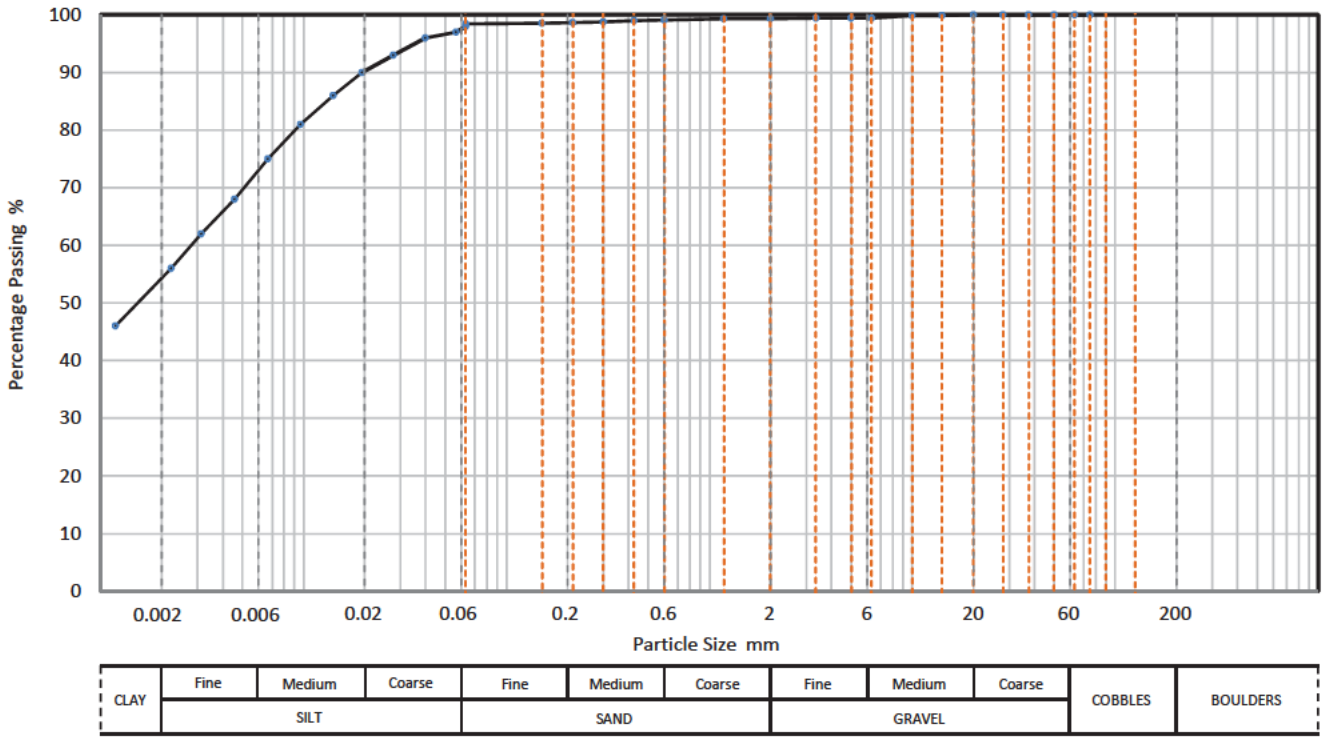
UKAS TESTING
7607

Hole		BHP4A	Lab sample ID	SLMK201409183
Depth (Top)	m	20.70	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	21	Soil Description	Soft brown slightly sandy slightly gravelly CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	98
		0.0565	97
75	100	0.0397	96
63	100	0.0278	93
50	100	0.0195	90
37.5	100	0.0140	86
28	100	0.0097	81
20	100	0.0067	75
14	100	0.0046	68
10	100	0.0031	62
6.3	99	0.0022	56
5	99	0.0012	46
3 35	99		
2	99		
1.18	99		
0.6	99	Particle density	(assumed)
0.425	99	2.65	Mg/m3
0.3	99		
0.212	99		
0.15	99		
0.063	98		

Dry Mass of sample, g: 409

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	1
Silt	44
Clay	54

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.00281
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 10:17

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
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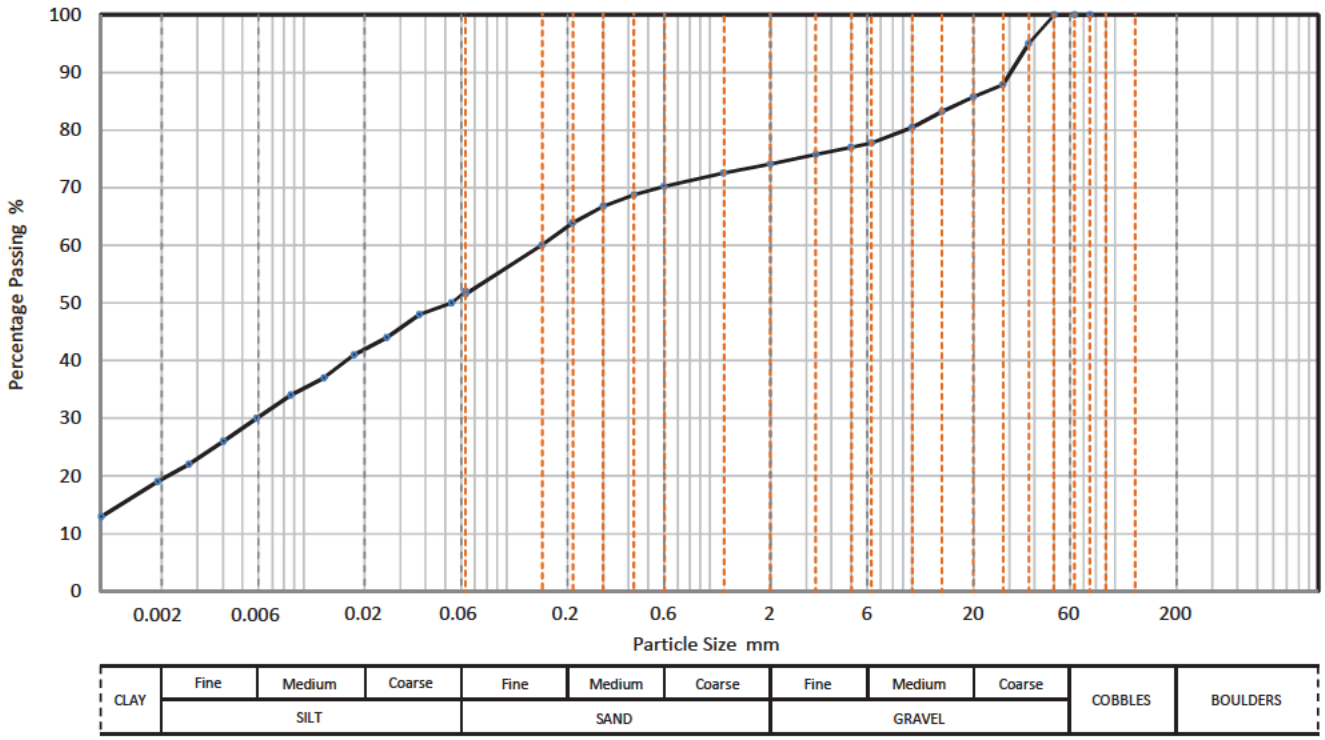
UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK201409187
Depth (Top)	m	1.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	1.95	Soil Description	Firm brown slightly silty slightly sandy slightly gravelly CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	52
		0.0538	50
75	100	0.0374	48
63	100	0.0258	44
50	100	0.0178	41
37.5	95	0.0126	37
28	88	0.0087	34
20	86	0.0059	30
14	83	0.0040	26
10	80	0.0027	22
6.3	78	0.0019	19
5	77	0.0010	13
3 35	76		
2	74		
1.18	73		
0.6	70	Particle density	(assumed)
0.425	69	2.65	Mg/m3
0.3	67		
0.212	64		
0.15	60		
0.063	52		

Dry Mass of sample, g	2084

Sample Proportions	% dry mass
Very coarse	0
Gravel	26
Sand	23
Silt	33
Clay	19

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.151
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
12 Yarm Road,
Stockton on Tees,
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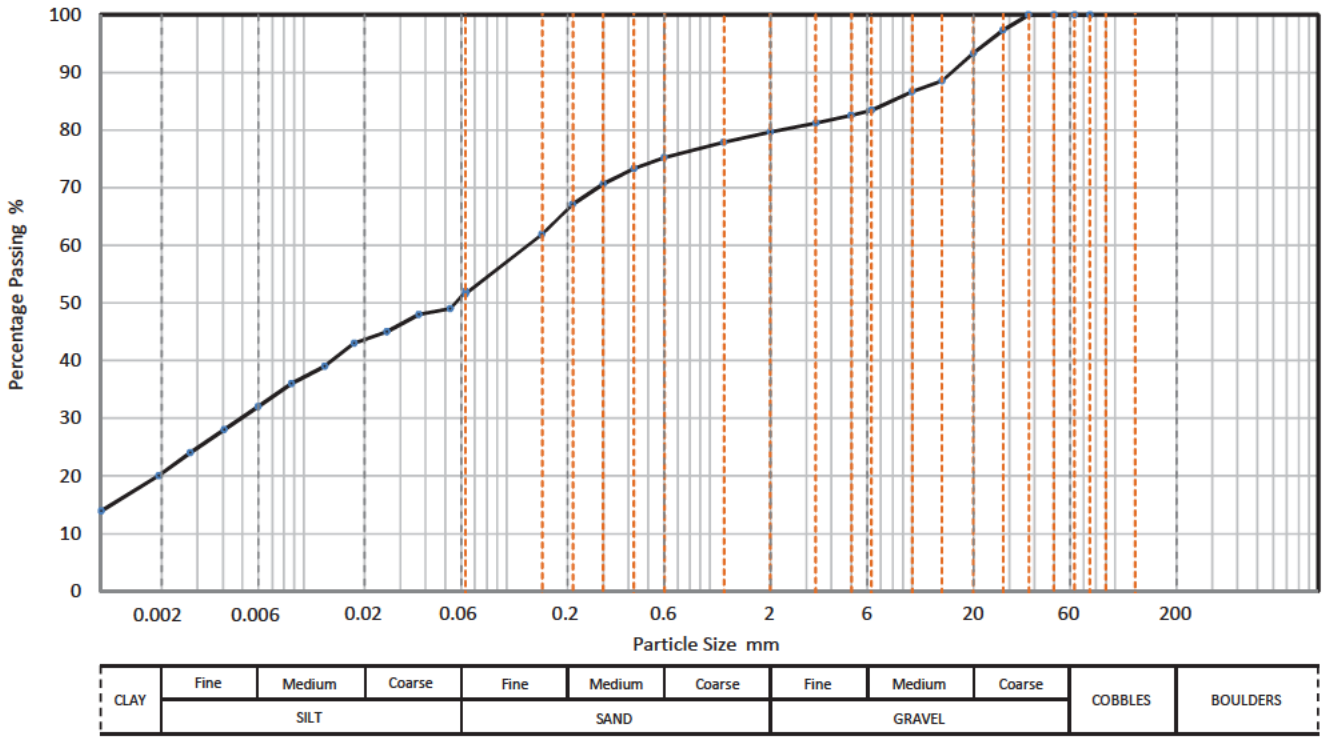
01642 607083
lab@solmek.com

UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK201409188
Depth (Top)	m	4.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	4.95	Soil Description	Soft locally firm brown slightly sandy slightly sandy slightly gravelly CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	52
		0.0529	49
75	100	0.0371	48
63	100	0.0258	45
50	100	0.0178	43
37.5	100	0.0127	39
28	97	0.0087	36
20	93	0.0060	32
14	89	0.0041	28
10	87	0.0028	24
6.3	83	0.0019	20
5	83	0.0010	14
3 35	81		
2	80		
1.18	78		
0.6	75	Particle density	(assumed)
0.425	73	2.65	Mg/m3
0.3	71		
0.212	67		
0.15	62		
0.063	52		

Dry Mass of sample, g: 2009

Sample Proportions	% dry mass
Very coarse	0
Gravel	20
Sand	28
Silt	31
Clay	21

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.128
D_{30}	mm	0.00489
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
12 Yarm Road,
Stockton on Tees,
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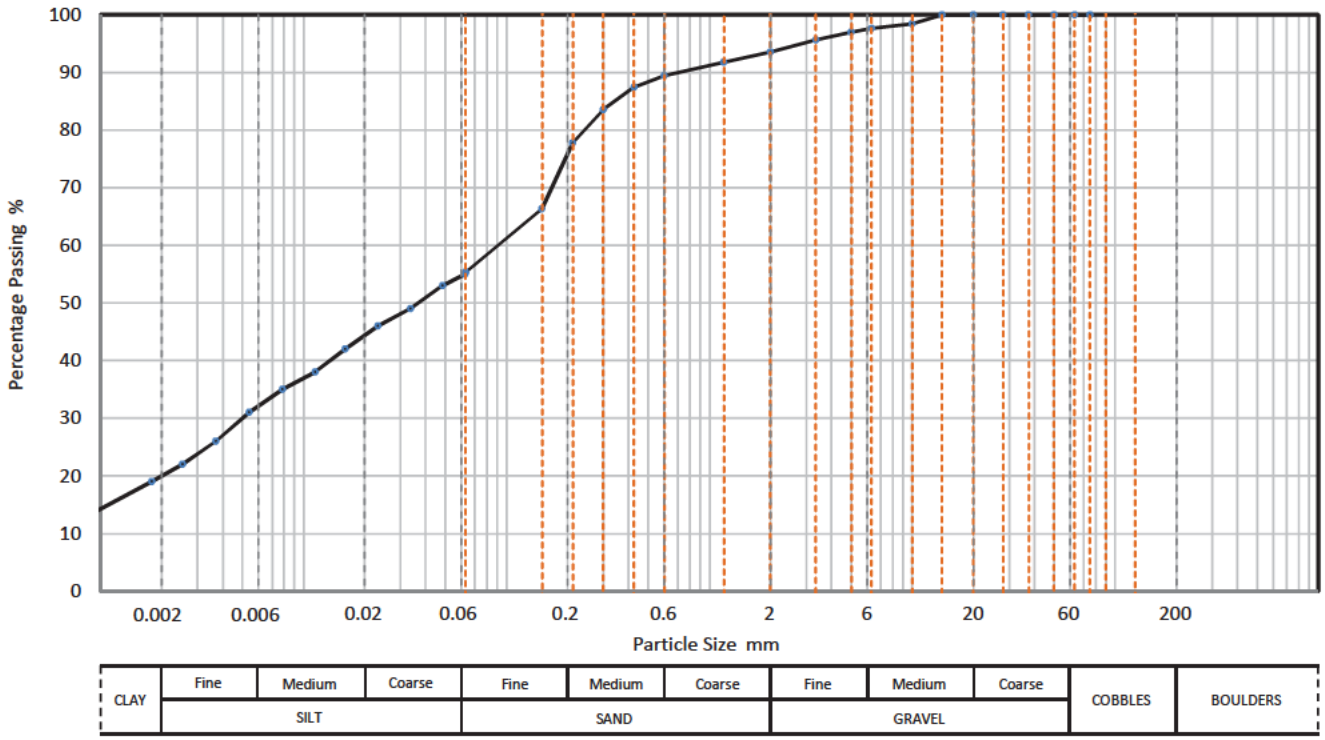
UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK201409189
Depth (Top)	m	8.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	8.95	Soil Description	Soft brown slightly sandy slightly gravelly CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0624	55
		0.0485	53
75	100	0.0337	49
63	100	0.0233	46
50	100	0.0161	42
37.5	100	0.0115	38
28	100	0.0079	35
20	100	0.0054	31
14	100	0.0037	26
10	98	0.0025	22
6.3	98	0.0018	19
5	97	0.0010	14
3 35	96		
2	94		
1.18	92		
0.6	89	Particle density	(assumed)
0.425	87	2.65	Mg/m3
0.3	84		
0.212	78		
0.15	66		
0.063	55		

Dry Mass of sample, g: 529

Sample Proportions	% dry mass
Very coarse	0
Gravel	7
Sand	38
Silt	35
Clay	20

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0912
D_{30}	mm	0.00508
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
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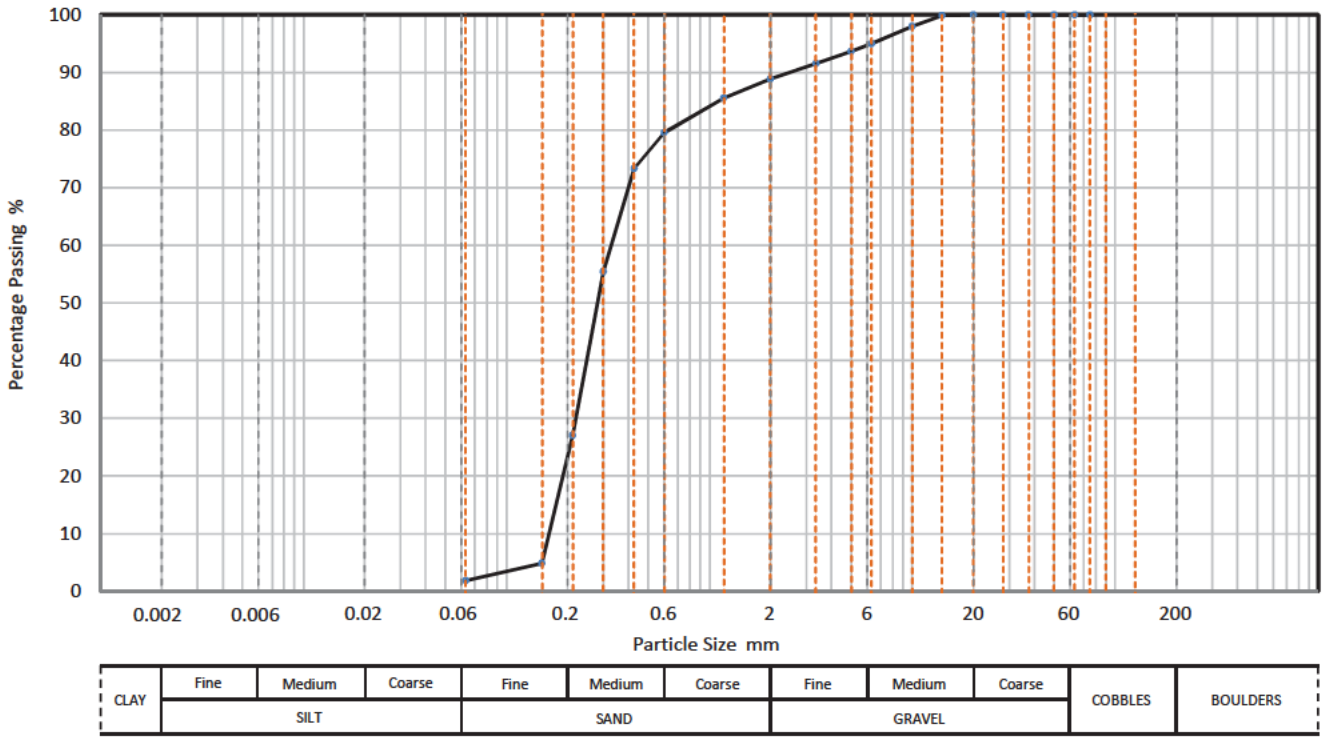
UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK2014091814
Depth (Top)	m	11.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m		Soil Description	Blackish grey SAND.
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	98		
6.3	95		
5	94		
3 35	92		
2	89		
1.18	86		
0.6	80		
0.425	73		
0.3	56		
0.212	27		
0.15	5		
0.063	2		

Dry Mass of sample, g: 673

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	87
Fines <0.063mm	2

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.328
D_{30}	mm	0.22
D_{10}	mm	0.163
Uniformity Coefficient		2
Curvature Coefficient		0.91

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

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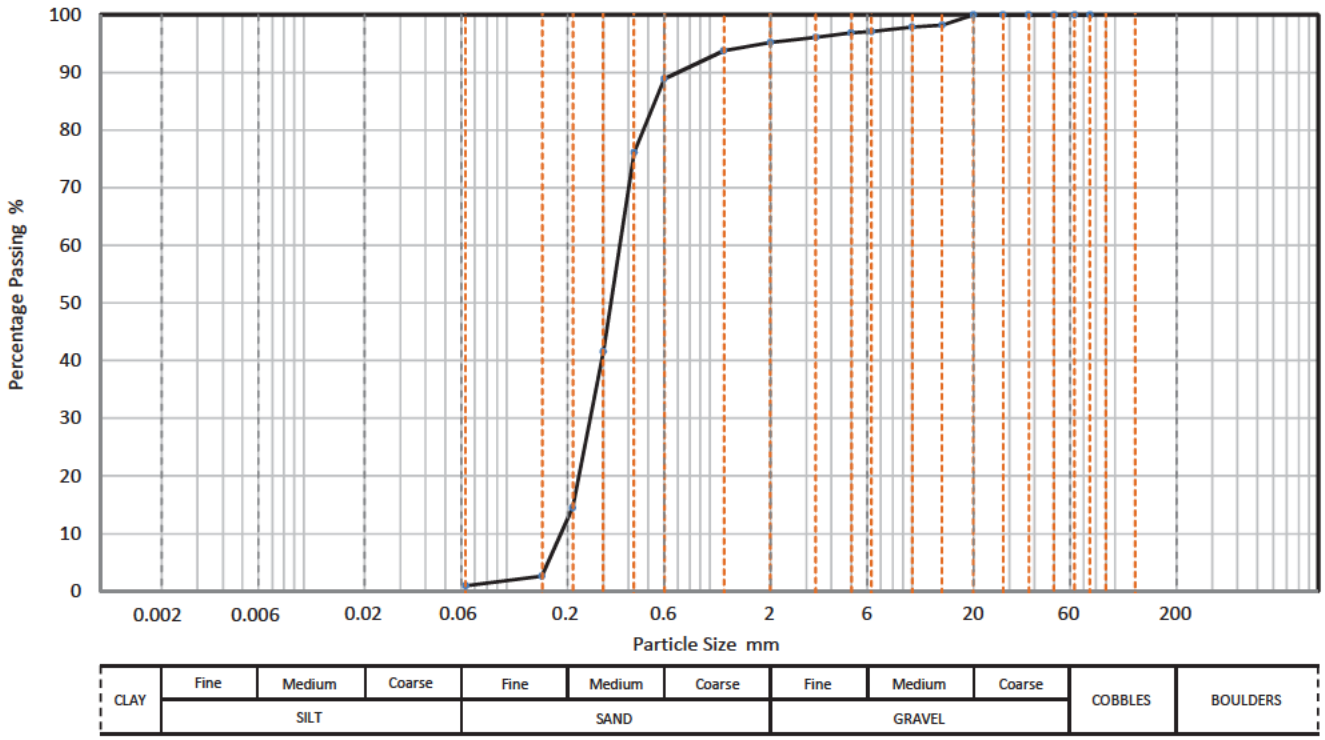
UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK2014091815
Depth (Top)	m	15.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m		Soil Description	
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	98		
10	98		
6.3	97		
5	97		
3 35	96		
2	95		
1.18	94		
0.6	89		
0.425	76		
0.3	42		
0.212	15		
0.15	3		
0.063	1		

Dry Mass of sample, g	649

Sample Proportions	% dry mass
Very coarse	0
Gravel	5
Sand	94
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.361
D_{30}	mm	0.258
D_{10}	mm	0.186
Uniformity Coefficient		1.9
Curvature Coefficient		0.99

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
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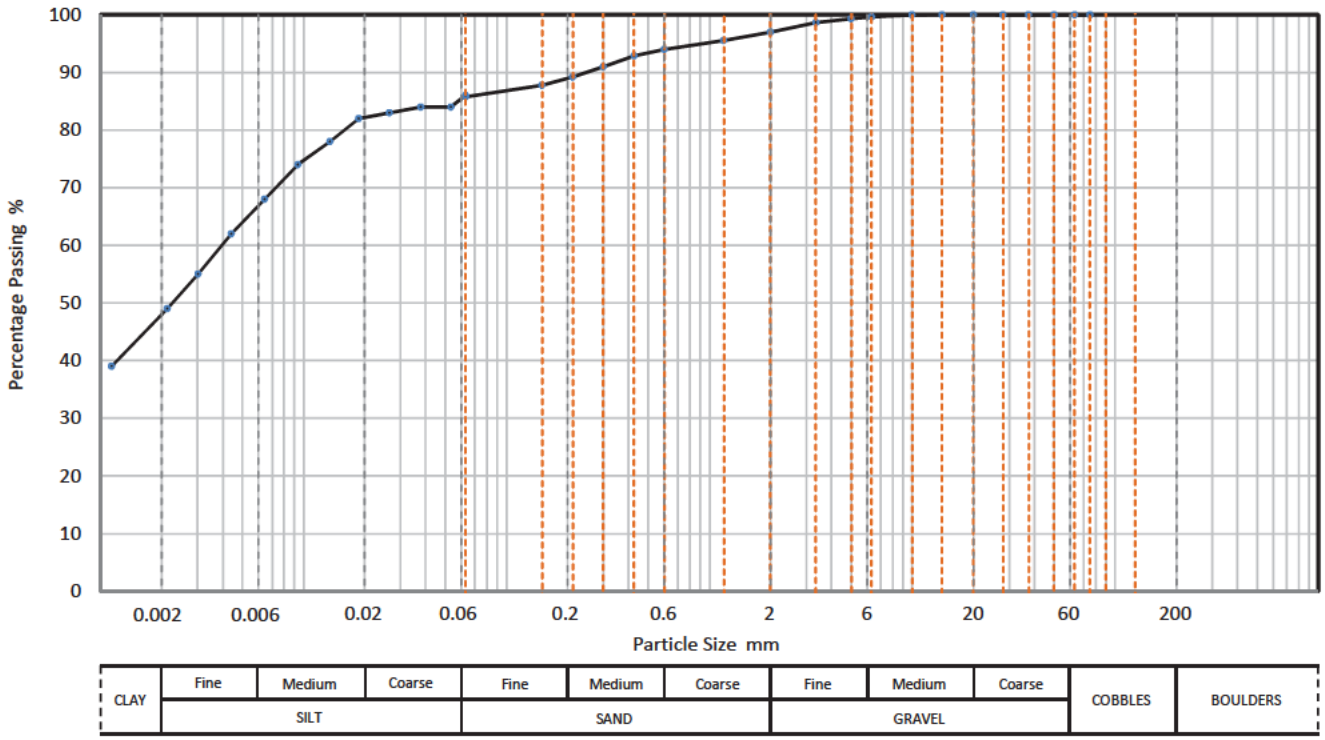
UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK2014091810
Depth (Top)	m	19.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	19.45	Soil Description	Soft brown CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	86
		0.0535	84
75	100	0.0378	84
63	100	0.0266	83
50	100	0.0187	82
37.5	100	0.0135	78
28	100	0.0094	74
20	100	0.0064	68
14	100	0.0044	62
10	100	0.0030	55
6.3	100	0.0021	49
5	99	0.0011	39
3 35	99		
2	97		
1.18	96		
0.6	94	Particle density	(assumed)
0.425	93	2.65	Mg/m3
0.3	91		
0.212	89		
0.15	88		
0.063	86		

Dry Mass of sample, g: 388

Sample Proportions	% dry mass
Very coarse	0
Gravel	3
Sand	11
Silt	38
Clay	48

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.00402
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

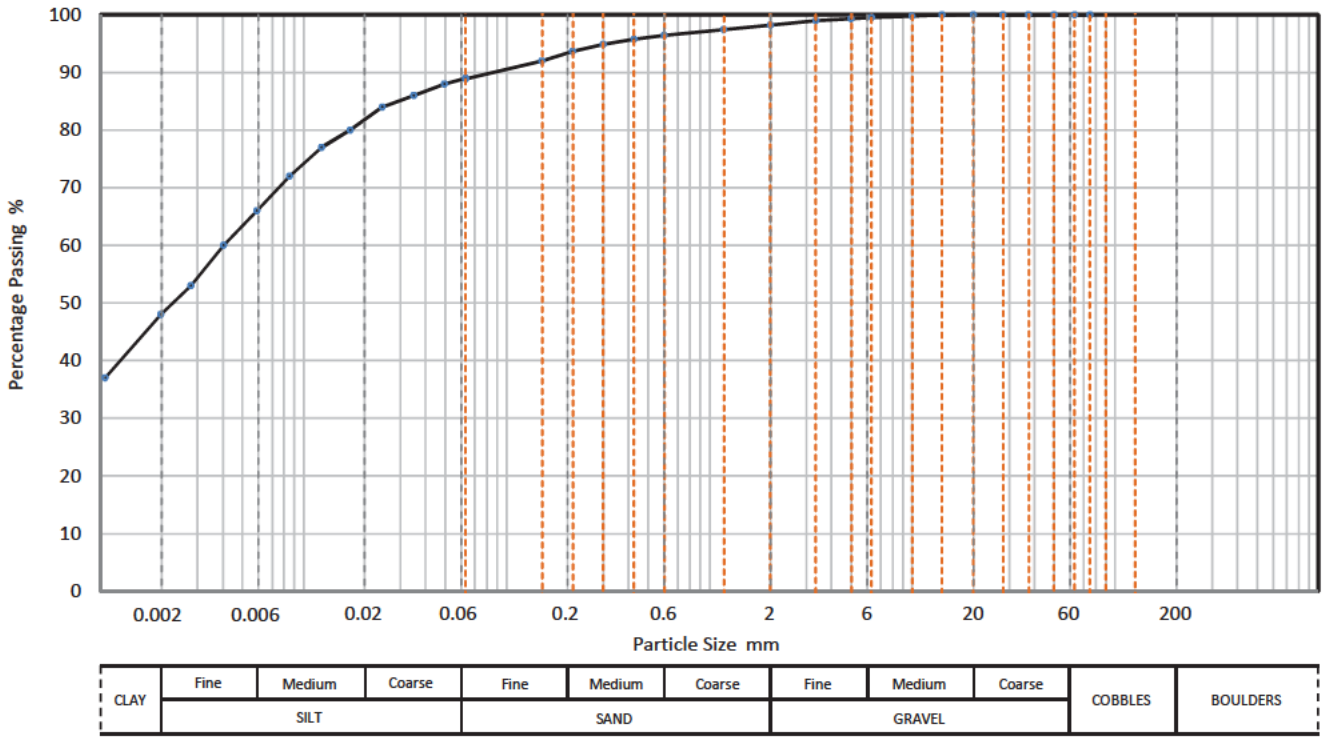
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Teesport	D6340_BHP5B

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING 7607

Hole		BHP5B	Lab sample ID	SLMK2014091811
Depth (Top)	m	21.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.5
Depth (Base)	m	21.45	Soil Description	Soft brown CLAY.
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	89
		0.0496	88
75	100	0.0349	86
63	100	0.0245	84
50	100	0.0171	80
37.5	100	0.0123	77
28	100	0.0085	72
20	100	0.0059	66
14	100	0.0041	60
10	100	0.0028	53
6.3	100	0.0020	48
5	99	0.0011	37
3 35	99		
2	98		
1.18	97		
0.6	96	Particle density	(assumed)
0.425	96	2.65	Mg/m3
0.3	95		
0.212	94		
0.15	92		
0.063	89		

Dry Mass of sample, g: 392

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	9
Silt	41
Clay	48

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.00408
D_{30}	mm	
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	HM
Approval date	18/09/2014 15:02

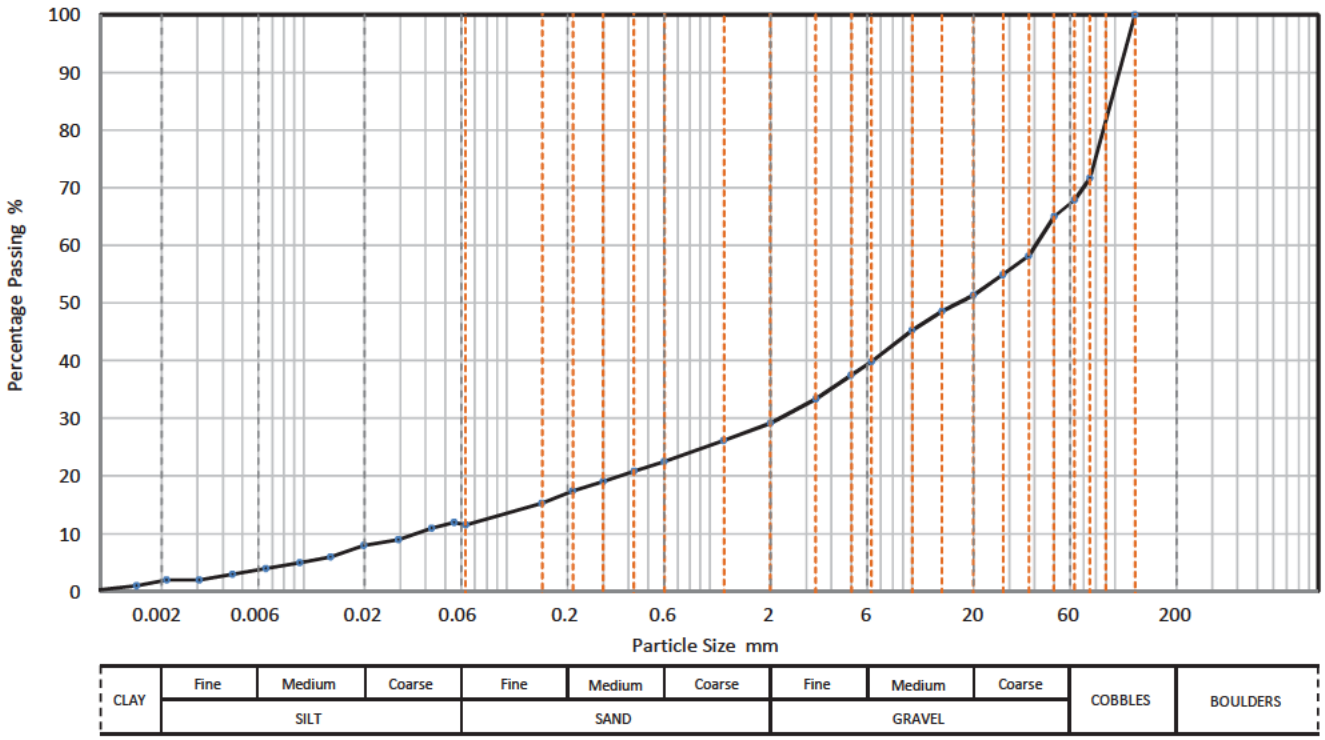
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090225
Depth (Top)	m	2.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m		Soil Description	
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0554	12
		0.0427	11
75	72	0.0293	9
63	68	0.0199	8
50	65	0.0136	6
37.5	58	0.0096	5
28	55	0.0065	4
20	51	0.0045	3
14	49	0.0031	2
10	45	0.0021	2
6.3	40	0.0015	1
5	38	0.0008	0
3.35	33		
2	29		
1.18	26		
0.6	23	Particle density	(assumed)
0.425	21	2.65	Mg/m3
0.3	19		
0.212	17		
0.15	15		
0.063	12		

Dry Mass of sample, g	8335

Sample Proportions	% dry mass
Very coarse	32
Gravel	39
Sand	18
Silt	10
Clay	2

Grading Analysis		
D_{100}	mm	125
D_{60}	mm	40.6
D_{30}	mm	2.21
D_{10}	mm	0.0369
Uniformity Coefficient		1100
Curvature Coefficient		3.3

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	04/09/2014 09:53

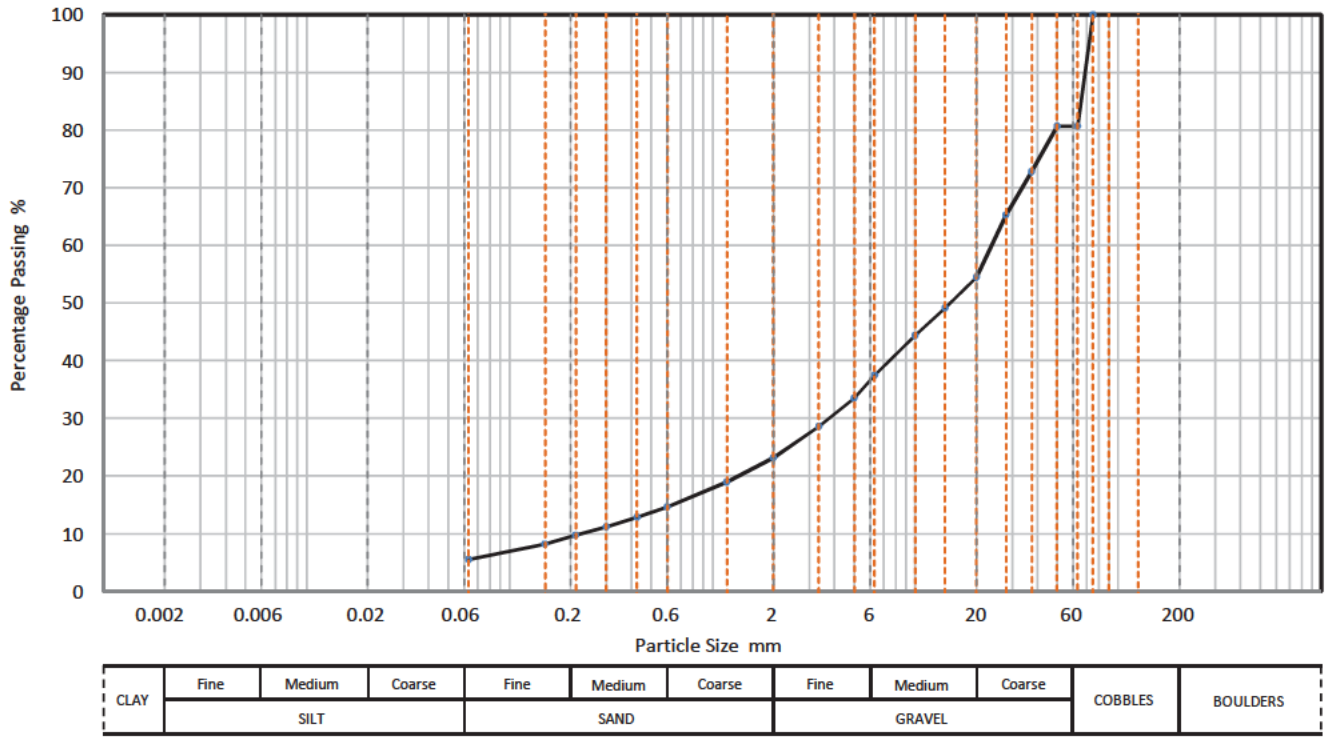
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090226
Depth (Top)	m	5.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	5.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	81		
50	81		
37.5	73		
28	65		
20	55		
14	49		
10	44		
6.3	38		
5	34		
3.35	29		
2	23		
1.18	19		
0.6	15		
0.425	13		
0.3	11		
0.212	10		
0.15	8		
0.063	6		

Dry Mass of sample, g	4239

Sample Proportions	% dry mass
Very coarse	19
Gravel	58
Sand	18
Fines <0.063mm	6

Grading Analysis		
D_{100}	mm	75
D_{60}	mm	23.8
D_{30}	mm	3.76
D_{10}	mm	0.227
Uniformity Coefficient		100
Curvature Coefficient		2.6

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 15:17

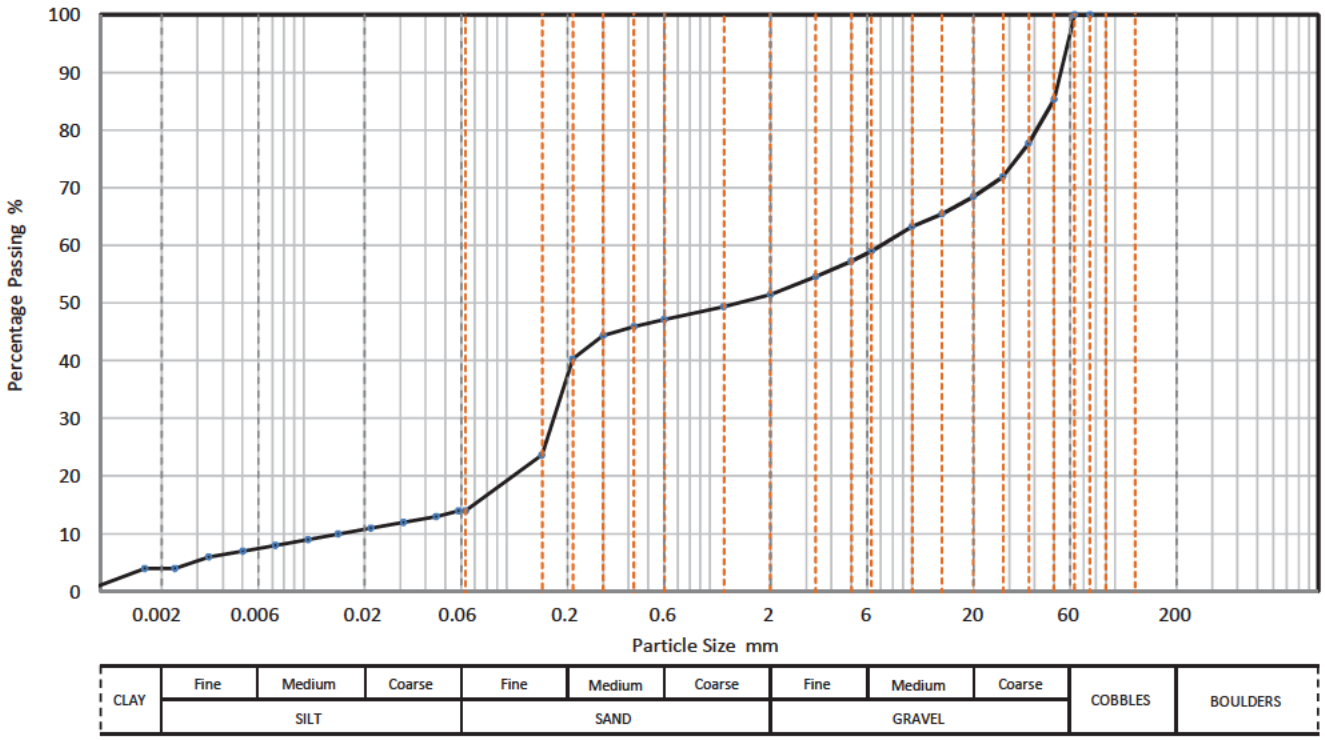
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090227
Depth (Top)	m	7.50	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m		Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0581	14
		0.0450	13
75	100	0.0311	12
63	100	0.0215	11
50	85	0.0148	10
37.5	78	0.0105	9
28	72	0.0073	8
20	68	0.0050	7
14	65	0.0034	6
10	63	0.0023	4
6.3	59	0.0017	4
5	57	0.0008	0
3.35	55		
2	51		
1.18	49		
0.6	47	Particle density	(assumed)
0.425	46	2.65	Mg/m3
0.3	44		
0.212	40		
0.15	24		
0.063	14		

Dry Mass of sample, g	3694

Sample Proportions	% dry mass
Very coarse	0
Gravel	49
Sand	37
Silt	10
Clay	4

Grading Analysis		
D_{100}	mm	
D_{60}	mm	7.05
D_{30}	mm	0.171
D_{10}	mm	0.0155
Uniformity Coefficient		450
Curvature Coefficient		0.27

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 15:22

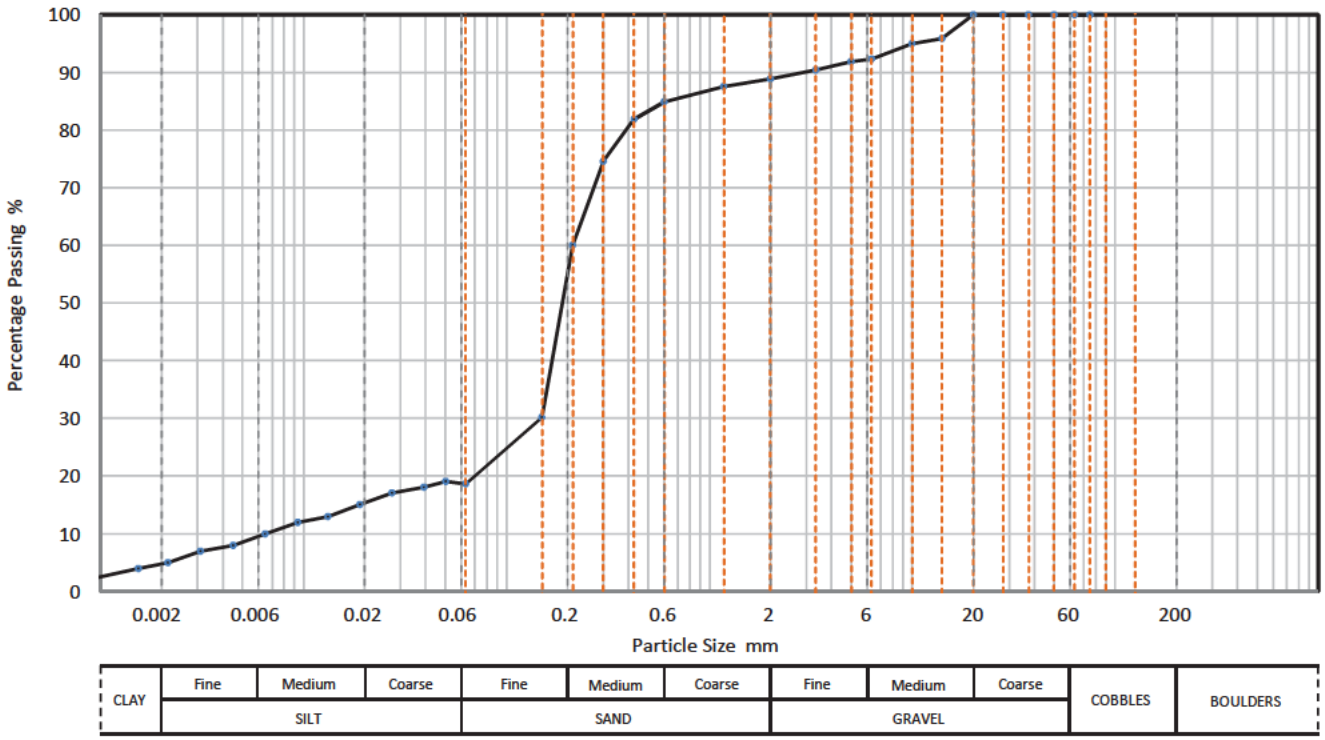
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090228
Depth (Top)	m	8.00	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m	8.55	Soil Description	
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0502	19
		0.0393	18
75	100	0.0274	17
63	100	0.0190	15
50	100	0.0132	13
37.5	100	0.0094	12
28	100	0.0065	10
20	100	0.0045	8
14	96	0.0031	7
10	95	0.0021	5
6.3	92	0.0015	4
5	92	0.0008	2
3.35	90		
2	89		
1.18	88		
0.6	85	Particle density	(assumed)
0.425	82	2.65	Mg/m3
0.3	75		
0.212	60		
0.15	30		
0.063	19		

Dry Mass of sample, g	749

Sample Proportions	% dry mass
Very coarse	0
Gravel	11
Sand	70
Silt	14
Clay	5

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.212
D_{30}	mm	0.148
D_{10}	mm	0.0067
Uniformity Coefficient		32
Curvature Coefficient		15

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 15:54

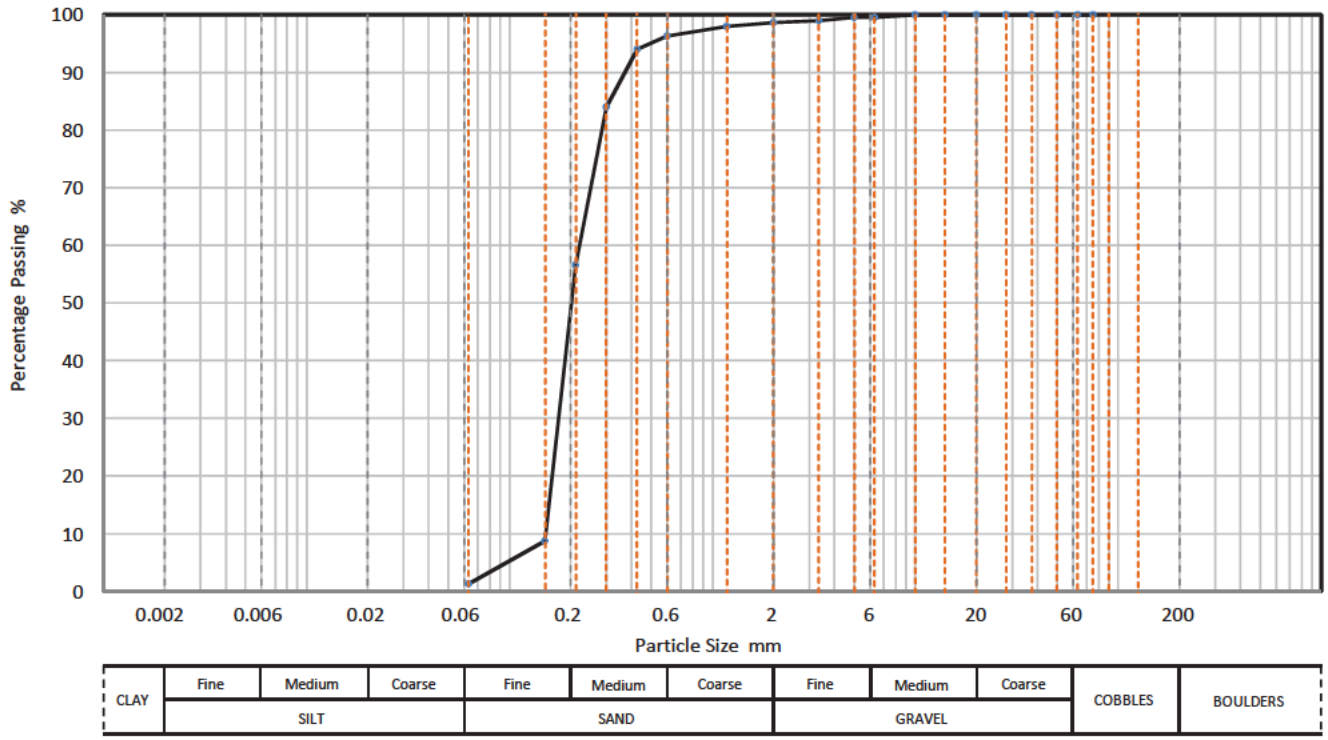
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090229
Depth (Top)	m	11.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	11.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	99		
2	99		
1.18	98		
0.6	96		
0.425	94		
0.3	84		
0.212	57		
0.15	9		
0.063	1		

Dry Mass of sample, g	824

Sample Proportions	% dry mass
Very coarse	0
Gravel	1
Sand	97
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.221
D_{30}	mm	0.175
D_{10}	mm	0.151
Uniformity Coefficient		1.5
Curvature Coefficient		0.91

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 15:57

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
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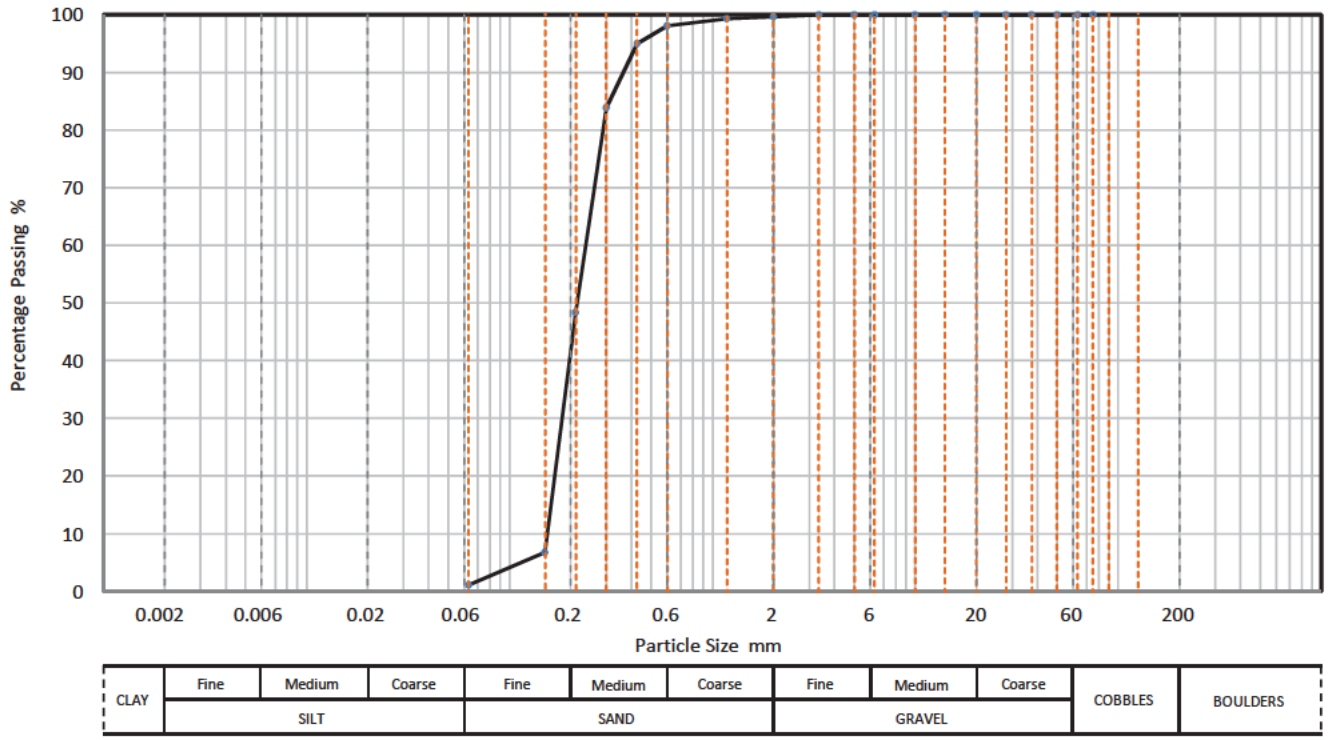
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090230
Depth (Top)	m	16.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	16.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5	100		
3.35	100		
2	100		
1.18	99		
0.6	98		
0.425	95		
0.3	84		
0.212	48		
0.15	7		
0.063	1		

Dry Mass of sample, g	746

Sample Proportions	% dry mass
Very coarse	0
Gravel	0
Sand	99
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.237
D_{30}	mm	0.182
D_{10}	mm	0.154
Uniformity Coefficient		1.5
Curvature Coefficient		0.9

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 15:59

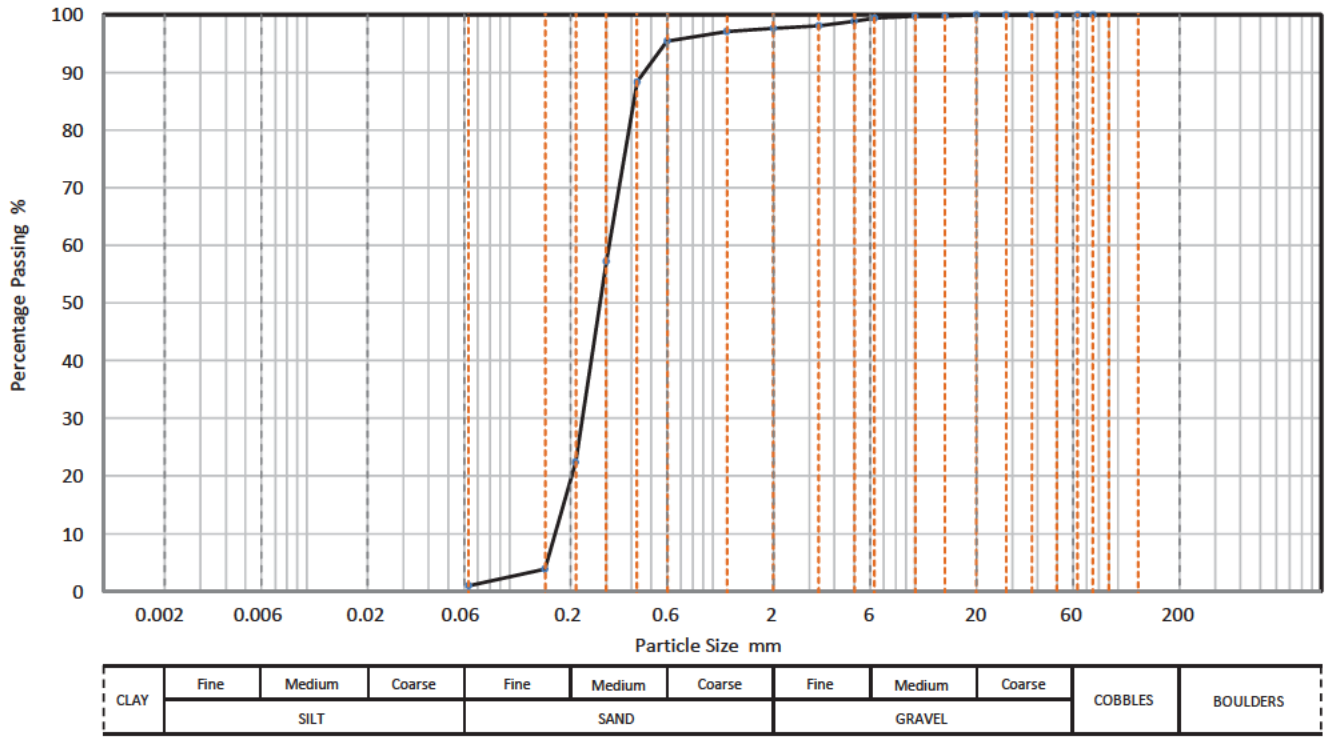
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090231
Depth (Top)	m	19.00	Test Method	BS 1377 - 2 : 1990 Clause 9.3
Depth (Base)	m	19.45	Soil Description	
Sample type		B		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	99		
5	99		
3.35	98		
2	98		
1.18	97		
0.6	95		
0.425	88		
0.3	57		
0.212	22		
0.15	4		
0.063	1		

Dry Mass of sample, g	783

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	97
Fines <0.063mm	1

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.31
D_{30}	mm	0.229
D_{10}	mm	0.168
Uniformity Coefficient		1.8
Curvature Coefficient		1

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 16:00

PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
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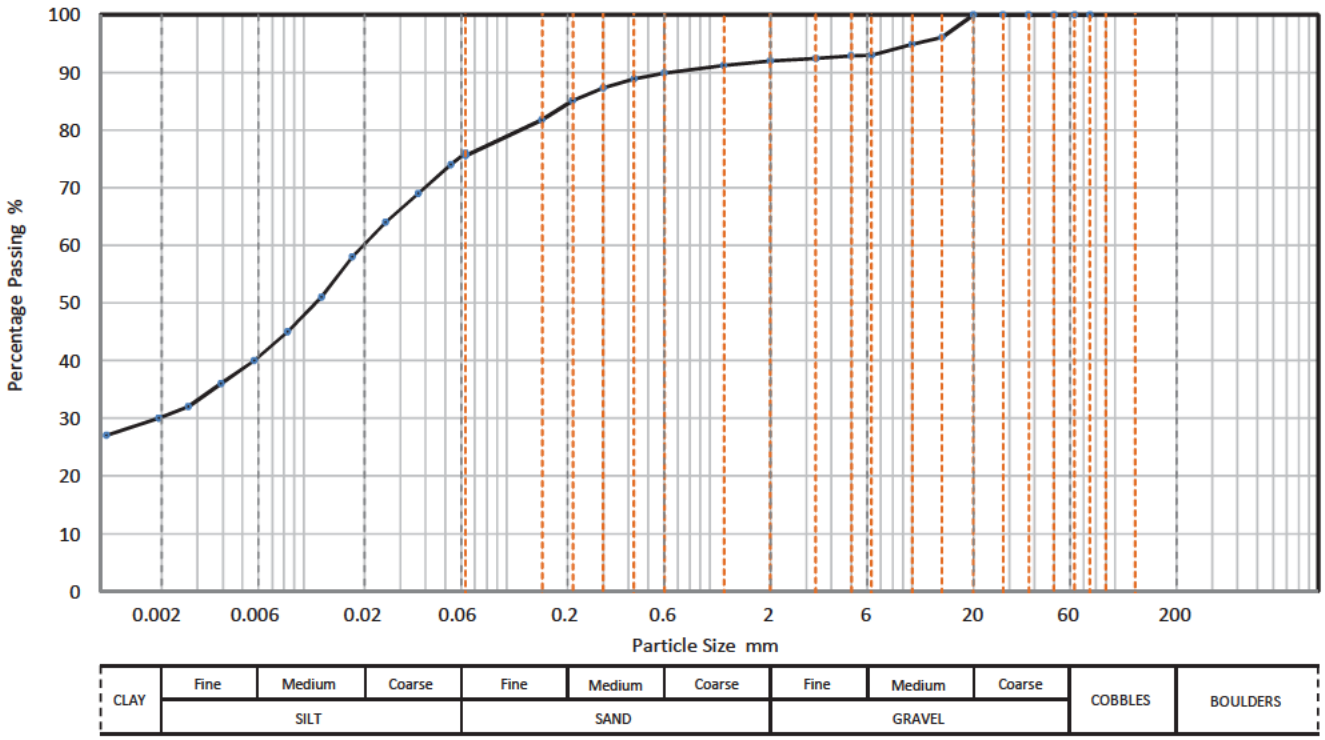
UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090233
Depth (Top)	m	20.45	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m	20.65	Soil Description	
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	76
		0.0533	74
75	100	0.0369	69
63	100	0.0255	64
50	100	0.0174	58
37.5	100	0.0123	51
28	100	0.0083	45
20	100	0.0057	40
14	96	0.0039	36
10	95	0.0027	32
6.3	93	0.0019	30
5	93	0.0011	27
3.35	92		
2	92		
1.18	91		
0.6	90	Particle density	(assumed)
0.425	89	2.65	Mg/m3
0.3	87		
0.212	85		
0.15	82		
0.063	76		

Dry Mass of sample, g	540

Sample Proportions	% dry mass
Very coarse	0
Gravel	8
Sand	17
Silt	45
Clay	30

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0199
D_{30}	mm	0.00199
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	08/09/2014 10:34

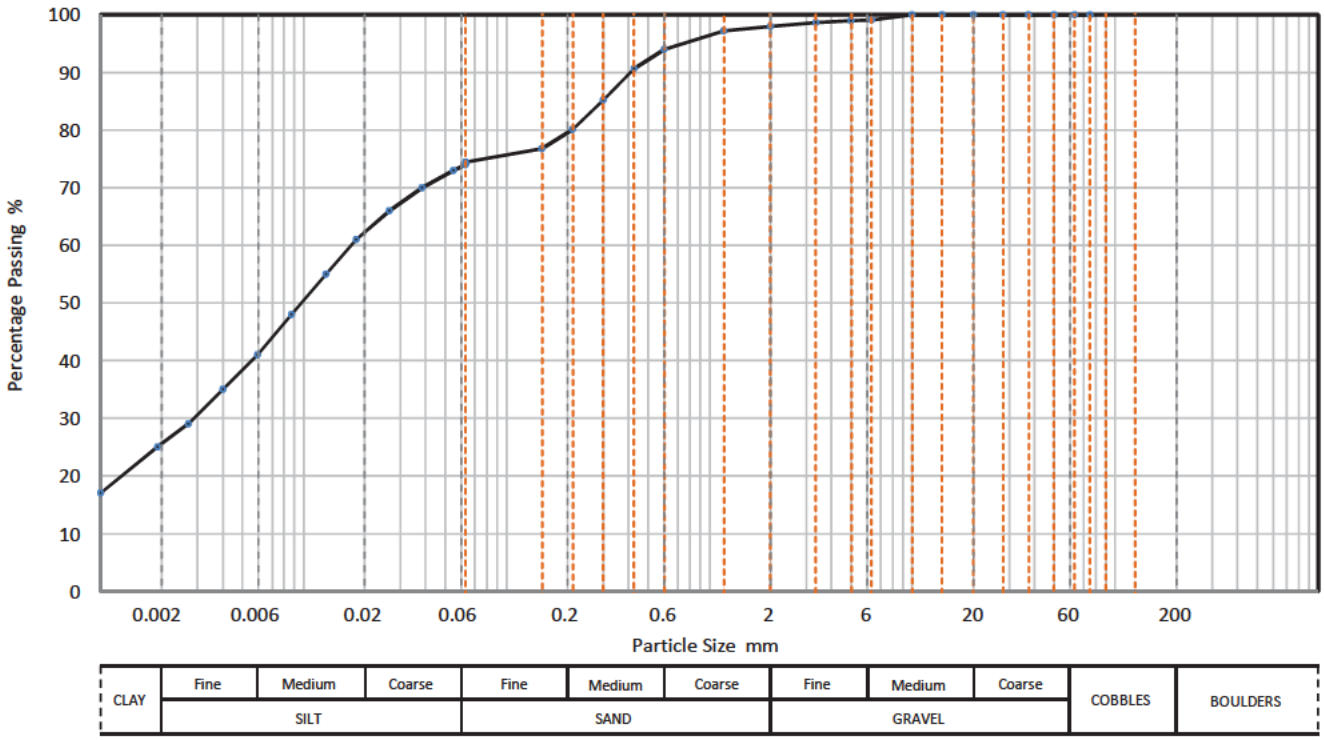
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID		SLMK2014090234
Depth (Top)	m	21.00	Test Method		BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m	21.45	Soil Description		
Sample type		B			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	74
		0.0550	73
75	100	0.0383	70
63	100	0.0266	66
50	100	0.0183	61
37.5	100	0.0129	55
28	100	0.0088	48
20	100	0.0059	41
14	100	0.0040	35
10	100	0.0027	29
6.3	99	0.0019	25
5	99	0.0010	17
3.35	99		
2	98		
1.18	97		
0.6	94	Particle density	(assumed)
0.425	91	2.65	Mg/m3
0.3	85		
0.212	80		
0.15	77		
0.063	74		

Dry Mass of sample, g	540

Sample Proportions	% dry mass
Very coarse	0
Gravel	2
Sand	24
Silt	49
Clay	25

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0175
D_{30}	mm	0.00283
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	04/09/2014 09:49

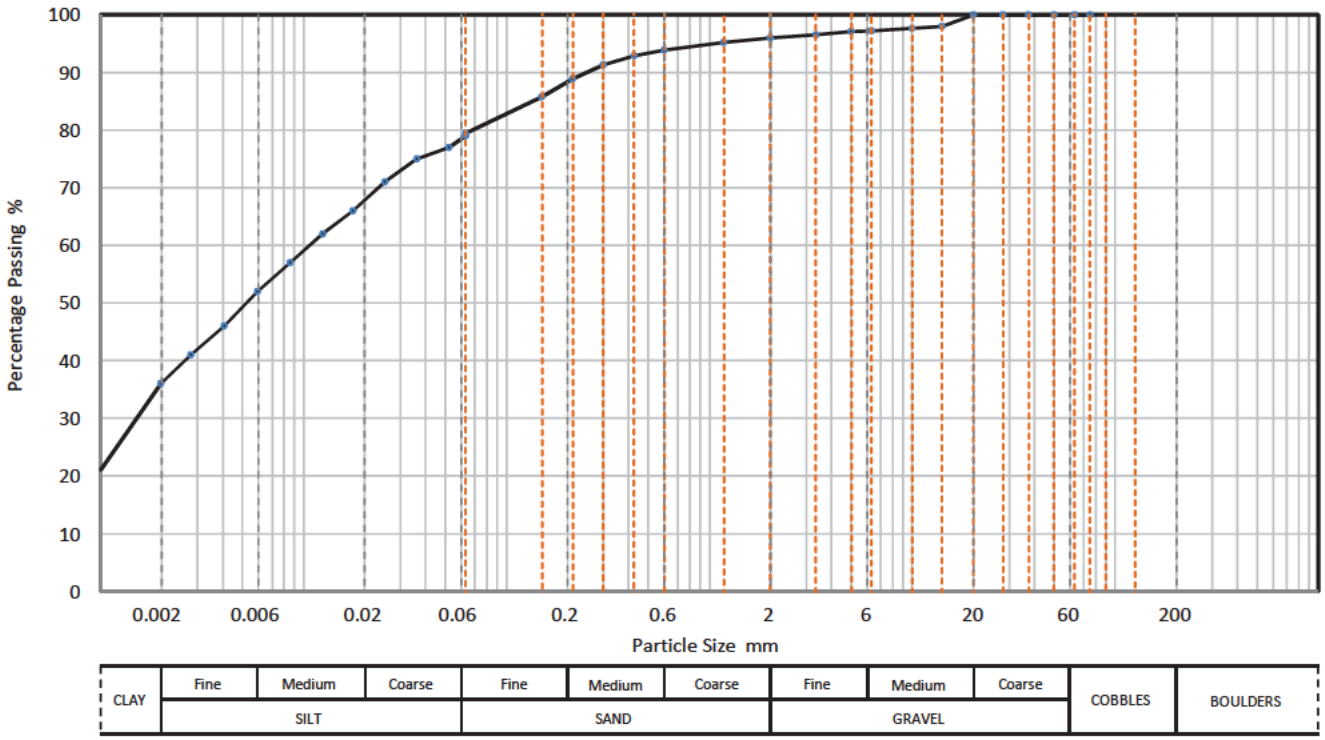
PARTICLE SIZE DISTRIBUTION

Site name	Job number
Bran Sands Quayside Investigation	D6340

Solmek
12 Yarm Road,
Stockton on Tees,
TS18 3NA
01642 607083
lab@solmek.com

UKAS TESTING
7607

Hole		BHP6	Lab sample ID	SLMK2014090236
Depth (Top)	m	22.45	Test Method	BS 1377 - 2 : 1990 Clauses 9.3 and 9.4
Depth (Base)	m	22.65	Soil Description	
Sample type		D		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
		0.0630	79
		0.0520	77
75	100	0.0363	75
63	100	0.0253	71
50	100	0.0175	66
37.5	100	0.0125	62
28	100	0.0086	57
20	100	0.0059	52
14	98	0.0041	46
10	98	0.0028	41
6.3	97	0.0020	36
5	97	0.0010	21
3.35	97		
2	96		
1.18	95		
0.6	94	Particle density	(assumed)
0.425	93	2.65	Mg/m3
0.3	91		
0.212	89		
0.15	86		
0.063	79		

Dry Mass of sample, g: 540

Sample Proportions	% dry mass
Very coarse	0
Gravel	4
Sand	17
Silt	43
Clay	36

Grading Analysis		
D_{100}	mm	
D_{60}	mm	0.0108
D_{30}	mm	0.00149
D_{10}	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks
Preparation and testing in accordance with test method unless noted below

Accreditation status
Sedimentation tests are not currently part of the Solmek UKAS accreditation schedule.

Approved by	IN
Approval date	02/09/2014 16:04

Appendix D.3

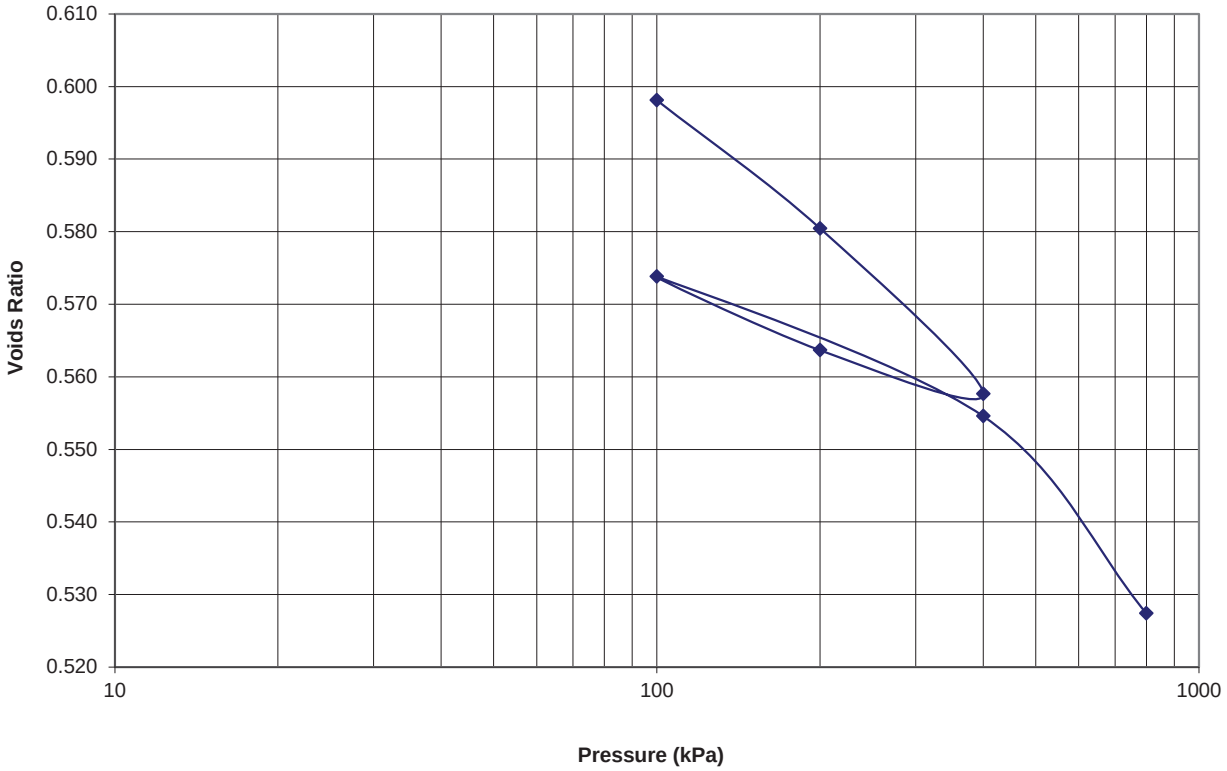
One Dimensional Consolidation Tests

ONE-DIMENSIONAL CONSOLIDATION

BS 1377 : PART 5 : 1900 : CLAUSE 3

Teesport D6340 BHP5B @ 20.0.20.45

Initial Conditions		Pressure Range			Mv	Cv	**Final Conditions**	
Moisture Content (%):	33	kPa			m2/MN	m2/yr	Moisture Content (%) :	29
Bulk Density (Mg/m3):	2.12	0	-	100	0.378	13.706	Bulk Density (Mg/m3) :	2.27
Dry Density (Mg/m3):	1.60	100	-	200	0.110	2.417	Dry Density (Mg/m3)	1.70
Voids Ratio:	0.6609	200	-	400	0.072	2.726	Voids Ratio:	0.527
Degree of saturation:	132.6	400	-	200	0.019	5.943	Degree of Saturation: :	132.6
Height (mm):	19	200	-	100	0.065	2.881	Height (mm) :	17.47
Diameter (mm)	72	100	-	400	0.041	5.226	Remarks:	
Particle Density (Mg/m3):	2.65	400	-	800	0.044	3.529		
Assumed								



SOLMEK

Checked and Approved By: HM

Date: 19/09/2014

Appendix D.4

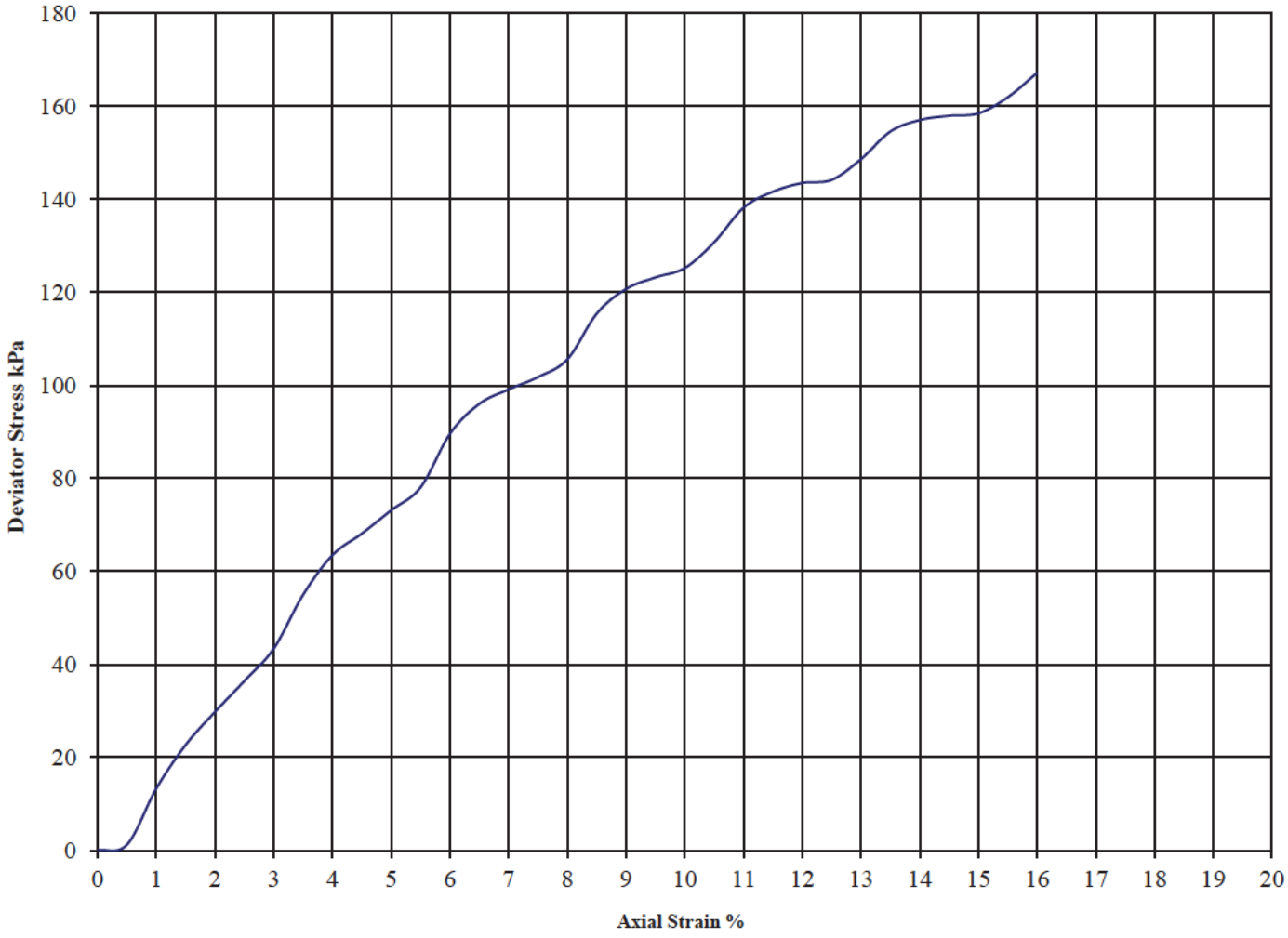
Undrained Shear Strength in Triaxial Compression Tests

Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BH 3** **Depth (m)** **17.00-17.45**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	23	2.26	1.83	340	167	84	16.0	Test Limit	84	
Sample Description:		Stiff orangeish brown slightly sandy slightly gravelly CLAY								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
KW	IN	03/09/14

SOLMEK

Bran Sands Quayside Investigation

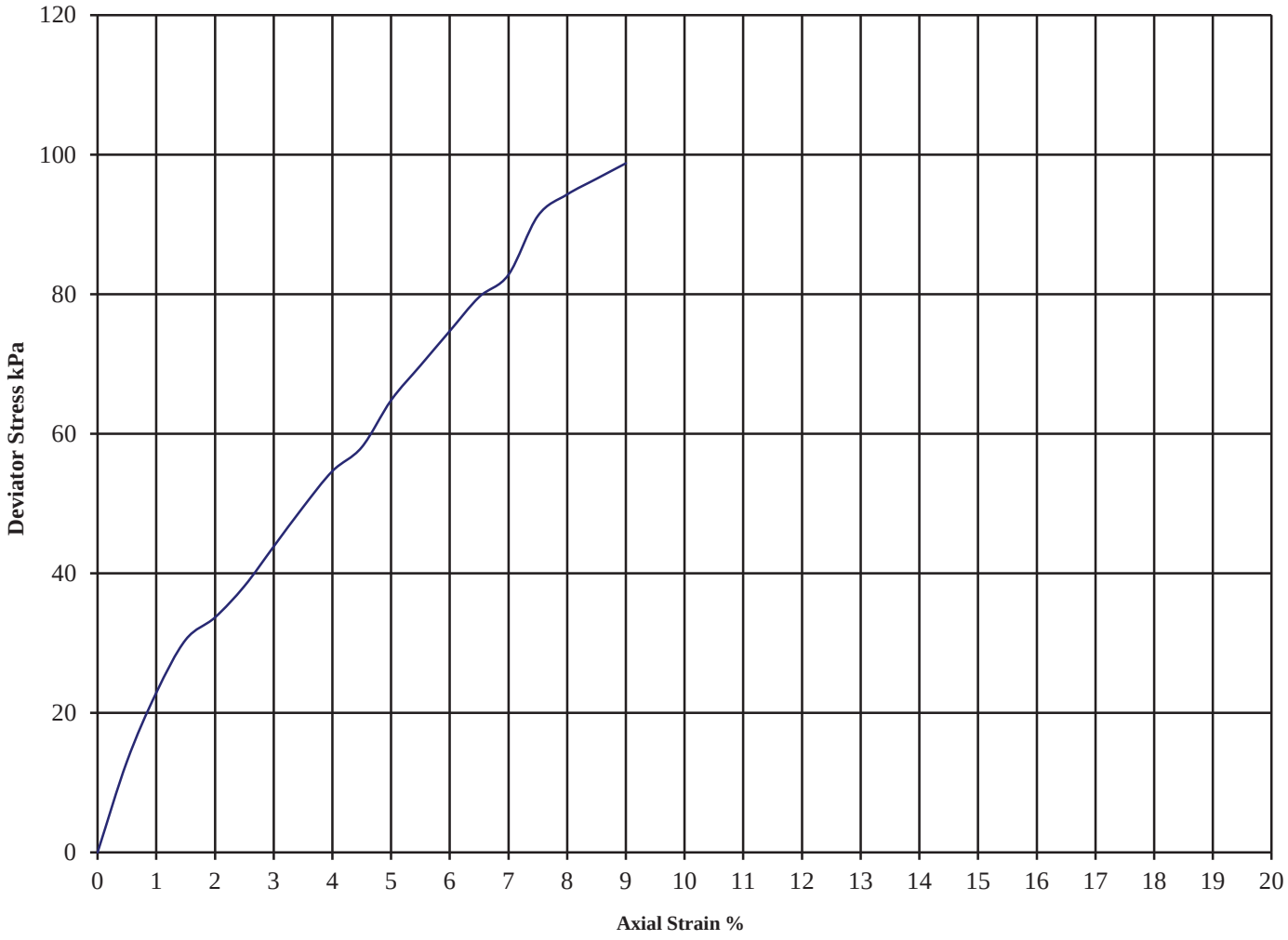
Contract No
D6340

Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BHP 4A** **Depth (m)** **19.1**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	30	2.07	1.59	382	105	53	10.0	Plastic	53	
Sample Description:		0.00								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
MS	HM	18/09/14

SOLMEK

Teesport

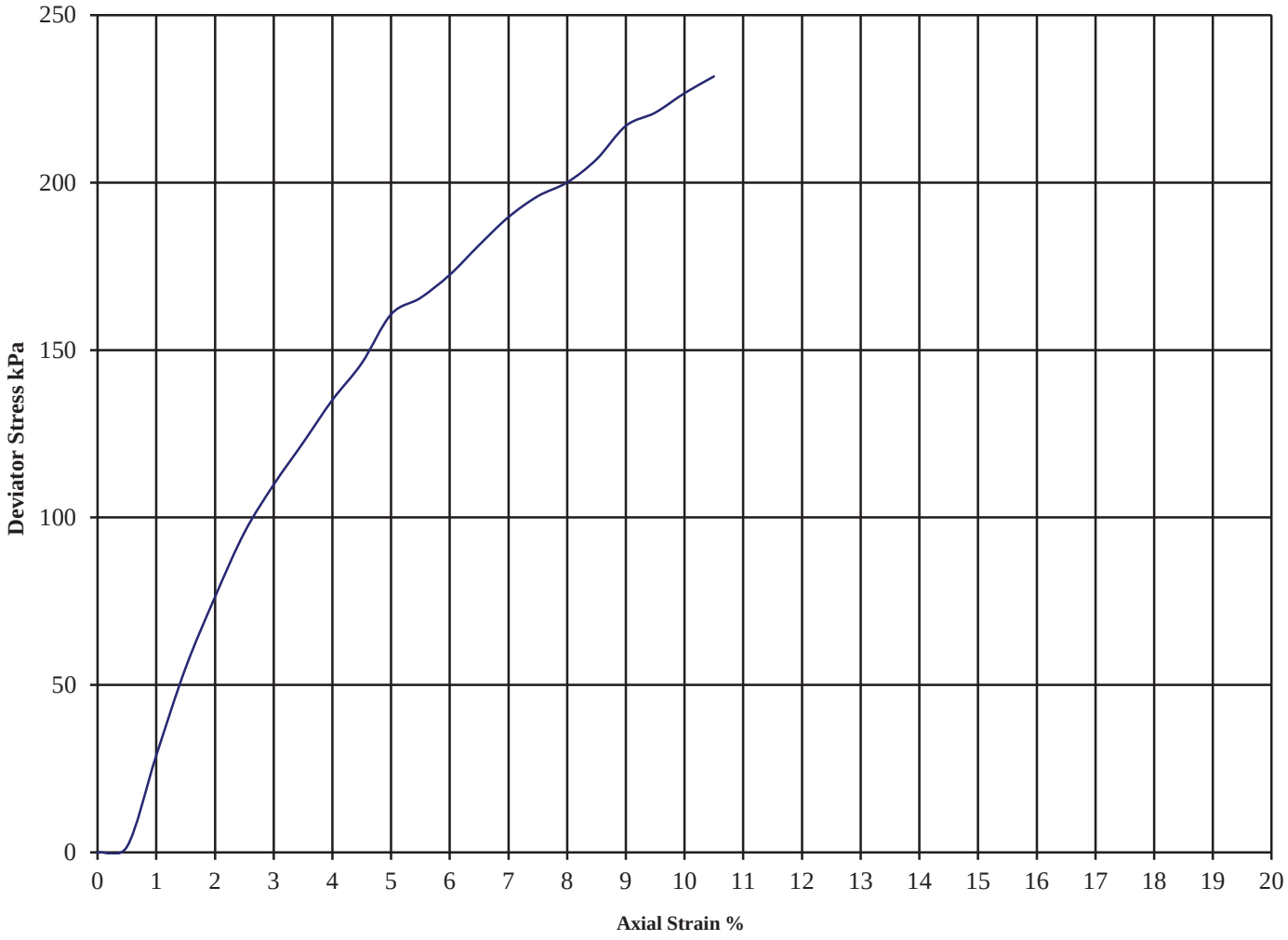
Contract No
D6340

Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BHP 4A** **Depth (m)** **22**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	11	2.30	2.07	440	246	123	11.5	Compound	123	
Sample Description:		0.00								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
MS	HM	18/09/14

SOLMEK

Teesport

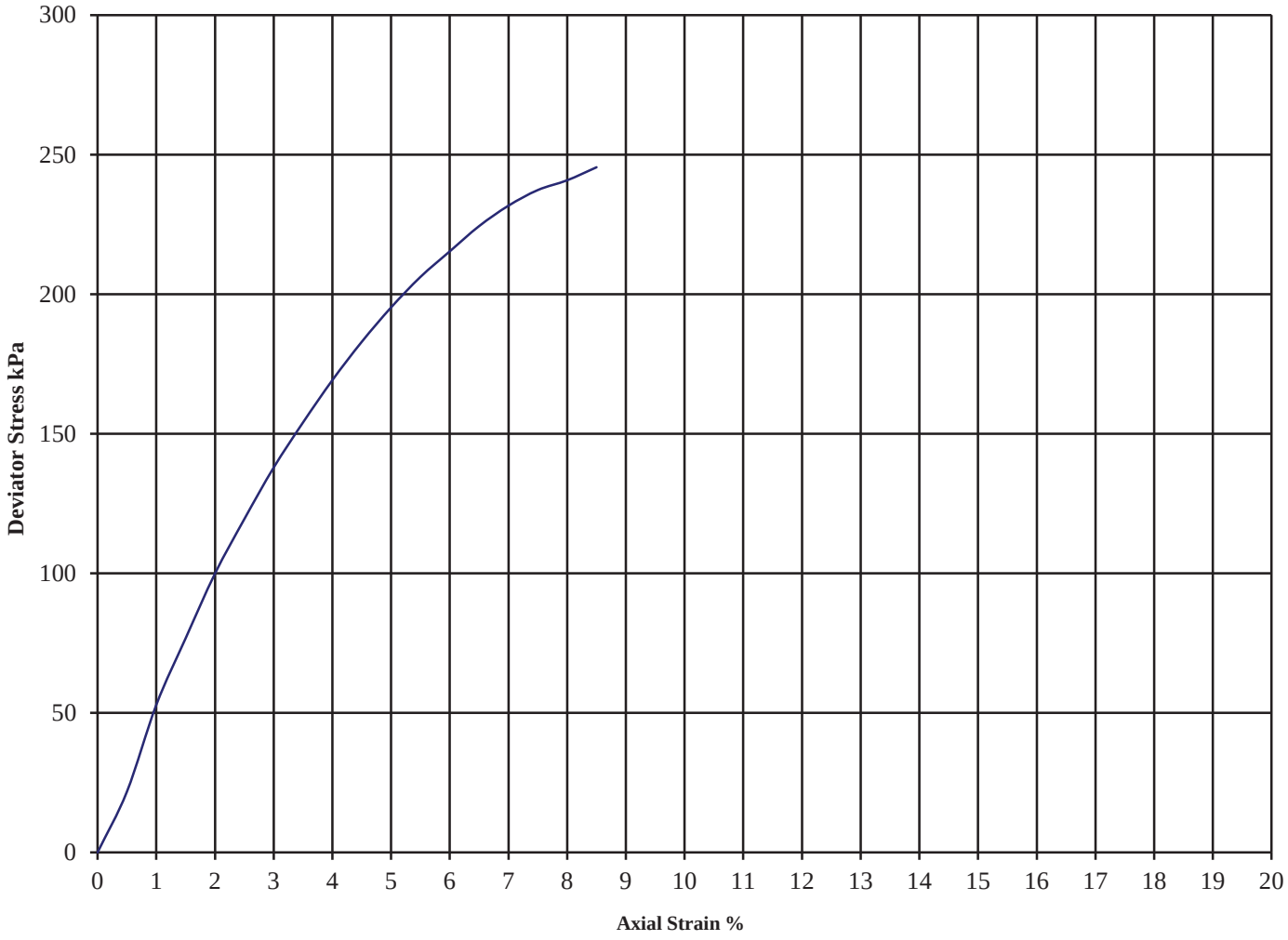
Contract No
D6340

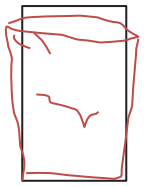
Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BHP 5B** **Depth (m)** **18.0-18.45**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	21	2.23	1.84	365	255	128	9.5	Plastic	128	
Sample Description:		Stiff, brown, slightly silty, slightly gravelly, thinly layered CLAY								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
MS	HM	19/09/14

SOLMEK

Teesport

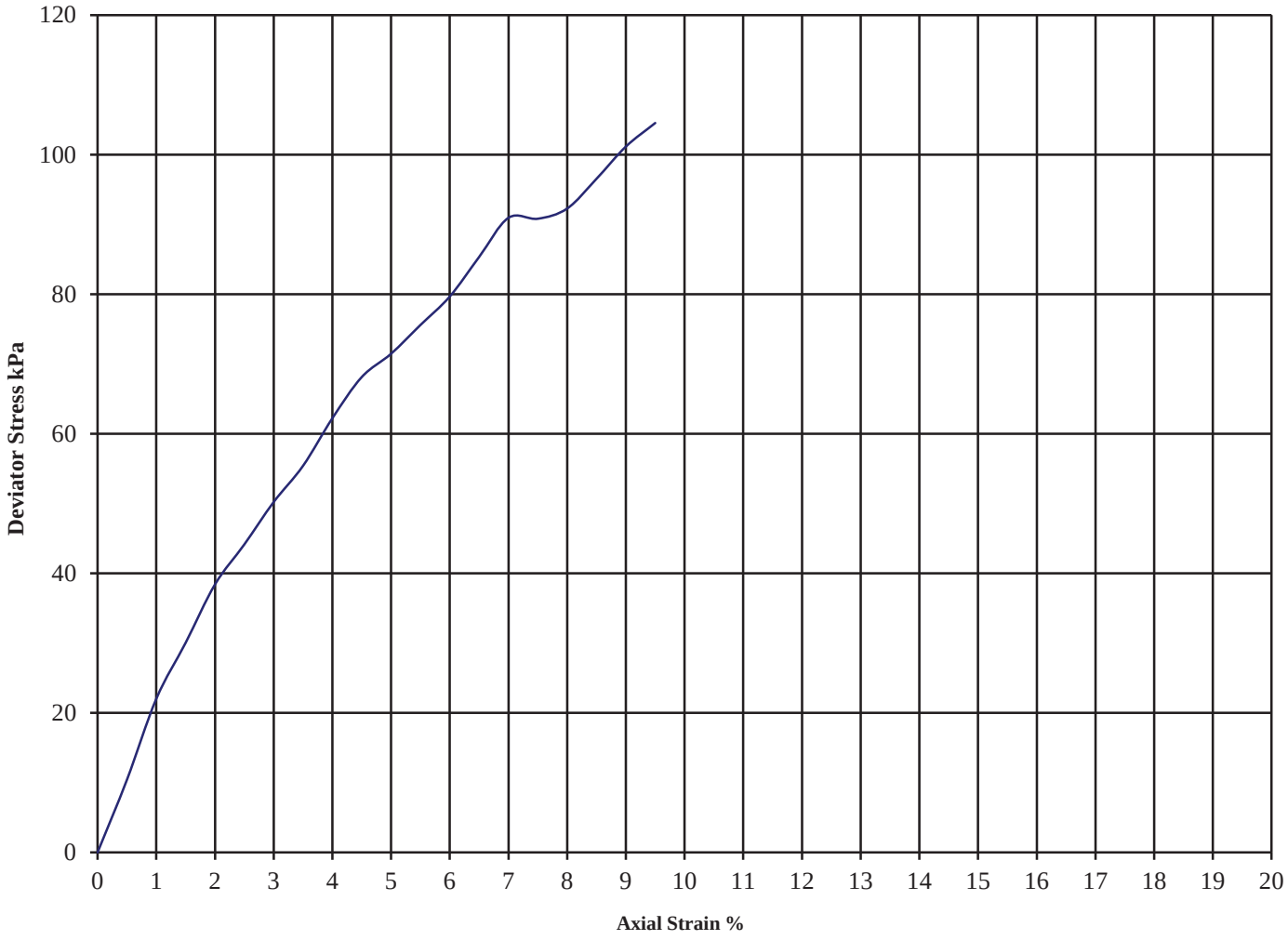
Contract No
D6340

Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BH 6** **Depth (m)** **20.00-20.45**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	33	2.12	1.60	400	105	52	9.5	Plastic	52	
Sample Description:		Firm brown slightly sandy silty CLAY. Organic laminations noted.								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
KW	IN	03/09/14

SOLMEK

Bran Sands Quayside Investigation

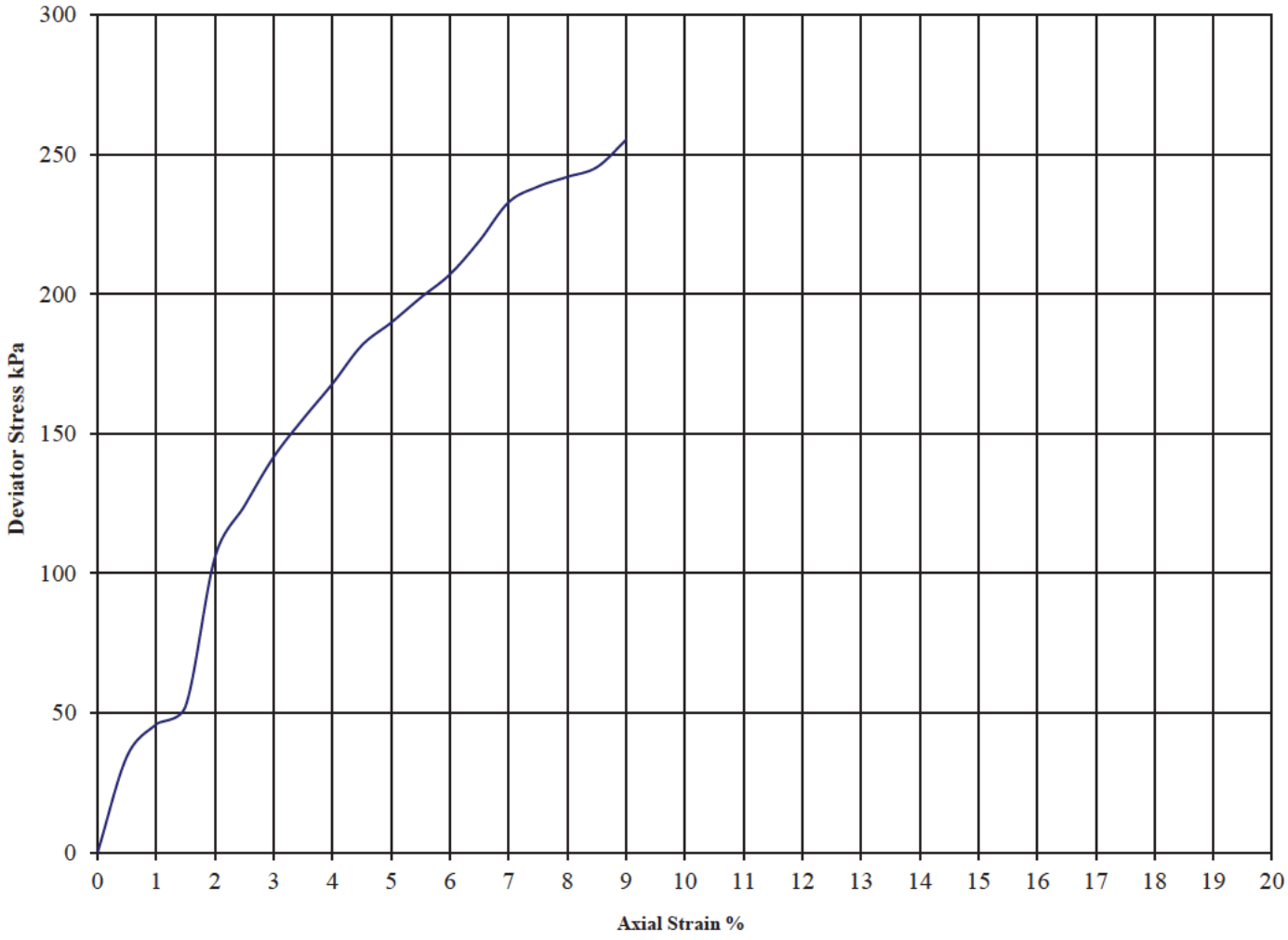
Contract No
D6340

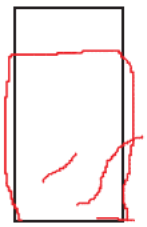
Undrained Shear Strength in Triaxial Compression

without measurement of Pore Pressure

BS1377-7:1990+A1:1994 [Preparation Method BS1377-1:1990:Clause 8.3]

Hole Reference **BH 6** **Depth (m)** **22.00-22.45**



Diameter (mm):		100	Height (mm):		200	Test:	100 mm Single Stage.			Sketch of Failure Conditions:
Stage	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Shear Strength (kPa)	
1	28	2.25	1.76	440	255	128	9.0	Ring Max	128	
Sample Description:		Stiff orangeish brown slightly sandy slightly gravelly CLAY								
Sample Condition:		Undisturbed		Rate of Strain %/min		2	Membrane Thickness		0.5mm	
Remarks:										

Operator	Checked by	Date
KW	IN	03/09/14

SOLMEK

Bran Sands Quayside Investigation

Contract No
D6340

Appendix D.5

Concrete Aggressisivity Tests

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-12974

20-Aug-14

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 14-12974

Client Reference D6340

Contract Title Bran Sands / Teesport

Description 5 Soil samples.

Date Received 13-Aug-14

Date Started 13-Aug-14

Date Completed 20-Aug-14

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12974
Client Ref D6340
Contract Title Bran Sands / Teesport

			Lab No	685071	685072	685073	685074	685075
			Sample ID	BHP6	BHP6	BHP4	BHP2	BHP3
			Depth	2.00	24.00-24.45	2.00-2.45	15.00-15.10	1.20-1.65
			Other ID					
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**					
Inorganics								
pH	DETSC 2008#			10.8	8.7	10.8	9.0	11.6
Chloride Aqueous Extract	DETSC 2055	1	mg/l	900	1400	230	1200	110
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	4.8	6.8	3.6	2.7	59
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1400	520	1400	480	1400

Key: # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 14-12974
Client Ref D6340
Contract Bran Sands / Teesport

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
685071	BHP6 2.00 SOIL		PT 1L (1kg)	Sample date not supplied	
685072	BHP6 24.00-24.45 SOIL		PT 1L (1kg)	Sample date not supplied	
685073	BHP4 2.00-2.45 SOIL		PT 1L (1kg)	Sample date not supplied	
685074	BHP2 15.00-15.10 SOIL		PT 1L (1kg)	Sample date not supplied	
685075	BHP3 1.20-1.65 SOIL		PT 1L (1kg)	Sample date not supplied	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-14985

15-Sep-14

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 14-14985

Client Reference D6340

Contract Title TEESPORT/BRAN SANDS

Description 2 Soil samples.

Date Received 08-Sep-14

Date Started 08-Sep-14

Date Completed 15-Sep-14

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-14985
Client Ref D6340
Contract Title TEESPORT/BRAN SANDS

			Lab No	696445	696446
			Sample ID	BHP5B	BHP5B
			Depth	1.50-1.95	23.00-23.45
			Other ID		
			Sample Type	B	B
			Sampling Date	n/s	n/s
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
Moisture Content	DETSC 1004*	0.1	%	24	21
Inorganics					
pH	DETSC 2008#			9.3	8.7
Chloride	DETSC 2055	1	mg/kg	85.7	1490
Nitrate as NO3	DETSC 2055	1	mg/kg	17	33
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	620	380

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 14-14985
Client Ref D6340
Contract TEESPORT/BRAN SANDS

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
696445	BHP5B 1.50-1.95 SOIL		PT 1L	Sample date not supplied	
696446	BHP5B 23.00-23.45 SOIL		GJ 1L	Sample date not supplied	

Key: P-Plastic T-Tub G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-14986

15-Sep-14

Client SOLMEK
12 Yarm Road
Stockton On Tees
Cleveland
TS18 3NA

Our Reference 14-14986

Client Reference D6340

Contract Title TEESPORT

Description One Soil sample.

Date Received 08-Sep-14

Date Started 08-Sep-14

Date Completed 15-Sep-14

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-14986
Client Ref D6340
Contract Title TEESPORT

Lab No	696447
Sample ID	BHP4A
Depth	22.45-23.00
Other ID	
Sample Type	B
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Preparation				
Moisture Content	DETSC 1004*	0.1	%	17
Inorganics				
pH	DETSC 2008#			8.6
Chloride	DETSC 2055	1	mg/kg	1570
Nitrate as NO3	DETSC 2055	1	mg/kg	49
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	370

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 14-14986
Client Ref D6340
Contract TEESPORT

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
696447	BHP4A 22.45-23.00 SOIL		PT 1L	Sample date not supplied	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Appendix D.6

Effective Stress Triaxial Compression Tests

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details

sketch showing specimen location in original sample

Depth			19.00-19.45m		
Description			Brown slightly sandy CLAY.		
Type			Undisturbed, vertical orientation.		
			1	2	3
Initial Length	L_0	(mm)	76.0	76.1	76.1
Initial Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Weight	W_0	(gr)	171.8	172.5	168.9
Initial Bulk Density	ρ_0	(Mg/m3)	1.99	2.00	1.95
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions			1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	600	850	950
Initial Back Pressure	U_{bi}	(kPa)	500	650	550
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Displacement Input	L_{IP}	(mm)	CH 2	CH 2	CH 2
Load Input	N_{IP}	(N)	CH 4	CH 4	CH 4
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	CH 3	CH 3
Sample Volume	V	(cm3)	CH 2	CH 2	CH 2
Initial Moisture	$\omega_i\%$	(%)	28	29	27
Initial Dry Density	ρ_{di}	(Mg/m3)	1.56	1.55	1.54
Initial Voids Ratio	e_i	.	0.697	0.713	0.725
Initial Degree of Saturation	S_i	(%)	100	100	99
B Value	B	.	0.96	0.96	0.94

Final Conditions			1	2	3
Final Moisture	$\omega_f\%$	(%)	27	26	24
Final Dry Density	ρ_{df}	(Mg/m3)	1.64	1.81	1.67
Final Voids Ratio	e_f	.	0.611	0.468	0.582
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Dev. Stress	Max. Dev. Stress	Max. Dev. Stress
Strain At Failure	$\varepsilon\%$	(%)	10.67	13.51	8.34
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	128.6	206.6	300.5
Minor Stress At Failure	σ_3'	(kPa)	73.0	127.0	224.0
Major Stress At Failure	σ_1'	(kPa)	201.6	333.6	524.5
Principal Stress At Failure	σ_1'/σ_3'	(kPa)	2.761	2.627	2.342

Notes

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP3 19.00-19.45 UT
Database: .\SQLEXPRESS \ System 3		Test Date	24/08/2014
Site Reference		Borehole	BHP3
Jobfile	Bran Sands, Quayside	Sample	19.00-19.45 UT
Client	Dunelm	Depth	19.00-19.45m

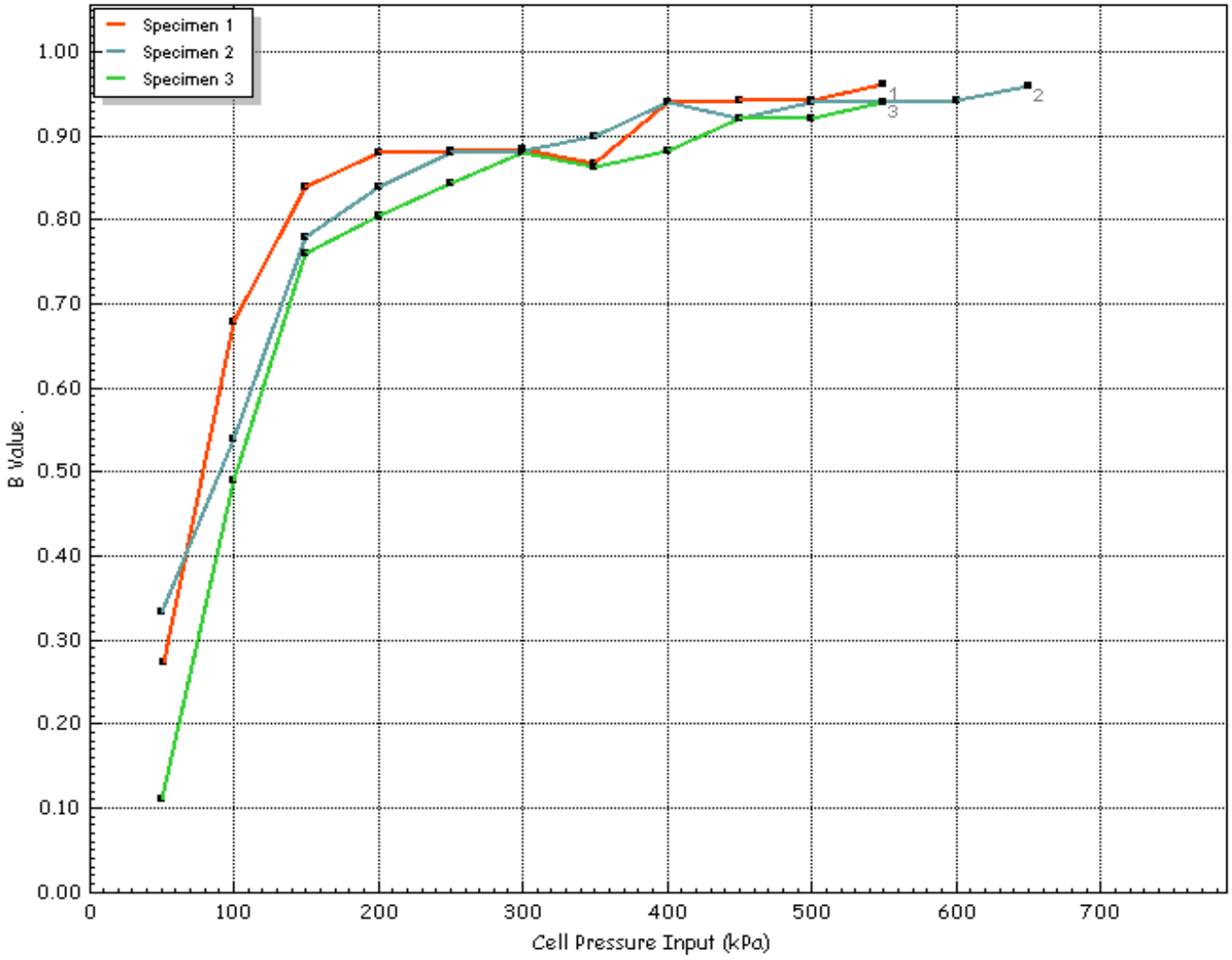
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

			1	2	3
Saturation Method			Stepped	Stepped	Stepped
Cell Pressure Input	σ	(kPa)	550	650	550
Pore Water Pressure Input	u pwp	(kPa)	544	640	541
B Value	B	.	0.96	0.96	0.94



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP3 19.00-19.45 UT
Database: .\SQLEXPRESS \ System 3		Test Date	24/08/2014
Site Reference		Borehole	BHP3
Jobfile	Bran Sands, Quayside	Sample	19.00-19.45 UT
Client	Dunelm	Depth	19.00-19.45m

Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Effective Stress Triaxial Compression

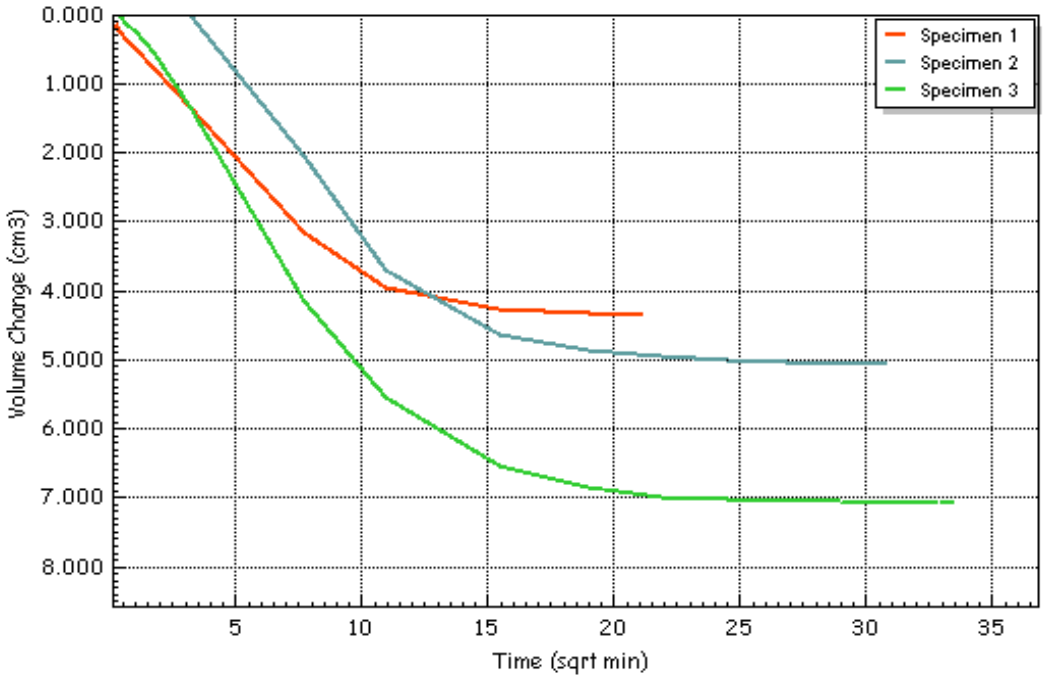
Consolidated Undrained

Consolidation Plots

Initial Conditions			1	2	3
Initial Cell Pressure	σ_3	(kPa)	600	850	950
Initial Back Pressure	u_{bi}	(kPa)	500	650	550
Pore Water Pressure Input	u_{pwp}	(kPa)	582	629	828
Drainage Method			Radial+One End	Radial+One End	Radial+One End

Final Conditions			1	2	3
PWP Dissipation %	U%	(%)	95.46	99.81	97.84
Volumetric Strain	ε_v%	(%)	5.05	5.87	8.16
Corrected Length	L_c	(mm)	74.7	74.6	74.0
Corrected Area	A_c	10.96	10.96	10.90	10.75
Corrected Volume	V_c	(cm3)	81.841	81.239	79.427
T100 Time to Failure	t_{100}	(min)	22.63	184.44	151.30
Consolidation	c_v	(m2/year)	1.318	0.162	0.197
Compress bility	m_v	(m2/MN)	0.673	2.258	0.300
Test Time	t_F	(h:m:s)	02:00:00	05:31:59	04:32:20
Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
Shear Machine Speed	d_r	(mm/min)	0.03113	0.01124	0.01359

Notes



Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP3 19.00-19.45 UT	
Database: .\SQLEXPRESS \ System 3			Test Date	24/08/2014	
Site Reference			Borehole	BHP3	
Jobfile	Bran Sands, Quayside		Sample	19.00-19.45 UT	
Client	Dunelm		Depth	19.00-19.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

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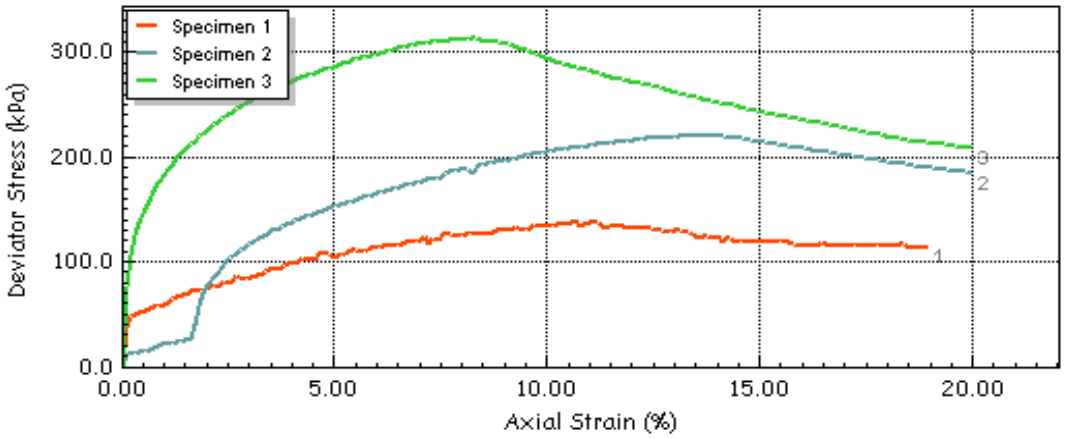
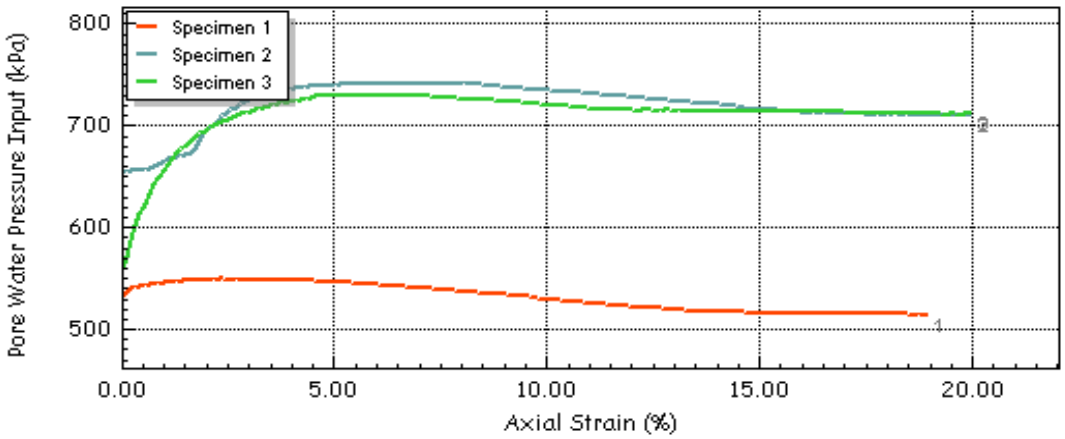
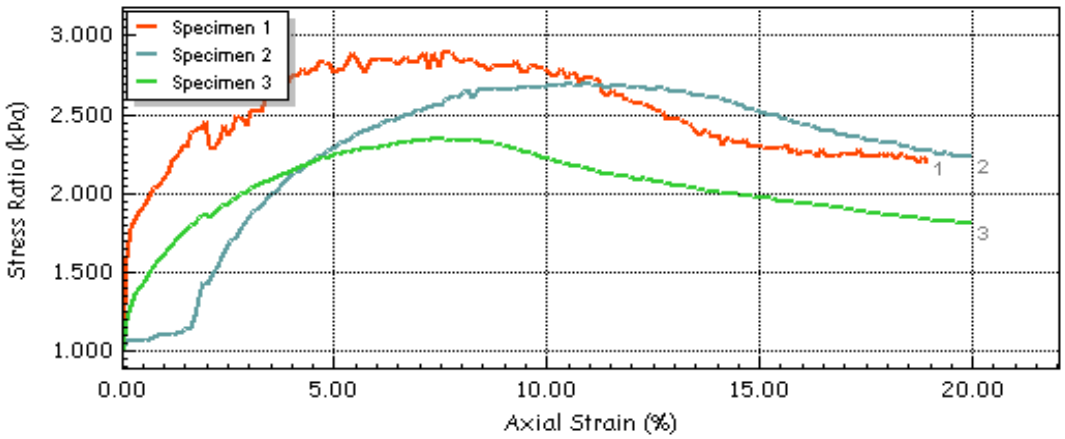
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







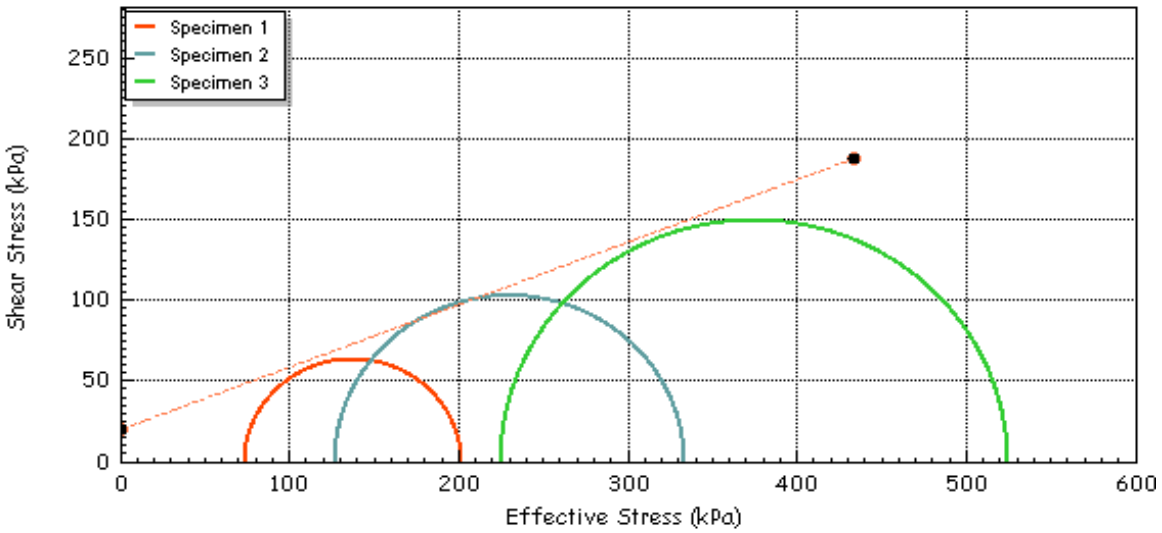
PSL Professional Soils Laboratory	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP3 19.00-19.45 UT	
	Database: .\SQLEXPRESS \ System 3		Test Date	24/08/2014	
	Site Reference		Borehole	BHP3	
	Jobfile	Bran Sands, Quayside	Sample	19.00-19.45 UT	
	Client	Dunelm	Depth	19.00-19.45m	
	Operator	David Burton	Checked	Sean Royle	Approved Anthony Watkins

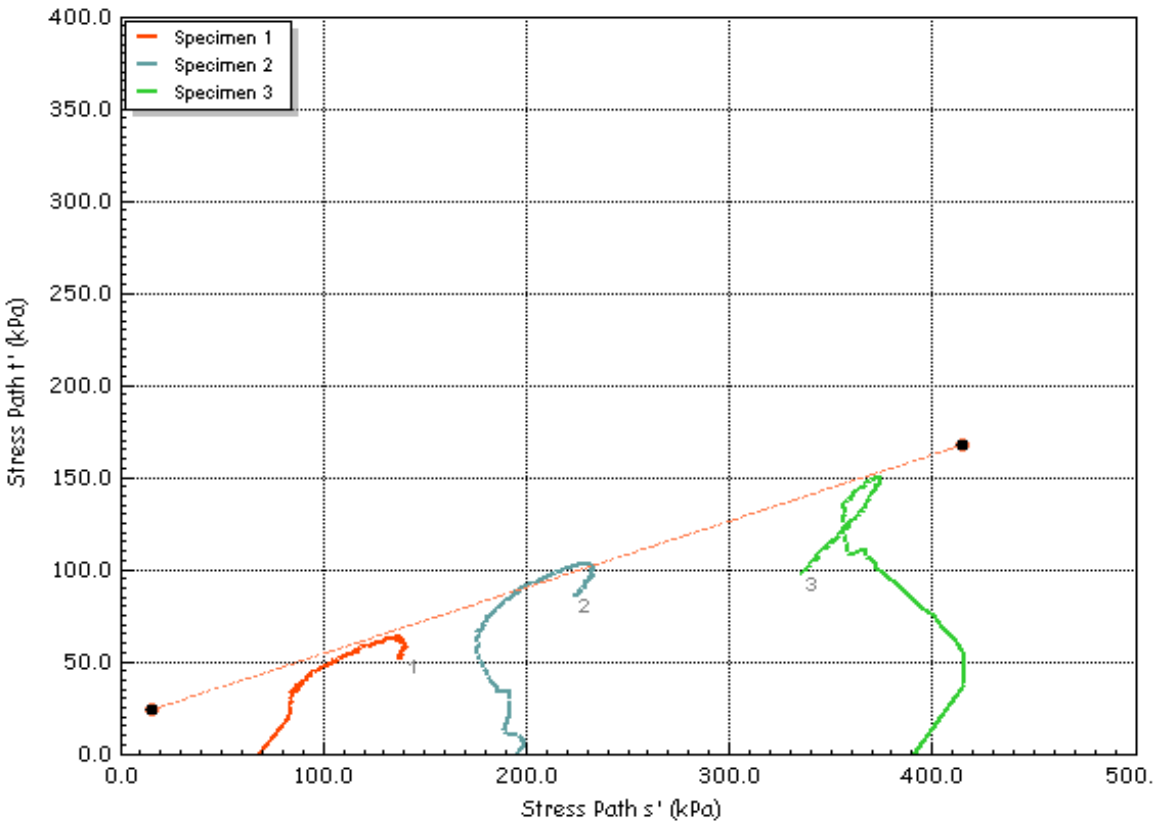
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	19.52	Effective Cohesion	c'	(kPa)	19.52
Effective Friction	ϕ'	(deg)	21.1	Effective Friction	ϕ'	(deg)	21.1





Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP3 19.00-19.45 UT	
Database: .\SQLEXPRESS \ System 3			Test Date	24/08/2014	
Site Reference			Borehole	BHP3	
Jobfile	Bran Sands, Quayside		Sample	19.00-19.45 UT	
Client	Dunelm		Depth	19.00-19.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

PSL Professional Soils Laboratory

Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details

sketch showing specimen location in original sample

Depth			21.00-21.45m		
Description			Brown slightly gravelly sandy CLAY.		
Type			Undisturbed, vertical orientation.		
			1	2	3
Initial Length	L_0	(mm)	76.1	76.1	76.0
Initial Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Weight	W_0	(gr)	186.7	188.6	187.7
Initial Bulk Density	ρ_0	(Mg/m3)	2.16	2.19	2.18
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions			1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	600	950	900
Initial Back Pressure	U_{bi}	(kPa)	500	750	500
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Displacement Input	L_{IP}	(mm)	CH 2	CH 2	CH 2
Load Input	N_{IP}	(N)	CH 4	CH 4	CH 4
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	CH 3	CH 3
Sample Volume	V	(cm3)	CH 2	CH 2	CH 2
Initial Moisture	$\omega_i\%$	(%)	17	17	17
Initial Dry Density	ρ_{di}	(Mg/m3)	1.85	1.87	1.86
Initial Voids Ratio	e_i	.	0.436	0.420	0.427
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.96	0.96	0.96

Final Conditions			1	2	3
Final Moisture	$\omega_f\%$	(%)	16	16	12
Final Dry Density	ρ_{df}	(Mg/m3)	1.89	1.92	1.93
Final Voids Ratio	e_f	.	0.405	0.379	0.371
Final Degree of Saturation	S_f	(%)	100.0	100.0	87.4
Failure Criteria		.	Max. Dev. Stress	Max. Dev. Stress	Max. Dev. Stress
Strain At Failure	$\varepsilon\%$	(%)	13.24	20.00	14.66
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	141.4	254.1	377.6
Minor Stress At Failure	σ_3'	(kPa)	75.0	159.0	245.0
Major Stress At Failure	σ_1'	(kPa)	216.4	413.1	622.6
Principal Stress At Failure	σ_1'/σ_3'	(kPa)	2.886	2.598	2.541

Notes

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP4A 21.00-21.45m
Database: .\SQLEXPRESS \ System 3		Test Date	11/09/2014
Site Reference		Borehole	BHP4A
Jobfile	Wilton	Sample	21.00-21.45m
Client	Dunelm	Depth	21.00-21.45m

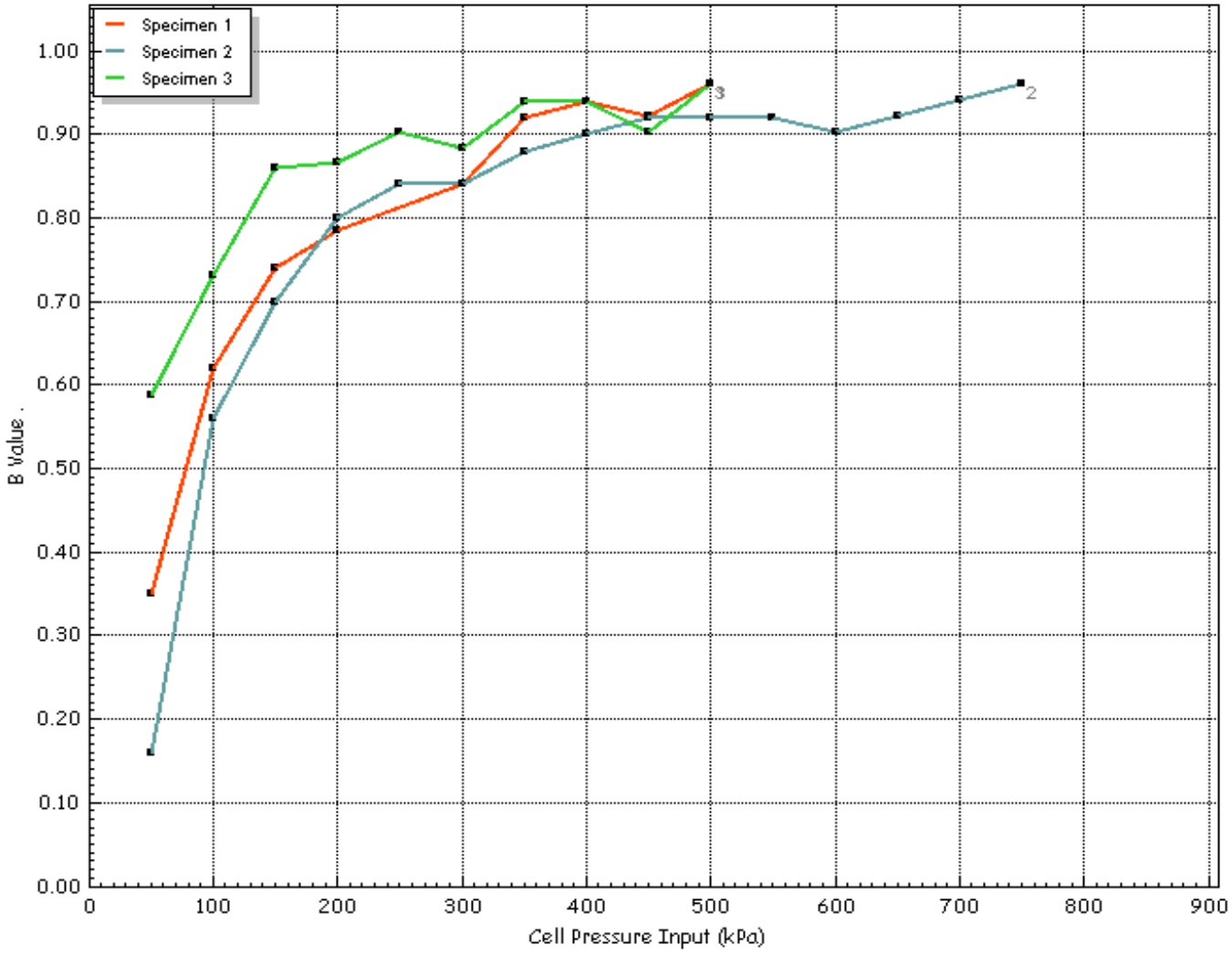
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

			1	2	3
Saturation Method			Stepped	Stepped	Stepped
Cell Pressure Input	σ	(kPa)	500	750	500
Pore Water Pressure Input	u pwp	(kPa)	491	740	494
B Value	B	.	0.96	0.96	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP4A 21.00-21.45m
Database: .\SQLEXPRESS \ System 3		Test Date	11/09/2014
Site Reference		Borehole	BHP4A
Jobfile	Wilton	Sample	21.00-21.45m
Client	Dunelm	Depth	21.00-21.45m

Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Professional Soils Laboratory

Effective Stress Triaxial Compression

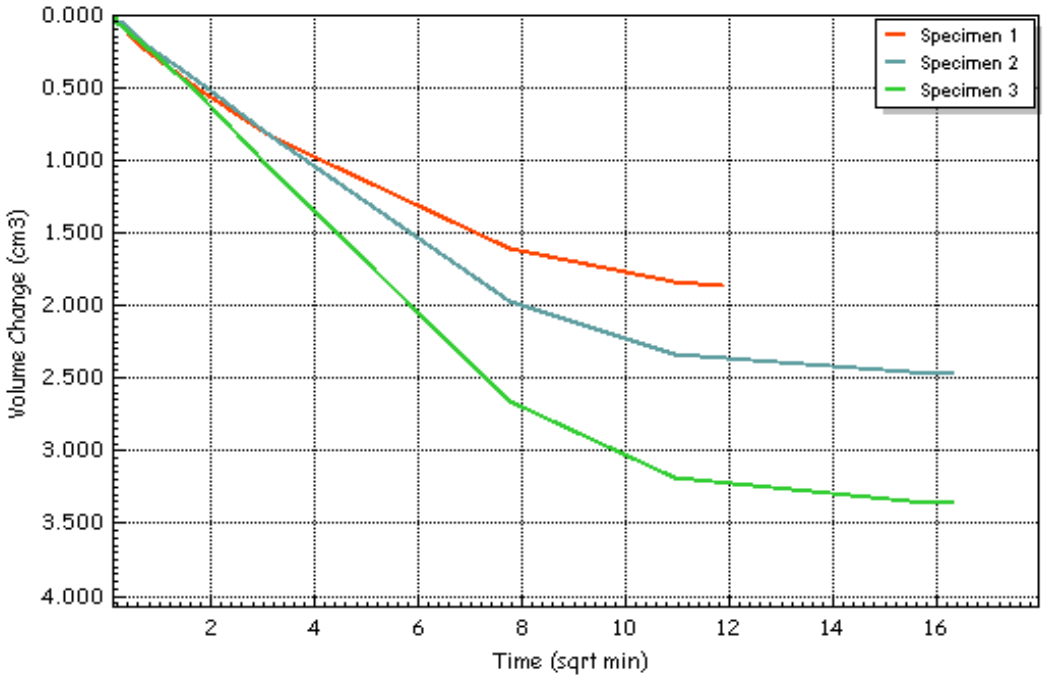
Consolidated Undrained

Consolidation Plots

Initial Conditions			1	2	3
Initial Cell Pressure	σ_3	(kPa)	600	950	900
Initial Back Pressure	u_{bi}	(kPa)	500	750	500
Pore Water Pressure Input	u_{pwp}	(kPa)	588	896	826
Drainage Method			Radial+One End	Radial+One End	Radial+One End

Final Conditions			1	2	3
PWP Dissipation %	U%	(%)	96.32	95.21	96.79
Volumetric Strain	ε_v%	(%)	2.16	2.87	3.90
Corrected Length	L_c	(mm)	75.6	75.4	75.0
Corrected Area	A_c	11.18	11.18	11.12	11.05
Corrected Volume	V_c	(cm3)	84.441	83.832	82.833
T100 Time to Failure	t_{100}	(min)	48.52	84.69	84.64
Consolidation	c_v	(m2/year)	0.615	0.352	0.352
Compress bility	m_v	(m2/MN)	0.260	0.206	0.126
Test Time	t_F	(h:m:s)	02:00:00	02:32:26	02:32:21
Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
Shear Machine Speed	d_r	(mm/min)	0.03148	0.02472	0.02462

Notes



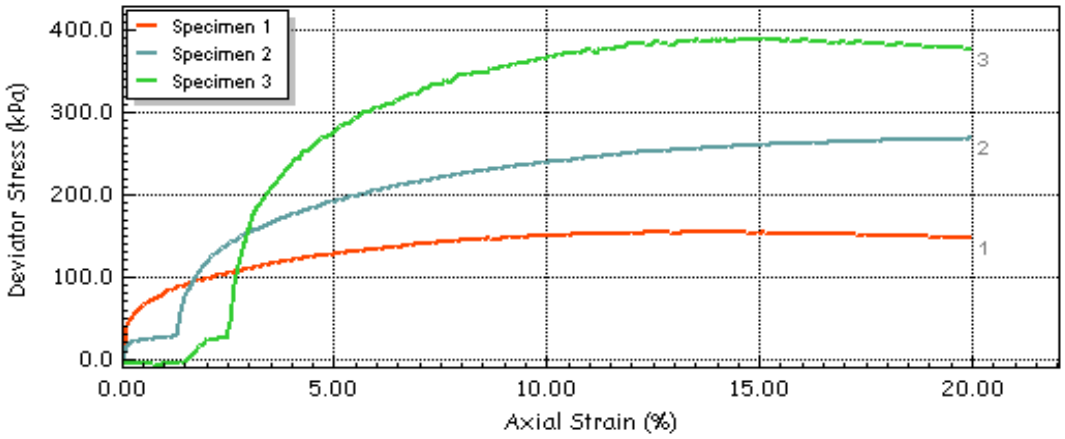
Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP4A 21.00-21.45m	
Database: .\SQLEXPRESS \ System 3			Test Date	11/09/2014	
Site Reference			Borehole	BHP4A	
Jobfile	Wilton		Sample	21.00-21.45m	
Client	Dunelm		Depth	21.00-21.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

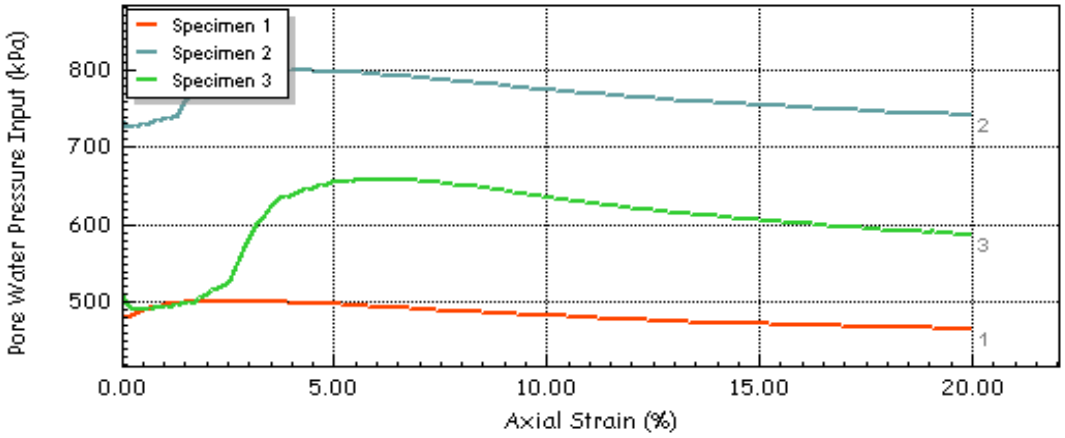
Professional Soils Laboratory

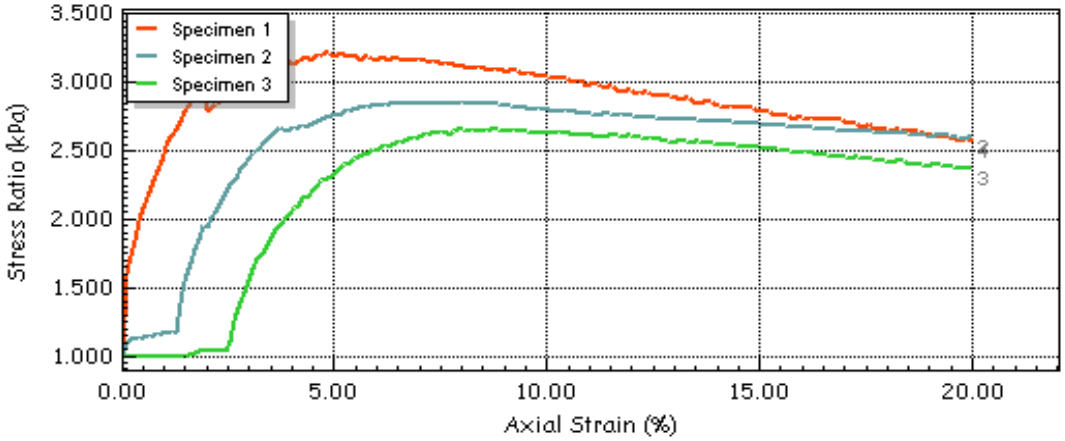
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







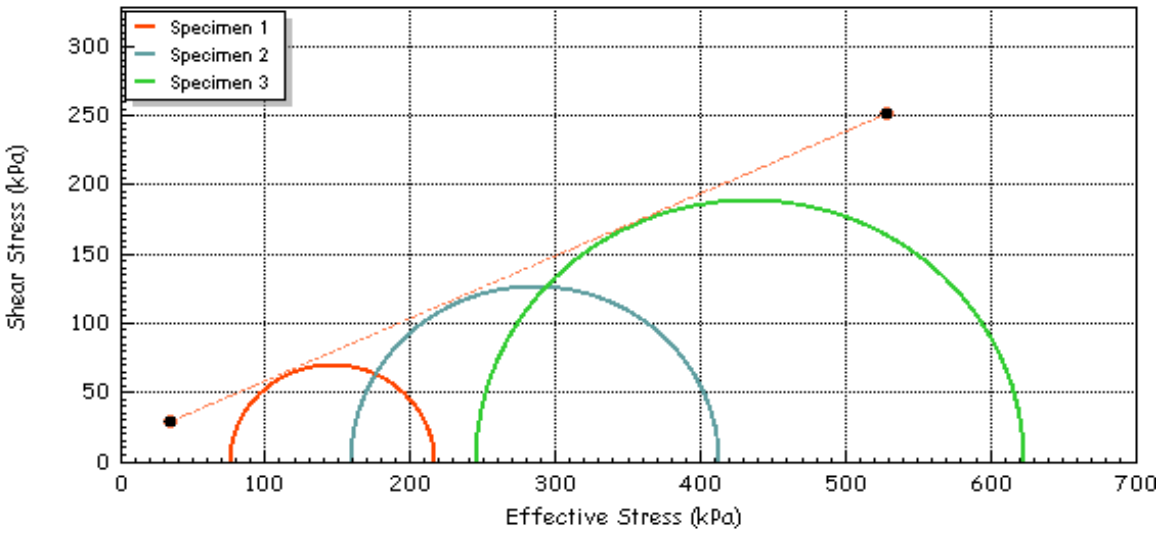
PSL Professional Soils Laboratory	Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP4A 21.00-21.45m	
	Database: .\SQLEXPRESS \ System 3		Test Date	11/09/2014	
	Site Reference		Borehole	BHP4A	
	Jobfile	Wilton	Sample	21.00-21.45m	
	Client	Dunelm	Depth	21.00-21.45m	
	Operator	David Burton	Checked	Sean Royle	Approved Anthony Watkins

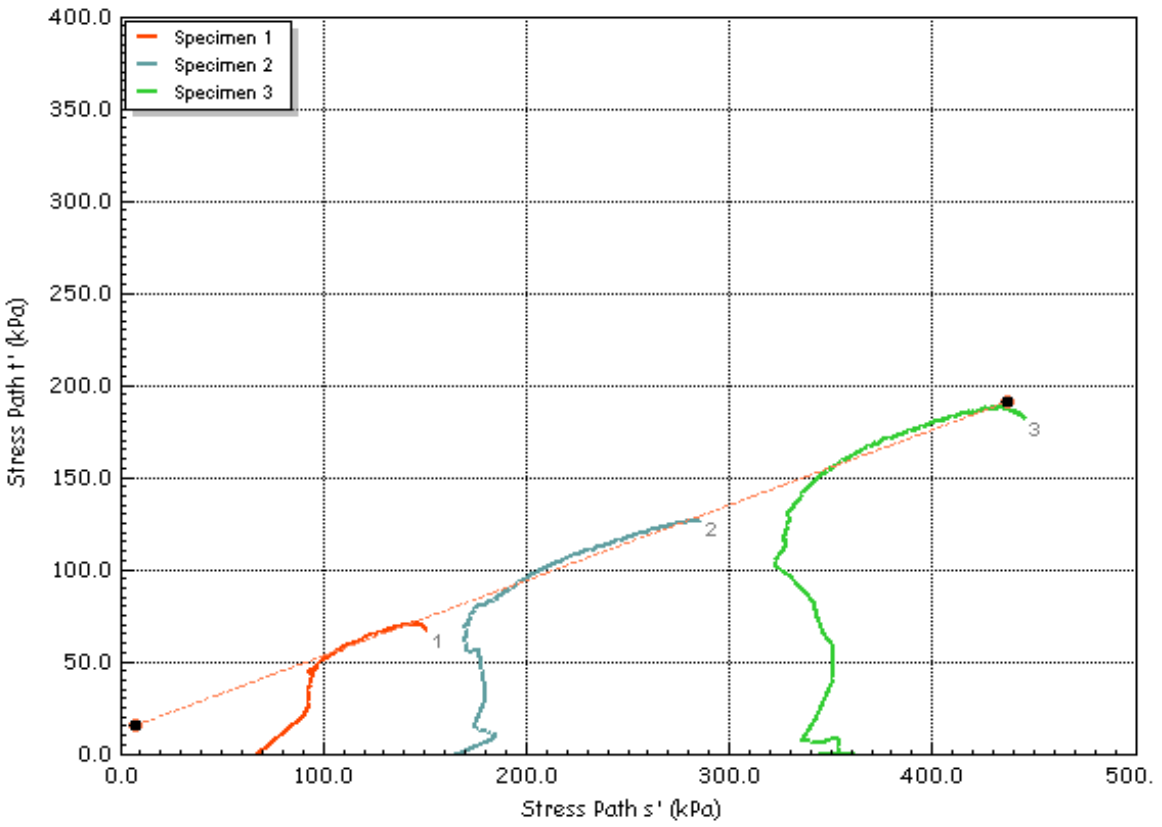
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	13.74	Effective Cohesion	c'	(kPa)	13.74
Effective Friction	ϕ'	(deg)	24.2	Effective Friction	ϕ'	(deg)	24.2





Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP4A 21.00-21.45m
Database: .\SQLEXPRESS \ System 3		Test Date	11/09/2014
Site Reference		Borehole	BHP4A
Jobfile	Wilton	Sample	21.00-21.45m
Client	Dunelm	Depth	21.00-21.45m

Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Professional Soils Laboratory

Effective Stress Triaxial Compression

Consolidated Undrained

Summary Report

Sample Details

sketch showing specimen location in original sample

Depth			22.00-22.45m		
Description			Brown slightly gravelly sandy CLAY.		
Type			Undisturbed, vertical orientation.		
			1	2	3
Initial Length	L_0	(mm)	76.0	76.0	76.0
Initial Diameter	D_0	(mm)	38.0	38.0	38.0
Initial Weight	W_0	(gr)	193.6	189.3	192.1
Initial Bulk Density	ρ_0	(Mg/m3)	2.25	2.20	2.23
Particle Density	ρ_s	(Mg/m3)	2.65	2.65	2.65

Initial Conditions			1	2	3
Initial Cell Pressure	σ_{3i}	(kPa)	750	650	900
Initial Back Pressure	U_{bi}	(kPa)	650	450	500
Membrane Thickness	m_b	(mm)	0.400	0.400	0.400
Displacement Input	L_{IP}	(mm)	CH 2	CH 2	CH 2
Load Input	N_{IP}	(N)	CH 4	CH 4	CH 4
Pore Water Pressure Input	u_{pwp}	(kPa)	CH 3	CH 3	CH 3
Volume Input	V	(cm3)	CH 2	CH 2	CH 2
Initial Moisture	$\omega_i\%$	(%)	15	15	15
Initial Dry Density	ρ_{di}	(Mg/m3)	1.96	1.90	1.93
Initial Voids Ratio	e_i	.	0.353	0.392	0.373
Initial Degree of Saturation	S_i	(%)	100	100	100
B Value	B	.	0.96	0.96	0.96

Final Conditions			1	2	3
Final Moisture	$\omega_f\%$	(%)	14	15	14
Final Dry Density	ρ_{df}	(Mg/m3)	1.99	1.96	1.98
Final Voids Ratio	e_f	.	0.329	0.352	0.338
Final Degree of Saturation	S_f	(%)	100.0	100.0	100.0
Failure Criteria		.	Max. Dev. Stress	Max. Dev. Stress	Max. Dev. Stress
Strain At Failure	$\varepsilon\%$	(%)	13.34	11.91	19.98
Stress At Failure	$(\sigma_1-\sigma_3)$	(kPa)	256.1	315.1	464.5
Minor Stress At Failure	σ_3'	(kPa)	112.0	152.0	246.0
Major Stress At Failure	σ_1'	(kPa)	368.1	467.1	710.5
Principal Stress At Failure	σ_1'/σ_3'	(kPa)	3.287	3.073	2.888

Notes

Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP5B 22.00-22.45m UT22
Database: .\SQLEXPRESS \ sys1 03FEB2014 final		Test Date	10/09/2014
Site Reference		Borehole	BHP5B
Jobfile	Wilton	Sample	22.00-22.45m
Client	Dunelm	Depth	22.00-22.45m

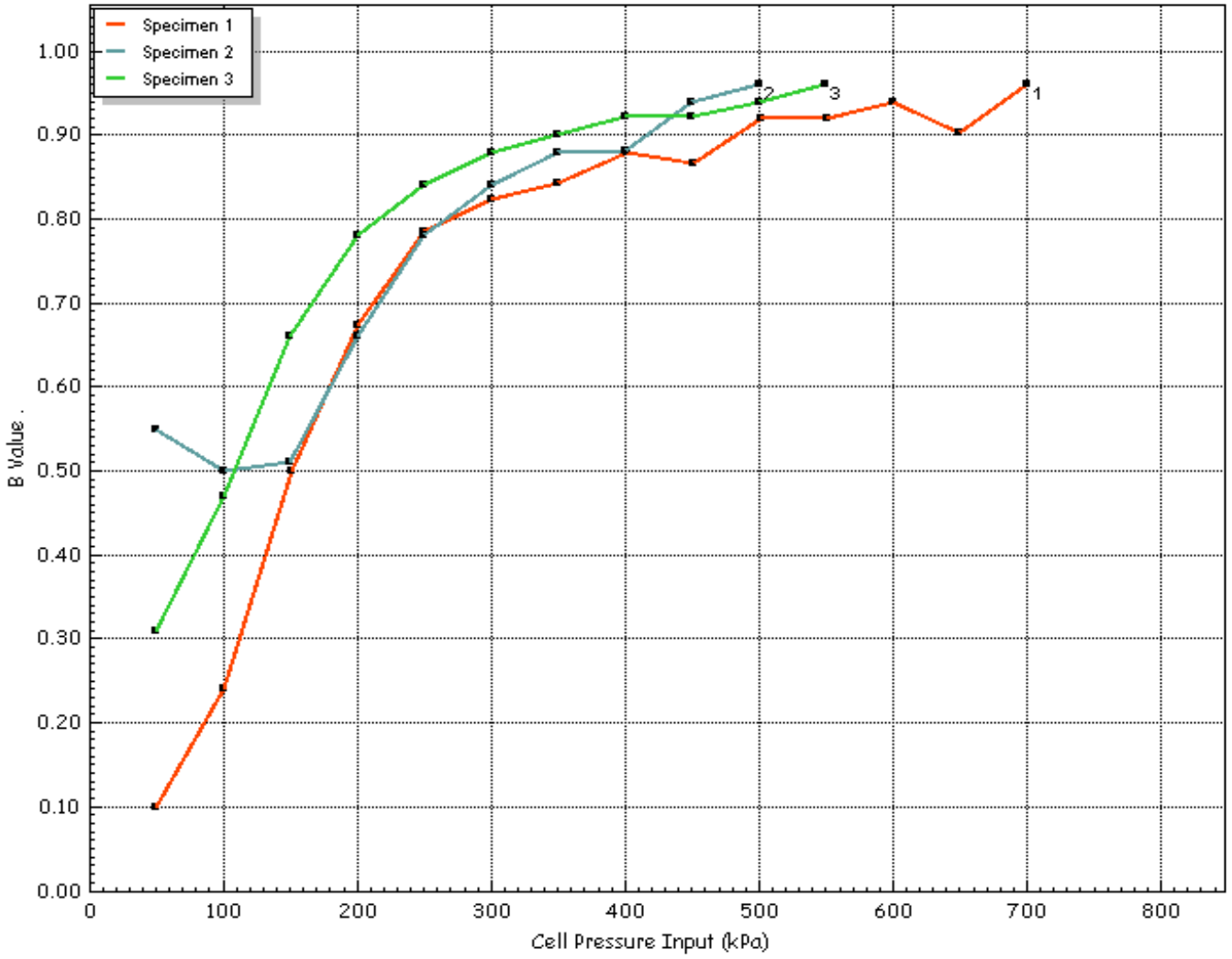
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Effective Stress Triaxial Compression

Consolidated Undrained

Saturation Plots

			1	2	3
Saturation Method			Stepped	Stepped	Stepped
Cell Pressure Input	σ	(kPa)	700	500	550
Pore Water Pressure Input	u pwp	(kPa)	683	481	534
B Value	B	.	0.96	0.96	0.96



Test Method	BS1377-8 : 1990 : Clause 7	Test Name	BHP5B 22.00-22.45m UT22
Database: .\SQLEXPRESS \ sys1 03FEB2014 final		Test Date	10/09/2014
Site Reference		Borehole	BHP5B
Jobfile	Wilton	Sample	22.00-22.45m
Client	Dunelm	Depth	22.00-22.45m

Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

Effective Stress Triaxial Compression

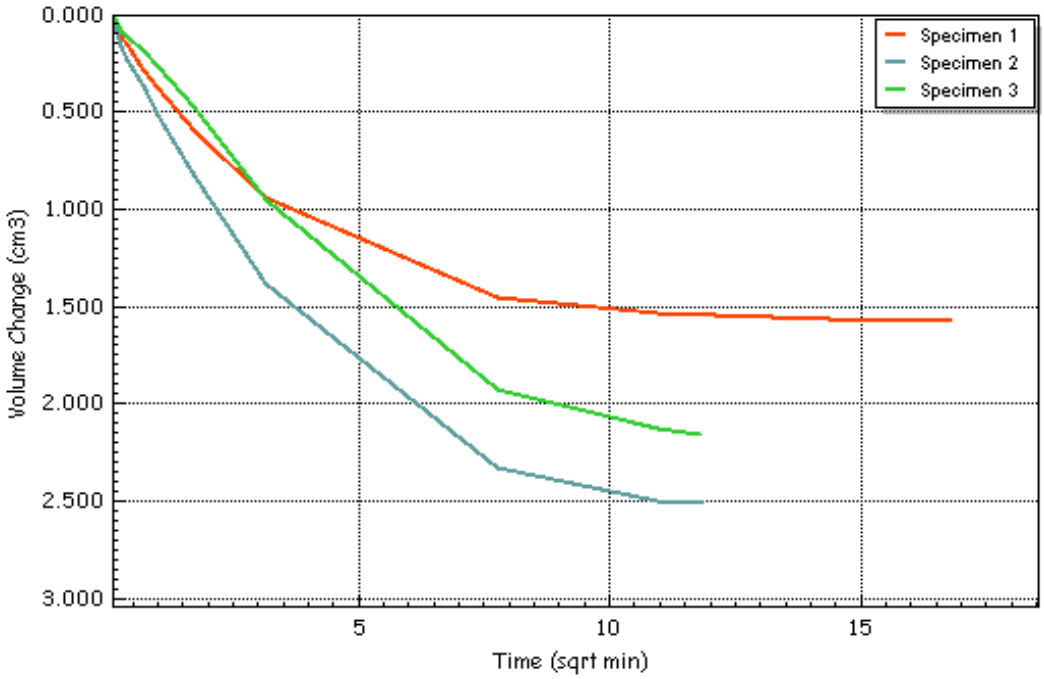
Consolidated Undrained

Consolidation Plots

Initial Conditions					
			1	2	3
Initial Cell Pressure	σ_3	(kPa)	750	650	900
Initial Back Pressure	u_{bi}	(kPa)	650	450	500
Pore Water Pressure Input	u_{pwp}	(kPa)	732	623	762
Drainage Method			Radial+One End	Radial+One End	Radial+One End

Final Conditions					
			1	2	3
PWP Dissipation %	U%	(%)	100.00	100.00	98.09
Volumetric Strain	ε_v%	(%)	1.83	2.91	2.50
Corrected Length	L_c	(mm)	75.5	75.3	75.4
Corrected Area	A_c	11.20	11.20	11.12	11.15
Corrected Volume	V_c	(cm3)	84.619	83.682	84.036
T100 Time to Failure	t_{100}	(min)	25.22	25.91	54.20
Consolidation	c_v	(m2/year)	1.182	1.151	0.550
Compress bility	m_v	(m2/MN)	0.215	0.165	0.097
Test Time	t_F	(h:m:s)	02:00:00	02:00:00	02:00:00
Estimated Strain to Failure	ε%	(%)	5.0	5.0	5.0
Shear Machine Speed	d_r	(mm/min)	0.03147	0.03136	0.03140

Notes



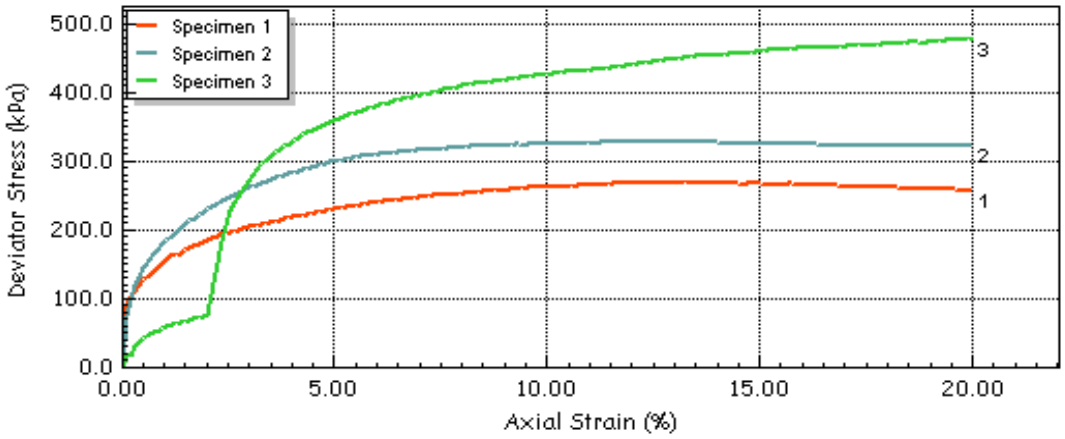
Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP5B 22.00-22.45m UT22	
Database: .\SQLEXPRESS \ sys1 03FEB2014 final			Test Date	10/09/2014	
Site Reference			Borehole	BHP5B	
Jobfile	Wilton		Sample	22.00-22.45m	
Client	Dunelm		Depth	22.00-22.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

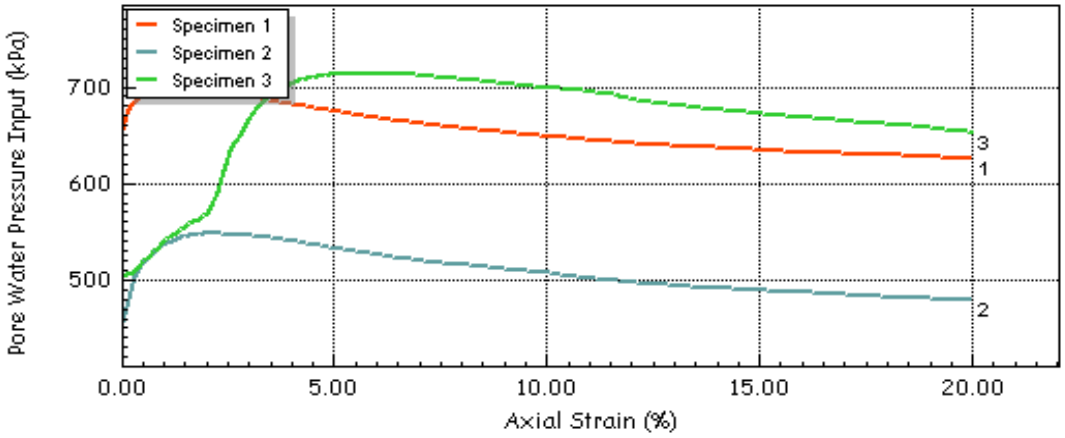
Professional Soils Laboratory

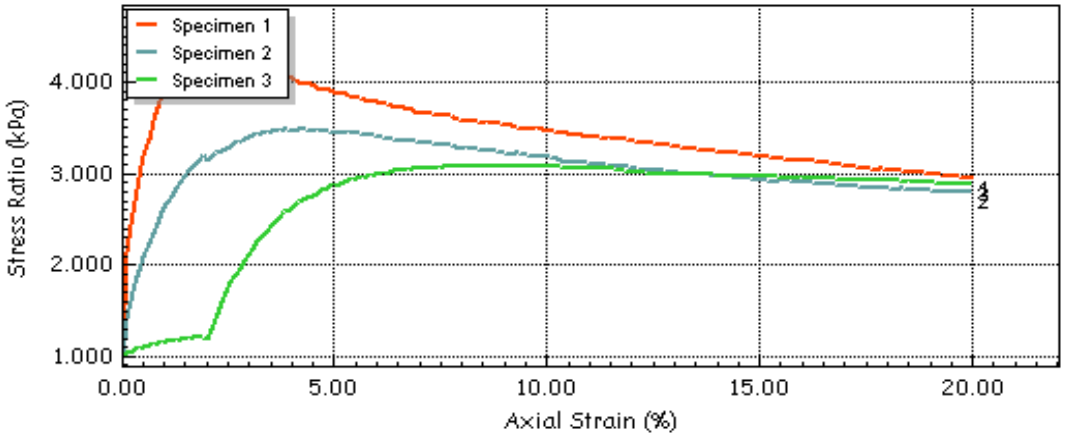
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots







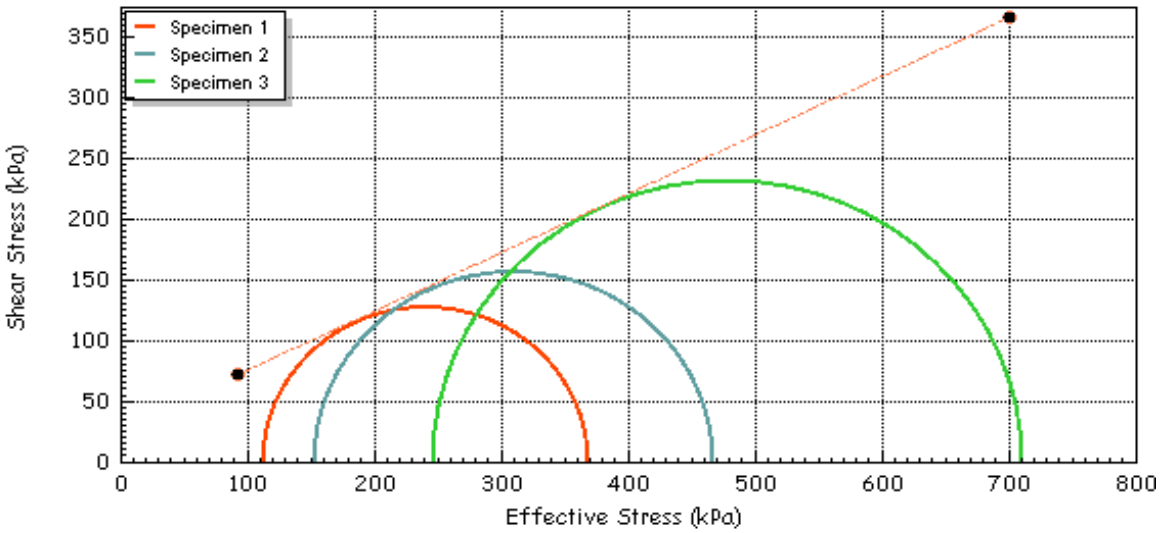
Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP5B 22.00-22.45m UT22	
Database: .\SQLEXPRESS \ sys1 03FEB2014 final			Test Date	10/09/2014	
Site Reference			Borehole	BHP5B	
Jobfile	Wilton		Sample	22.00-22.45m	
Client	Dunelm		Depth	22.00-22.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

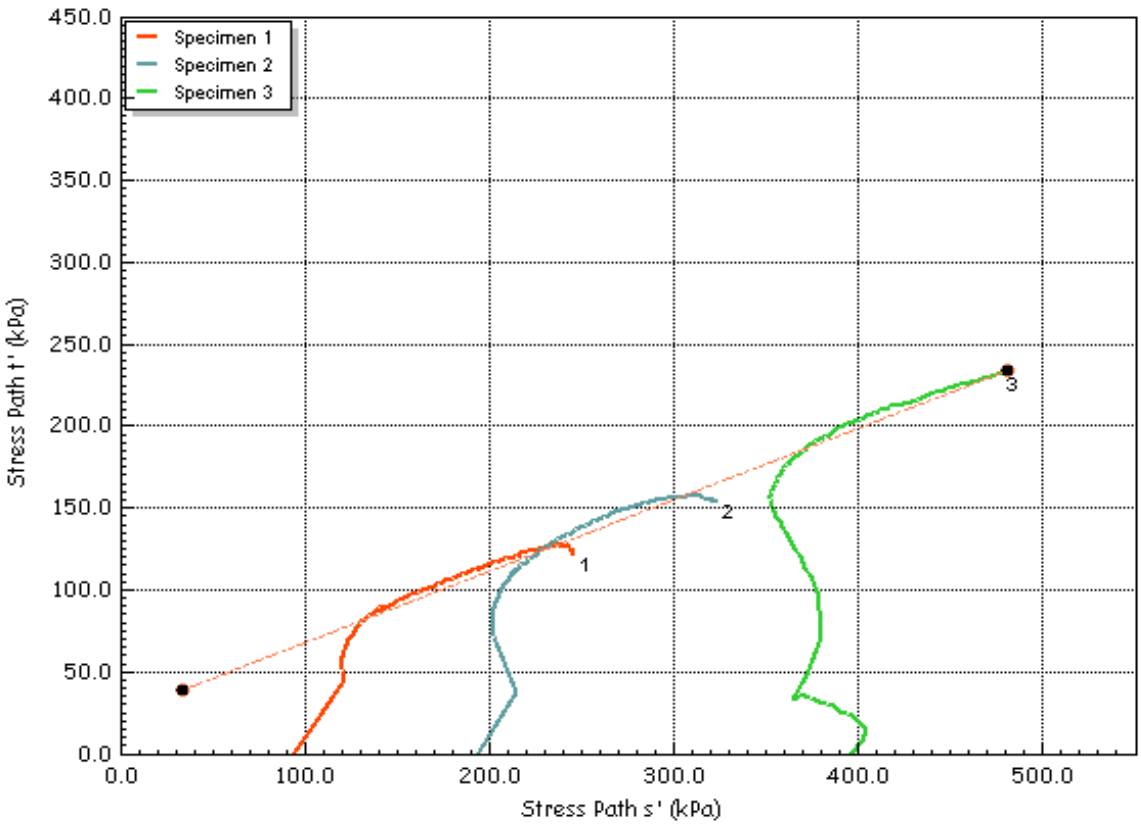
Effective Stress Triaxial Compression

Consolidated Undrained

Shear Stage Plots

Effective Cohesion	c'	(kPa)	27.22	Effective Cohesion	c'	(kPa)	27.22
Effective Friction	ϕ'	(deg)	25.9	Effective Friction	ϕ'	(deg)	25.9





Test Method	BS1377-8 : 1990 : Clause 7		Test Name	BHP5B 22.00-22.45m UT22	
Database: .\SQLEXPRESS \ sys1 03FEB2014 final			Test Date	10/09/2014	
Site Reference			Borehole	BHP5B	
Jobfile	Wilton		Sample	22.00-22.45m	
Client	Dunelm		Depth	22.00-22.45m	
Operator	David Burton	Checked	Sean Royle	Approved	Anthony Watkins

PSL Professional Soils Laboratory

Professional Soils Laboratory

Appendix D.7

Point Load Tests

SUMMARY OF POINT LOAD TEST RESULTS

POINT LOAD TEST - ISRM

Borehole Number	Depth (m)	Test Type	Orientation	Dimensions (mm)		Area	D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure	Remarks
			Par / Perp	W	D	(mm2)		(mm)	MPa	kN	(MPa)	F	(MPa)	Type	
BHP5B	30.00	A	Par	84	56	3136	5989.32	77.39	1.779	2.38	0.397	1.217	**0.48**	Valid	
BHP5B	30.90	A	Par	84	37	1369	3957.23	62.91	1.856	2.48	0.626	1.109	**0.69**	Valid	
BHP5B	32.06	A	Par	84	49	2401	5240.65	72.39	1.701	2.27	0.433	1.181	**0.51**	Valid	
BHP5B	33.80	A	Par	84	38	1444	4064.18	63.75	1.962	2.62	0.644	1.116	**0.72**	Valid	
BHP5B	35.05	A	Par	84	41	1681	4385.04	66.22	1.651	2.20	0.503	1.135	**0.57**	Valid	
BHP5B	36.08	A	Par	84	34	1156	3636.37	60.30	1.702	2.27	0.625	1.088	**0.68**	Valid	
BHP5B	38.73	A	Par	84	62	3844	6631.03	81.43	1.295	1.73	0.261	1.245	**0.32**	Valid	
BHP5B	39.50	A	Par	84	43	1849	4598.94	67.82	1.473	1.97	0.428	1.147	**0.49**	Valid	
BHP5B	40.86	A	Par	84	57	3249	6096.27	78.08	1.598	2.13	0.350	1.222	**0.43**	Valid	
BHP5B	42.13	A	Par	84	39	1521	4171.13	64.58	1.348	1.80	0.431	1.122	**0.48**	Valid	
BHP5B	43.57	A	Par	84	28	784	2994.66	54.72	1.607	2.15	0.716	1.041	**0.75**	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular

PSL
Professional Soils Laboratory

BRAN SANDS. **Contract No:** **PSL14/4475.** **Client Ref:** **D6340.**

Checked [redacted] **Date** 16/09/2014 **Approved B** [redacted] **Date** 16/09/2014

SUMMARY OF POINT LOAD TEST RESULTS

POINT LOAD TEST - ISRM

Borehole Number	Depth (m)	Test Type	Orientation	Dimensions (mm)			D_e^2	D_e	Failure Load (P)		I_s	Corr Fac	I_{s50}	Failure	Remarks
			Par / Perp	L	D			(mm)	MPa	kN	(MPa)	F	(MPa)	Type	
BHP5B	30.00	D	Perp		84		7056	84.00	0.403	0.54	0.076	1.263	**0.10**	Valid	
BHP5B	30.90	D	Perp		84		7056	84.00	0.340	0.45	0.064	1.263	**0.08**	Valid	
BHP5B	32.06	D	Perp		84		7056	84.00	0.396	0.53	0.075	1.263	**0.09**	Valid	
BHP5B	33.80	D	Perp		84		7056	84.00	0.598	0.80	0.113	1.263	**0.14**	Valid	
BHP5B	35.05	D	Perp		84		7056	84.00	0.517	0.69	0.098	1.263	**0.12**	Valid	
BHP5B	36.08	D	Perp		84		7056	84.00	0.854	1.14	0.162	1.263	**0.20**	Valid	
BHP5B	38.73	D	Perp		84		7056	84.00	0.714	0.95	0.135	1.263	**0.17**	Valid	
BHP5B	39.50	D	Perp		84		7056	84.00	0.654	0.87	0.124	1.263	**0.16**	Valid	
BHP5B	40.86	D	Perp		84		7056	84.00	0.572	0.76	0.108	1.263	**0.14**	Valid	
BHP5B	42.13	D	Perp		84		7056	84.00	0.478	0.64	0.090	1.263	**0.11**	Valid	
BHP5B	43.57	D	Perp		84		7056	84.00	0.608	0.81	0.115	1.263	**0.15**	Valid	

Note All testing carried out on samples at as received water content

Par = parallel, Perp = perpendicular

PSL
Professional Soils Laboratory

BRAN SANDS. **Contract No:** **PSL14/4475.** **Client Ref:** **D6340.**

Checked By [redacted] **Date** 16/09/2014 **Approved B** [redacted] **Date** 16/09/2014

Appendix D.8

Unconfined Compressive Strength Tests

Professional Soils Laboratory

5/7 Hexthorpe Road
Hexthorpe, Doncaster, DN4 0AR
tel: +44 (0)844 8156641
fax: +44 (0)844 8156642
e-mail: awatkins@prosoils.co.uk

Date: 16-Sep-14
Contract Number: PSL14/4475
Location: BRAN SANDS.
Sample Type: Core
Sample Preparation: Cutting & GRINDING
Operator: J.Melville.

Determination of Unconfined Compressive Strength.

ISRM Suggested Methods, pp 111 –116, 1981.

Borehole Number	Depth Top (m)	Depth Bottom (m)	Diameter (mm)	Length (mm)	Height: ratio	Initial mass g	Bulk Density Mg/m3	MC %	Dry Density Mg/m3	Load Failure	UCS(MPA)	Mode OF FAILURE	Date Tested	Remarks
BHP5B	30.00	30.30	84.00	147.00	1.8	2079	2.55	5.1	2.43	27.2	4.9	Brittle	16-Sep-14	
BHP5B	30.90	31.18	84.00	152.00	1.8	2155	2.56	4.9	2.44	16.9	3.0	Brittle	16-Sep-14	
BHP5B	32.06	32.54	84.00	164.00	2.0	2341	2.58	5.3	2.45	20.0	3.6	Brittle	16-Sep-14	
BHP5B	33.80	34.19	84.00	173.00	2.1	2461	2.57	4.9	2.45	19.9	3.6	Brittle	16-Sep-14	
BHP5B	38.73	38.95	84.00	159.00	1.9	2262	2.57	5.5	2.43	14.3	2.6	Brittle	16-Sep-14	

Checked by: ... [redacted] .. Date 16/09/2014

Approved by: ... [redacted] .. Date 16/09/2014

Appendix E

Geoenvironmental Laboratory Results

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Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-12959

19-Aug-14

Client Dunelm Geotechnical & Environmental Ltd
Foundation House
St. John's Road
Meadowfield
Durham
DH7 8TZ

Our Reference 14-12959

Client Reference D6340

Contract Title Bran Sands Quayside Investigation

Description 9 Soil samples, 9 Leachate samples.

Date Received 13-Aug-14

Date Started 13-Aug-14

Date Completed 19-Aug-14

Test Procedures Identified by prefix DETSn (details on request), Asbestos Analysis DETSC 1101.

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]
Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684974	684975	684976	684977	684978	684979
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5
			Depth	0.10	1.00	9.80	0.30	1.00	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	9.0	8.6	6.0	4.2	4.4	7.7
Boron (water soluble)	DETSC 2123#	0.2	mg/kg	5.4	4.6	2.7	4.9	5.9	5.5
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.6	0.1	0.4	0.7	0.6
Chromium	DETSC 2301#	0.15	mg/kg	49	220	51	370	810	600
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	15	15	3.1	14	22	21
Lead	DETSC 2301#	0.3	mg/kg	32	17	35	12	14	14
Mercury	DETSC 2325#	0.05	mg/kg	0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	8.0	11	19	5.3	5.8	8.9
Selenium	DETSC 2301#	0.5	mg/kg	4.7	13	< 0.5	6.0	8.3	13
Zinc	DETSC 2301#	1	mg/kg	89	41	26	42	42	30
Inorganics									
pH	DETSC 2008#			11.1	11.0	9.5	11.6	12.2	12.3
Cyanide total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Cyanide free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
FOC	DETSC 2002	0.001		0.016	0.010	0.003	0.013	0.013	0.009
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1300	1500	350	700	73	96
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.06	0.07	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	3.5	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	12	3.1	23	18	11	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	37	5.5	1100	35	16	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	49	< 10	1200	53	27	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	49	< 10	1200	53	27	< 10

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684974	684975	684976	684977	684978	684979
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5
			Depth	0.10	1.00	9.80	0.30	1.00	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.4	0.2	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.1	< 0.1	< 0.1	0.7	0.3	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	1.3	< 0.1	< 0.1	6.1	3.2	0.2
Anthracene	DETSC 3301	0.1	mg/kg	0.3	< 0.1	< 0.1	1.8	1.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	3.3	< 0.1	< 0.1	9.0	5.8	0.4
Pyrene	DETSC 3301	0.1	mg/kg	2.8	< 0.1	< 0.1	7.4	4.5	0.3
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	1.6	< 0.1	< 0.1	3.5	2.5	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	1.6	< 0.1	< 0.1	3.2	2.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.4	< 0.1	< 0.1	2.5	1.9	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.7	< 0.1	< 0.1	1.4	1.0	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	1.7	< 0.1	< 0.1	3.1	1.9	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	1.2	< 0.1	< 0.1	2.3	1.4	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.2	< 0.1	< 0.1	0.4	0.3	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.2	< 0.1	< 0.1	2.4	1.5	< 0.1
PAH	DETSC 3301	1.6	mg/kg	18	< 1.6	< 1.6	44	28	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684974	684975	684976	684977	684978	684979
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5
			Depth	0.10	1.00	9.80	0.30	1.00	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
VOCs									
Vinyl Chloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.06	< 0.01	< 0.01
o-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684974	684975	684976	684977	684978	684979
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5
			Depth	0.10	1.00	9.80	0.30	1.00	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
sec-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SVOCs									
Phenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2	0.2	< 0.1
2,6-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684974	684975	684976	684977	684978	684979
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5
			Depth	0.10	1.00	9.80	0.30	1.00	0.50
			Other ID						
			Sample Type	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	0.2	< 0.1	< 0.1	0.6	0.4	< 0.1

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684980	684981	684982
			Sample ID	BHP6	BHP6	BHP6
			Depth	0.50	1.50	8.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	6.2	7.2	9.3
Boron (water soluble)	DETSC 2123#	0.2	mg/kg	6.7	6.4	4.4
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.6	0.4
Chromium	DETSC 2301#	0.15	mg/kg	190	270	53
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	12	18	6.9
Lead	DETSC 2301#	0.3	mg/kg	16	13	32
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	5.9	9.1	14
Selenium	DETSC 2301#	0.5	mg/kg	11	8.8	0.8
Zinc	DETSC 2301#	1	mg/kg	25	28	38
Inorganics						
pH	DETSC 2008#			11.0	11.2	10.3
Cyanide total	DETSC 2130#	0.1	mg/kg	< 0.1	0.2	< 0.1
Cyanide free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1
FOC	DETSC 2002	0.001		0.007	0.007	0.007
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	1600	1400	980
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	2.3
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	0.40
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	0.33
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	0.04
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	0.07	0.07	0.10
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	< 10	< 10	< 10

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684980	684981	684982
			Sample ID	BHP6	BHP6	BHP6
			Depth	0.50	1.50	8.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.3	0.3	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.3	0.3	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1
PAH	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6
Phenols						
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684980	684981	684982
			Sample ID	BHP6	BHP6	BHP6
			Depth	0.50	1.50	8.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
VOCs						
Vinyl Chloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431*	0.01	mg/kg	0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684980	684981	684982
			Sample ID	BHP6	BHP6	BHP6
			Depth	0.50	1.50	8.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
sec-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
SVOCs						
Phenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Summary of Chemical Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684980	684981	684982
			Sample ID	BHP6	BHP6	BHP6
			Depth	0.50	1.50	8.50
			Other ID			
			Sample Type	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1	< 0.1

Summary of Chemical Analysis
Leachate Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684983	684984	684985	684986	684987	684988	684989
			Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5	BHP6
			Depth	0.10	1.00	9.80	0.30	1.00	0.50	0.50
			Other ID							
			Sample Type	ES	ES	ES	ES	ES	ES	ES
			Sampling Date	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14	28/07/14
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**							
Preparation										
NRA Leachate Preparation	DETS 036*			Y	Y	Y	Y	Y	Y	Y
Metals										
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.6	1.4	1.4	0.66	0.98	0.52	0.71
Boron	DETSC 2123	100	ug/l	180	110	270	210	180	220	250
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	0.29	< 0.25	0.65	0.82	5.0	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.6	0.9	0.7	1.7	2.3	1.3	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.47	0.14	0.10	< 0.09	< 0.09	< 0.09	< 0.09
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.83	0.90	0.39	0.55	0.76	0.74	0.75
Zinc, Dissolved	DETSC 2306	1.25	ug/l	1.55	< 1.25	1.76	< 1.25	< 1.25	1.38	< 1.25
Inorganics										
pH	DETSC 2008			8.7	9.2	8.4	10.0	10.2	10.9	10.1
Sulphate as SO4	DETSC 2055	0.1	mg/l	20	38	50	13	14	20	41
Petroleum Hydrocarbons										
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	1.5	1.5	< 1.0	< 1.0	1.6	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	1.7	1.2	< 1.0	< 1.0	1.3	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Leachate Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	684990	684991
			Sample ID	BHP6	BHP6
			Depth	1.50	8.50
			Other ID		
			Sample Type	ES	ES
			Sampling Date	28/07/14	28/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
NRA Leachate Preparation	DETS 036*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.51	2.3
Boron	DETSC 2123	100	ug/l	280	260
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.4	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	< 0.09	0.49
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.73	< 0.25
Zinc, Dissolved	DETSC 2306	1.25	ug/l	< 1.25	< 1.25
Inorganics					
pH	DETSC 2008			9.9	9.1
Sulphate as SO4	DETSC 2055	0.1	mg/l	29	20
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 14-12959
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
684974	BHP2 0.10	SOIL	NAD	none	Colin Patrick
684975	BHP2 1.00	SOIL	NAD	none	Colin Patrick
684977	BHP4 0.30	SOIL	NAD	none	Colin Patrick
684978	BHP4 1.00	SOIL	NAD	none	Colin Patrick
684979	BHP5 0.50	SOIL	NAD	none	Colin Patrick
684980	BHP6 0.50	SOIL	NAD	none	Colin Patrick
684981	BHP6 1.50	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 14-12959
Client Ref D6340
Contract Bran Sands Quayside Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
684974	BHP2 0.10 SOIL	28/07/14	PT (1kg), GJ 1L (1L), GV (40ml)		
684975	BHP2 1.00 SOIL	28/07/14	PT (1kg), GJ 1L (1L), GV (40ml)		
684976	BHP2 9.80 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684977	BHP4 0.30 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684978	BHP4 1.00 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684979	BHP5 0.50 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684980	BHP6 0.50 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684981	BHP6 1.50 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684982	BHP6 8.50 SOIL	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684983	BHP2 0.10 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684984	BHP2 1.00 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684985	BHP2 9.80 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684986	BHP4 0.30 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684987	BHP4 1.00 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		

Information in Support of the Analytical Results

Our Ref 14-12959
Client Ref D6340
Contract Bran Sands Quayside Investigation

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
684988	BHP5 0.50 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684989	BHP6 0.50 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684990	BHP6 1.50 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		
684991	BHP6 8.50 LEACHATE	28/07/14	GJ 1L (1L), PT 1L (1kg), GV (40ml)		

Key: G-Glass J-Jar V-Vial P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-13080

20-Aug-14

Client Dunelm Geotechnical & Environmental Ltd
Foundation House
St. John's Road
Meadowfield
Durham
DH7 8TZ

Our Reference 14-13080

Client Reference D6340

Contract Title Bran Sands Quayside Investigation

Description 2 Soil samples, 2 Leachate samples.

Date Received 14-Aug-14

Date Started 14-Aug-14

Date Completed 20-Aug-14

Test Procedures Identified by prefix DETSn (details on request), Asbestos Analysis DETSC 1101.

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685691	685692
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	11	12
Boron (water soluble)	DETSC 2123#	0.2	mg/kg	9.5	1.8
Cadmium	DETSC 2301#	0.1	mg/kg	0.5	0.4
Chromium	DETSC 2301#	0.15	mg/kg	48	61
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	13	30
Lead	DETSC 2301#	0.3	mg/kg	150	100
Mercury	DETSC 2325#	0.05	mg/kg	0.09	0.16
Nickel	DETSC 2301#	1	mg/kg	19	20
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	94	110
Inorganics					
pH	DETSC 2008#			8.8	11.0
Cyanide total	DETSC 2130#	0.1	mg/kg	< 0.1	0.1
Cyanide free	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1
FOC	DETSC 2002	0.001		0.017	0.014
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	930	240
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	9.0	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	8.1	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	17	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg	17	< 10

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685691	685692
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.2	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.3	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	3.5	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	1.0	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	6.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	5.4	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	2.3	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	2.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.9	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	1.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	2.3	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	1.7	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.4	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.7	< 0.1
PAH	DETSC 3301	1.6	mg/kg	30	< 1.6
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685691	685692
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
VOCs					
Vinyl Chloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Chloroform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Benzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Trichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Dibromomethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Toluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Chlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Ethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
m+p-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
o-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromoform	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Bromobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
n-propylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685691	685692
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
sec-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
n-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01	< 0.01
SVOCs					
Phenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dibenzofuran	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Diphenylamine	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685691	685692
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Azobenzene	DETSC 3433*	0.1	mg/kg	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	0.1	< 0.1

Summary of Chemical Analysis
Leachate Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	685693	685694
			Sample ID	BHP3	BHP3
			Depth	0.30	7.80
			Other ID		
			Sample Type	ES	ES
			Sampling Date	22/07/14	22/07/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Preparation					
NRA Leachate Preparation	DETS 036*			Y	Y
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.74	1.5
Boron	DETSC 2123	100	ug/l	140	280
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	1.3	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	< 0.4	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.15	0.11
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.5	0.82
Zinc, Dissolved	DETSC 2306	1.25	ug/l	< 1.25	1.95
Inorganics					
pH	DETSC 2008			8.3	8.1
Sulphate as SO4	DETSC 2055	0.1	mg/l	140	51
Petroleum Hydrocarbons					
C5-C10 Gasoline Range Organics (GRO)	DETSC 3322	1	ug/l	< 1.0	< 1.0
C10-C24 Diesel Range Organics (DRO)	DETSC 3311	10	ug/l	23	24
C24-C40 Lube Oil Range Organics (LORO)	DETSC 3311	10	ug/l	39	49
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 14-13080
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
685691	BHP3 0.30	SOIL	NAD	none	Jeff Cruddas

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * - not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 14-13080
Client Ref D6340
Contract Bran Sands Quayside Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
685691	BHP3 0.30 SOIL	22/07/14	GJ 1L (1L), GV (40ml)		
685692	BHP3 7.80 SOIL	22/07/14	GJ 1L (1L), GV (40ml)		
685693	BHP3 0.30 LEACHATE	22/07/14	GJ 1L (1L)		
685694	BHP3 7.80 LEACHATE	22/07/14	GJ 1L (1L)		

Key: G-Glass J-Jar V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-13480

27-Aug-14

Client Dunelm Geotechnical & Environmental Ltd
Foundation House
St. John's Road
Meadowfield
Durham
DH7 8TZ

Our Reference 14-13480

Client Reference D6340

Contract Title Bran Sands Quayside Investigation

Description 1 Soil sample, 1 Leachate sample.

Date Received 19-Aug-14

Date Started 20-Aug-14

Date Completed 27-Aug-14

Test Procedures Identified by prefix DETSn (details on request), Asbestos Analysis DETSC 1101.

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	687788
Sample ID	BHP5B
Depth	1.50
Other ID	
Sample Type	ES
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Metals				
Arsenic	DETSC 2301#	0.2	mg/kg	20
Boron (water soluble)	DETSC 2123#	0.2	mg/kg	2.3
Cadmium	DETSC 2301#	0.1	mg/kg	0.8
Chromium	DETSC 2301#	0.15	mg/kg	130
Hexavalent Chromium	DETSC 2204*	1	mg/kg	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	21
Lead	DETSC 2301#	0.3	mg/kg	25
Mercury	DETSC 2325#	0.05	mg/kg	0.78
Nickel	DETSC 2301#	1	mg/kg	34
Selenium	DETSC 2301#	0.5	mg/kg	1.3
Zinc	DETSC 2301#	1	mg/kg	81
Inorganics				
pH	DETSC 2008#			10.9
Cyanide total	DETSC 2130#	0.1	mg/kg	< 0.1
Cyanide free	DETSC 2130#	0.1	mg/kg	< 0.1
Organic matter	DETSC 2002#	0.1	%	3.3
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	580
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	8.1
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	14
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	85
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	110
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	5.1
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	19
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	100
Aromatic C5-C35	DETSC 3072*	10	mg/kg	130
TPH Ali/Aro	DETSC 3072*	10	mg/kg	240
PAHs				
Naphthalene	DETSC 3301	0.1	mg/kg	1.2
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	0.9
Fluorene	DETSC 3301	0.1	mg/kg	0.4
Phenanthrene	DETSC 3301	0.1	mg/kg	0.9

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	687788
Sample ID	BHP5B
Depth	1.50
Other ID	
Sample Type	ES
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Anthracene	DETSC 3301	0.1	mg/kg	0.2
Fluoranthene	DETSC 3301	0.1	mg/kg	0.4
Pyrene	DETSC 3301	0.1	mg/kg	0.3
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1
PAH	DETSC 3301	1.6	mg/kg	4.4
Phenols				
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	687788
Sample ID	BHP5B
Depth	1.50
Other ID	
Sample Type	ES
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
VOCs				
Vinyl Chloride	DETSC 3431*	0.01	mg/kg	< 0.01
1,1 Dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01
1,1-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01
2,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01
Bromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01
Chloroform	DETSC 3431*	0.01	mg/kg	< 0.01
1,1,1-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01
1,1-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01
Carbon tetrachloride	DETSC 3431*	0.01	mg/kg	< 0.01
Benzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2-dichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01
Trichloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01
Dibromomethane	DETSC 3431*	0.01	mg/kg	< 0.01
Bromodichloromethane	DETSC 3431*	0.01	mg/kg	< 0.01
cis-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01
Toluene	DETSC 3431*	0.01	mg/kg	< 0.01
trans-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg	< 0.01
1,1,2-trichloroethane	DETSC 3431*	0.01	mg/kg	< 0.01
Tetrachloroethylene	DETSC 3431*	0.01	mg/kg	< 0.01
1,3-dichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01
Dibromochloromethane	DETSC 3431*	0.01	mg/kg	< 0.01
1,2-dibromoethane	DETSC 3431*	0.01	mg/kg	< 0.01
Chlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431*	0.01	mg/kg	< 0.01
Ethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
m+p-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01
o-Xylene	DETSC 3431*	0.01	mg/kg	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg	< 0.01
Bromoform	DETSC 3431*	0.01	mg/kg	< 0.01
Isopropylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
Bromobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2,3-trichloropropane	DETSC 3431*	0.01	mg/kg	< 0.01
n-propylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
2-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01
1,3,5-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
4-chlorotoluene	DETSC 3431*	0.01	mg/kg	< 0.01
Tert-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2,4-trimethylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01

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Summary of Chemical Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

			Lab No	687788
			Sample ID	BHP5B
			Depth	1.50
			Other ID	
			Sample Type	ES
			Sampling Date	n/s
			Sampling Time	n/s
Test	**Method**	**LOD**	**Units**	
sec-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
p-isopropyltoluene	DETSC 3431*	0.01	mg/kg	< 0.01
1,3-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,4-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
n-butylbenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2-dichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431*	0.01	mg/kg	< 0.01
1,2,4-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
Hexachlorobutadiene	DETSC 3431*	0.01	mg/kg	< 0.01
1,2,3-trichlorobenzene	DETSC 3431*	0.01	mg/kg	< 0.01
SVOCs				
Phenol	DETSC 3433*	0.1	mg/kg	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg	< 0.1
2-Chlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Benzyl Alcohol	DETSC 3433*	0.1	mg/kg	< 0.1
2-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433*	0.1	mg/kg	< 0.1
3&4-Methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1
2,4-Dimethylphenol	DETSC 3433*	0.1	mg/kg	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433*	0.1	mg/kg	< 0.1
2,4-Dichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
4-Chloro-3-methylphenol	DETSC 3433*	0.1	mg/kg	< 0.1
2-Methylnaphthalene	DETSC 3433*	0.1	mg/kg	0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg	< 0.1
2,4,6-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
2-Chloronaphthalene	DETSC 3433*	0.1	mg/kg	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Dibenzofuran	DETSC 3433*	0.1	mg/kg	< 0.1
2,6-Dinitrotoluene	DETSC 3433*	0.1	mg/kg	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Diethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Diphenylamine	DETSC 3433*	0.1	mg/kg	< 0.1
4-Bromophenylphenylether	DETSC 3433*	0.1	mg/kg	< 0.1
Hexachlorobenzene	DETSC 3433*	0.1	mg/kg	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only implied if report carries the MCERTS logo). n/s -not supplied.

Summary of Chemical Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	687788
Sample ID	BHP5B
Depth	1.50
Other ID	
Sample Type	ES
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Pentachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Di-n-butylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433*	0.1	mg/kg	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
Dimethylphthalate	DETSC 3433*	0.1	mg/kg	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg	< 0.1
Azobenzene	DETSC 3433*	0.1	mg/kg	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	0.1

Summary of Chemical Analysis
Leachate Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	687789
Sample ID	BHP5B
Depth	1.50
Other ID	
Sample Type	ES
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Preparation				
NRA Leachate Preparation	DETS 036*			Y
Metals				
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	1.8
Boron	DETSC 2123	100	ug/l	110
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	2.7
Lead, Dissolved	DETSC 2306	0.09	ug/l	4.5
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	1.1
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.78
Zinc, Dissolved	DETSC 2306	1.25	ug/l	6.14
Inorganics				
pH	DETSC 2008			6.7
Sulphate as SO4	DETSC 2055	0.1	mg/l	12
Petroleum Hydrocarbons				
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	9.6
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	8.5
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	18
Benzene	DETSC 3322	1	ug/l	< 1.0
Toluene	DETSC 3322	1	ug/l	8.5
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Asbestos Analysis
Soil Samples

Our Ref 14-13480
Client Ref D6340
Contract Title Bran Sands Quayside Investigation

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
687788	BHP5B 1.50	SOIL	Amosite Chrysotile	Board debris present	Keith Wilson

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Information in Support of the Analytical Results

Our Ref 14-13480
Client Ref D6340
Contract Bran Sands Quayside Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
687788	BHP5B 1.50 SOIL		GJ 1L (1L), GV (40ml), PT 1L (1kg)	Sample date not supplied	
687789	BHP5B 1.50 LEACHATE		GJ 1L (1L)	Sample date not supplied	

Key: G-Glass P-Plastic J-Jar V-Vial T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Derwentside Environmental Testing Services

Certificate of Analysis

Certificate Number 14-14993

15-Sep-14

Client Dunelm Geotechnical & Environmental Ltd
Foundation House
St. John's Road
Meadowfield
Durham
DH7 8TZ

Our Reference 14-14993

Client Reference D6340

Contract Title Brans Sands Quayside Investigation

Description 2 Water samples.

Date Received 08-Sep-14

Date Started 08-Sep-14

Date Completed 15-Sep-14

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the scope of UKAS accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. Observations and interpretations are outside the scope of ISO 17025. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By [redacted]

Rob Brown
Business Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Water Samples

Our Ref 14-14993
Client Ref D6340
Contract Title Brans Sands Quayside Investigation

			Lab No	696456	696457
			Sample ID	BHP2	BHP3
			Depth		
			Other ID		
			Sample Type	EW	EW
			Sampling Date	05/09/14	05/09/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Metals					
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	2.1	15
Boron, Dissolved	DETSC 2306*	12	ug/l	3400	5900
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.07	0.08
Calcium, Dissolved	DETSC 2306	0.09	mg/l	400	390
Total Chromium	DETSC 2306*	0.25	ug/l	35	15
Copper, Dissolved	DETSC 2306	0.4	ug/l	33	4.4
Iron, Dissolved	DETSC 2306	5.5	ug/l	41	67
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.53	1.7
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	1100	1200
Manganese, Dissolved	DETSC 2306	0.22	ug/l	21	15
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	18	3.6
Potassium, Dissolved	DETSC 2306	0.08	mg/l	320	330
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.29	< 0.25
Sodium, Dissolved	DETSC 2306	0.07	mg/l	9000	9600
Zinc, Dissolved	DETSC 2306	1.25	ug/l	820	200
Inorganics					
Conductivity	DETSC 2009	1	uS/cm	40800	41200
pH	DETSC 2008			7.8	7.8
Hydroxide Alkalinity as CaCO3	DETSC 2030*	10	mg/l	< 10	< 10
Total Biochemical Oxygen Demand	DETSC 2031	1	mg/l	2.0	2.7
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l	13	11
Cyanide total	DETSC 2130	40	ug/l	< 40	< 40
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.45	0.43
Chloride	DETSC 2055	0.1	mg/l	17000	17000
Nitrate as NO3	DETSC 2055	0.1	mg/l	17	15
Nitrite as N	DETSC 2201	0.035	mg/l	0.090	< 0.035
Sulphate as SO4	DETSC 2055	0.1	mg/l	2300	2500
Sulphide	DETSC 2208	10	ug/l	< 10	< 10
Petroleum Hydrocarbons					
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 14-14993
Client Ref D6340
Contract Title Brans Sands Quayside Investigation

			Lab No	696456	696457
			Sample ID	BHP2	BHP3
			Depth		
			Other ID		
			Sample Type	EW	EW
			Sampling Date	05/09/14	05/09/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l	< 10	< 10
PAHs					
Naphthalene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol	*	0.5	ug/l	< 0.50	< 0.50

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 14-14993
Client Ref D6340
Contract Title Brans Sands Quayside Investigation

				Lab No	696456	696457
				Sample ID	BHP2	BHP3
				Depth		
				Other ID		
				Sample Type	EW	EW
				Sampling Date	05/09/14	05/09/14
				Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**			
VOCs						
Dichlorodifluoromethane	DETSC 3432	1	ug/l	< 1	< 1
Chloromethane	DETSC 3432	1	ug/l	< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l	< 1	< 1
Bromomethane	DETSC 3432	1	ug/l	< 1	< 1
Chloroethane	DETSC 3432	1	ug/l	< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l	< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1
cis-1,2-dichloroethylene	DETSC 3432	1	ug/l	< 1	< 1
2,2-dichloropropane	DETSC 3432	2	ug/l	< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l	< 4	< 4
Chloroform	DETSC 3432	1	ug/l	< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l	< 1	< 1
Benzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l	< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l	< 1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l	< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l	< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
Toluene	DETSC 3432	1	ug/l	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l	< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l	< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l	< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l	< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l	< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l	< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l	< 2	< 2
o-Xylene	DETSC 3432	1	ug/l	< 1	< 1
Styrene	DETSC 3432	1	ug/l	< 1	< 1
Bromoform	DETSC 3432	1	ug/l	< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l	< 1	< 1
Bromobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l	< 1	< 1

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 14-14993
Client Ref D6340
Contract Title Brans Sands Quayside Investigation

			Lab No	696456	696457
			Sample ID	BHP2	BHP3
			Depth		
			Other ID		
			Sample Type	EW	EW
			Sampling Date	05/09/14	05/09/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
n-propylbenzene	DETSC 3432	1	ug/l	< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l	< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l	< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l	< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l	< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l	< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l	< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l	< 1	< 1
SVOCs					
Phenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Aniline	DETS 071*	1	ug/l	< 1.0	< 1.0
2-Chlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Benzyl Alcohol	DETS 071*	1	ug/l	< 1.0	< 1.0
2-Methylphenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Bis(2-chloroisopropyl)ether	DETS 071*	1	ug/l	< 1.0	< 1.0
3&4-Methylphenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Bis(2-chloroethoxy)methane	DETS 071*	1	ug/l	< 1.0	< 1.0
2,4-Dimethylphenol	DETS 071*	1	ug/l	< 1.0	< 1.0
2,4-Dichlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
1,2,4-Trichlorobenzene	DETS 071*	1	ug/l	< 1.0	< 1.0
4-Chloro-3-methylphenol	DETS 071*	1	ug/l	< 1.0	< 1.0
2-Methylnaphthalene	DETS 071*	1	ug/l	< 1.0	< 1.0
1,2-Dinitrotoluene	DETS 071*	1	ug/l	< 1.0	< 1.0
Hexachlorocyclopentadiene	DETS 071*	1	ug/l	< 1.0	< 1.0
2,4,6-Trichlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
2,4,5-Trichlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
2-Chloronaphthalene	DETS 071*	1	ug/l	< 1.0	< 1.0
2-Nitroaniline	DETS 071*	1	ug/l	< 1.0	< 1.0
2,4-Dinitrotoluene	DETS 071*	1	ug/l	< 1.0	< 1.0
3-Nitroaniline	DETS 071*	1	ug/l	< 1.0	< 1.0
4-Nitrophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Dibenzofuran	DETS 071*	1	ug/l	< 1.0	< 1.0
2,6-Dinitrotoluene	DETS 071*	1	ug/l	< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Summary of Chemical Analysis
Water Samples

Our Ref 14-14993
Client Ref D6340
Contract Title Brans Sands Quayside Investigation

			Lab No	696456	696457
			Sample ID	BHP2	BHP3
			Depth		
			Other ID		
			Sample Type	EW	EW
			Sampling Date	05/09/14	05/09/14
			Sampling Time	n/s	n/s
Test	**Method**	**LOD**	**Units**		
Diethylphthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
4-Chlorophenylphenylether	DETS 071*	1	ug/l	< 1.0	< 1.0
4-Nitroaniline	DETS 071*	1	ug/l	< 1.0	< 1.0
Diphenylamine	DETS 071*	1	ug/l	< 1.0	< 1.0
4-Bromophenylphenylether	DETS 071*	1	ug/l	< 1.0	< 1.0
Hexachlorobenzene	DETS 071*	1	ug/l	< 1.0	< 1.0
Bis(2-ethylhexyl)ether	DETS 071*	1	ug/l	< 1.0	< 1.0
Pentachlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Di-n-butylphthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
Butylbenzylphthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
Di-n-octylphthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
1,4-Dinitrobenzene	DETS 071*	1	ug/l	< 1.0	< 1.0
Dimethylphthalate	DETS 071*	1	ug/l	< 1.0	< 1.0
1,3-Dinitrobenzene	DETS 071*	1	ug/l	< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol	DETS 071*	1	ug/l	< 1.0	< 1.0
Azobenzene	DETS 071*	1	ug/l	< 1.0	< 1.0
Carbazole	DETS 071*	1	ug/l	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 14-14993
Client Ref D6340
Contract Brans Sands Quayside Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
696456	BHP2 WATER	05/09/14	GJ 1L (1L) x3		
696457	BHP3 WATER	05/09/14	GJ 1L (1L) x3		

Key: G-Glass J-Jar

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time and/or inappropriate containers are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

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Appendix F

Groundwater Monitoring Results

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BH No	Date	Time (hh:mm)	Water Level	Dissolved Oxygen (ppm)	Conductivity (mS)	pH Value	Redox Potential (mV)	Temperature (℃)
BHP2	5/9/14	11:00	4.50m	1.05-1.11	47.78-47.81	7.02-7.97	10.10-23.90	15.25
BHP3	5/9/14	10:15	5.00m	0.77-0.80	36.70-41.48	7.22-7.61	68.7-40.1	15.35
BHP6	5/9/14	09:45	Dry	N/A				

DUNELM GEOTECHNICAL & ENVIRONMENTAL	**Contract:** **Bran Sands Quayside Investigation**			**Contract No:** **D6340**
	Drawing Title: **Groundwater Quality Results**			
Table No: **D6340/2**	**Date:** **September 2014**	**Scale:** **N/A**	**Status:** **Final**	**Drawn by:** **JH**

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Appendix G

In-situ Testing Results

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Appendix G.1

PID Test Results

Borehole	Depth	Result (ppm)
BHP2	3.8	5.1
BHP2	4.8	4.6
BHP2	5.8	2.6
BHP2	0.1	0.0
BHP2	0.3	0.0
BHP2	1.8	0.9
BHP2	2.8	4.7
BHP2	6.8	0.0
BHP2	7.5	0.0
BHP2	7.8	0.0
BHP2	8.8	0.0
BHP2	9.8	0.0
BHP2	10.8	0.0
BHP2	11.8	0.0
BHP2	12.8	0.0
BHP4	5.8	21.6
BHP4	6.8	9.6
BHP4	7.8	1.7
BHP4	8.5	2.2
BHP4	9.8	1.0
BHP4A	10.8	0.0
BHP4A	11.8	0.0
BHP4A	12.8	0.0
BHP4A	13.8	0.0
BHP4A	14.8	0.0
BHP4A	15.8	0.0
BHP4A	16.8	0.0
BHP4A	17.8	0.0
BHP4A	18.8	0.0
BHP4A	19.0	0.0

DUNELM GEOTECHNICAL & ENVIRONMENTAL

TEL: 0191 378 3151
FAX: 0191 378 3157

Contract:
Bran Sands Quayside Investigation

Contract No:
D6340

Client:
York Potash Ltd

Title:
PID Results

Table
D6340/PID1

Borehole	Depth	Result (ppm)
BHP5	0.5	0.3
BHP5	2.5	1.5
BHP5	3.5	4.1
BHP5	4.5	22.7
BHP5B	10.2	0.0
BHP5B	11.3	0.0
BHP5B	13.2	0.0
BHP5B	14.2	0.0
BHP5B	15.2	0.0
BHP5B	16.2	0.0
BHP5B	17.2	0.0
BHP5B	18.2	0.0
BHP5B	19.2	0.0
BHP5B	20.2	0.0
BHP5B	21.2	0.0
BHP5B	22.2	0.0
BHP5B	23.2	0.0
BHP5B	24.2	0.0
BHP5B	24.9	0.0

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Appendix G.2

Hand Vane Results

BH No	Sample Type	Depth (Top)	Depth (Base)	Hand Vane (Top)	Hand Vane (Base)	Remarks
BHP3	UT100	7.80m	8.25m	23	Unsuitable	Sand at base
BHP3	UT100	17.00m	17.45m	65	54	
BHP3	UT100	19.00m	19.45m	60	70	
BHP4A	UT100	22.00m	22.45m	Unsuitable	Unsuitable	Too granular for test
BHP4A	UT100	21.00m	21.45m	61	Unsuitable	Cobble at base
BHP4A	UT100	19.10m	19.55m	67	37	
BHP5B	UT100	18.00m	18.45m	71	85	
BHP5B	UT100	20.00m	20.45m	61	72	
BHP5B	UT100	22.00m	22.45m	57	72	Granular material noted
BHP6	UT100	22.00m	22.45m	85	98	
BHP6	UT100	20.00m	20.45m	32	32	

DUNELM GEOTECHNICAL & ENVIRONMENTAL

Contract:
Bran Sands Quayside Investigation

Contract No:
D6340

Table Title:
Hand Vane Results

Table No:	Date:	Scale:	Status:	Drawn by:
D6340/HV1	September 2014	N/A	Final	JH

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Appendix H

Digital Data

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Royal HaskoningDHV
Enhancing Society Together

APPENDIX B

Data Assessment

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Harbour Facility - Human Health Data Assessment

			Sample ID			BHP2	BHP2	BHP2	BHP4	BHP4	BHP5	BHP6	BHP6	BHP6
			Depth			0.1	1	9.8	0.3	1	0.5	0.5	1.5	8.5
						MG	MG	TFD	MG	MG	MG	MG	MG	TFD
			Sampling Date			28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014
Test	**Method**	**LOD**	**Units**											
Material Type						SOIL	SO L		SOIL	SOIL	SO L	SOIL	SOIL	
Result						NAD	NAD		NAD	NAD	NAD	NAD	NAD	
Comment*						none	none		none	none	none	none	none	
Analyst						Co in Patrick	Colin Patrick		Colin Patrick	Co in Patrick	Colin Patrick	Colin Patrick	Colin Patrick	
Metals				**Commercial GAC (SOM-2.5%)**										
Arsenic	DETSC 2301#	0.2	mg/kg	**640**		9	8.6	6	4.2	4.4	7.7	6.2	7.2	9.3
Boron (water soluble)	DETSC 2123#	0.2	mg/kg			5.4	4.6	2.7	4.9	5.9	5.5	6.7	6.4	4.4
Cadmium	DETSC 2301#	0.1	mg/kg	**230**		0.5	0.6	0.1	0.4	0.7	0.6	0.4	0.6	0.4
Chromium	DETSC 2301#	0.15	mg/kg	**8844**		49	220	51	370	810	600	190	270	53
Hexavalent Chromium	DETSC 2204*	1	mg/kg	**35**		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	**71690**		15	15	3.1	14	22	21	12	18	6.9
Lead	DETSC 2301#	0.3	mg/kg	**1100**		32	17	35	12	14	14	16	13	32
Mercury	DETSC 2325#	0.05	mg/kg	**391**		0.09	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	**1800**		8	11	19	5.3	5.8	8.9	5.9	9.1	14
Selenium	DETSC 2301#	0.5	mg/kg	**13000**		4.7	13	< 0.5	6	8.3	13	11	8.8	0.8
Zinc	DETSC 2301#	1	mg/kg	**665453**		89	41	26	42	42	30	25	28	38
Inorganics														
pH	DETSC 2008#					11.1	11	9.5	11.6	12.2	12.3	11	11.2	10.3
Cyanide total	DETSC 2130#	0.1	mg/kg	**16248**		< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1
Cyanide free	DETSC 2130#	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
FOC	DETSC 2002	0.001				0.016	0.01	0.003	0.013	0.013	0.009	0.007	0.007	0.007
SOM						2.7586207	1.7241379	0.5172414	2.2413793	2.2413793	1.5517241	1.2068966	1.2068966	1.2068966
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l			1300	1500	350	700	73	96	1600	1400	980
Petroleum Hydrocarbons														
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	**56**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	2.3
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	**162**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.4
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	**47**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.33
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	**236**		< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	**1576**		< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg			< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg			< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg			< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	**130**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.04
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	**269.8**		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	**63**		< 0.01	< 0.01	< 0.01	0.06	0.07	< 0.01	0.07	0.07	0.1
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	**162**		< 0.9	< 0.9	3.5	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	**308**		< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	**485**		12	3.1	23	18	11	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	**1108**		37	5.5	1100	35	16	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg			49	< 10	1200	53	27	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	mg/kg			49	< 10	1200	53	27	< 10	< 10	< 10	< 10
PAHs														
Naphthalene	DETSC 3301	0.1	mg/kg	**483**		0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	**97417**		< 0.1	< 0.1	< 0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	**97735**		< 0.1	< 0.1	< 0.1	0.4	0.2	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	**68676**		0.1	< 0.1	< 0.1	0.7	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	**22382**		1.3	< 0.1	< 0.1	6.1	3.2	0.2	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	**536890**		0.3	< 0.1	< 0.1	1.8	1.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	**22675**		3.3	< 0.1	< 0.1	9	5.8	0.4	0.3	0.3	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	**54427**		2.8	< 0.1	< 0.1	7.4	4.5	0.3	0.3	0.3	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	**95**		1.6	< 0.1	< 0.1	3.5	2.5	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	**141**		1.6	< 0.1	< 0.1	3.2	2.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	**101**		1.4	< 0.1	< 0.1	2.5	1.9	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	**143**		0.7	< 0.1	< 0.1	1.4	1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	**14**		1.7	< 0.1	< 0.1	3.1	1.9	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	**659**		1.2	< 0.1	< 0.1	2.3	1.4	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	**12.9**		0.2	< 0.1	< 0.1	0.4	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	**61**		1.2	< 0.1	< 0.1	2.4	1.5	< 0.1	< 0.1	< 0.1	< 0.1
PAH	DETSC 3301	1.6	mg/kg			18	< 1.6	< 1.6	44	28	< 1.6	< 1.6	< 1.6	< 1.6
Phenols														
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	**3200**		< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
VOCs														
Vinyl Chloride	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1 Dichloroethylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trans-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloroethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cis-1,2-dichloroethylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2,2-dichloropropane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromochloromethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chloroform	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1-trichloroethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1-dichloropropene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Carbon tetrachloride	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloroethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Trichloroethylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichloropropane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromomethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromodichloromethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
cis-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
trans-1,3-dichloropropene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,2-trichloroethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tetrachloroethylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichloropropane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibromochloromethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromoethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,1,1,2-tetrachloroethane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3431*	0.01	mg/kg	**2800**		< 0.01	< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
m+p-Xylene	DETSC 3431*	0.01	mg/kg	**3200**		< 0.01	< 0.01	< 0.01	0.06	< 0.01	< 0.01	0.01	< 0.01	< 0.01
o-Xylene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Styrene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromoform	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Isopropylbenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Bromobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichloropropane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-propylbenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
2-chlorotoluene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3,5-trimethylbenzene	DETSC 3431*	0.01	mg/kg	**0.2**		< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4-chlorotoluene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tert-butylbenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trimethylbenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
sec-butylbenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
p-isopropyltoluene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,3-dichlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,4-dichlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
n-butylbenzene	DETSC 3431*	0.01	mg/kg	**8552**		< 0.01	< 0.01	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dichlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2-dibromo-3-chloropropane	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,4-trichlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobutadiene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
1,2,3-trichlorobenzene	DETSC 3431*	0.01	mg/kg			< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
SVOCs														
Phenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aniline	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzyl Alcohol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylphenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-chloroisopropyl)ether	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3&4-Methylphenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dimethylphenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis-(dichloroethoxy)methane	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dichlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2,4-Trichlorobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chloro-3-methylphenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methylnaphthalene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorocyclopentadiene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,6-Trichlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4,5-Trichlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Chloronaphthalene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Nitroaniline	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,4-Dinitrotoluene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
3-Nitroaniline	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitrophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzofuran	DETSC 3433*	0.1	mg/kg		n/a	< 0.1	< 0.1	< 0.1	0.2	0.2	< 0.1	< 0.1	< 0.1	< 0.1
2,6-Dinitrotoluene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,3,4,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diethylphthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Chlorophenylphenylether	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Nitroaniline	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Methyl-4,6-Dinitrophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Diphenylamine	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
4-Bromophenylphenylether	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Hexachlorobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pentachlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-butylphthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Butylbenzylphthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Bis(2-ethylhexyl)phthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Di-n-octylphthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,4-Dinitrobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dimethylphthalate	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,3-Dinitrobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,2-Dinitrobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2,3,5,6-Tetrachlorophenol	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Azobenzene	DETSC 3433*	0.1	mg/kg			< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Carbazole	DETSC 3433*	0.1	mg/kg	**640**		0.2	< 0.1	< 0.1	0.6	0.4	< 0.1	< 0.1	< 0.1	< 0.1

Key: * -not accredited. # -MCERTS (accreditation only implied f report carries the MCERTS logo). n/s -not supplied.

Harbour Facility - Controlled Waters Data Assessment (leachate)

				Sample ID	BHP2	BHP2	BHP2	BHP4	BHP4	BHP5	BHP6	BHP6	BHP6
				Depth	0.1	1	9.8	0.3	1	0.5	0.5	1.5	8.5
					MG	MG	TFD	MG	MG	MG	MG	MG	TFD
				Sampling Date	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014	28/07/2014
Test	**Method**	**LOD**	**Units**	**WQS**									
Preparation													
NRA Leachate Preparation	DETS 036*				Y	Y	Y	Y	Y	Y	Y	Y	Y
Metals													
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	25	1.6	1.4	1.4	0.66	0.98	0.52	0.71	0.51	2.3
Boron	DETSC 2123	100	ug/l	7000	180	110	270	210	180	220	250	280	260
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chromium, Dissolved	DETSC 2306	0.25	ug/l	4.7	< 0.25	0.29	< 0.25	0.65	0.82	5	< 0.25	< 0.25	< 0.25
Copper, Dissolved	DETSC 2306	0.4	ug/l	5	1.6	0.9	0.7	1.7	2.3	1.3	< 0.4	< 0.4	< 0.4
Lead, Dissolved	DETSC 2306	0.09	ug/l	7.2	0.47	0.14	0.1	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09	0.49
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.05	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	20	< 0.5	< 0.5	< 0.5	< 0.5	0.6	< 0.5	< 0.5	< 0.5	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	10	0.83	0.9	0.39	0.55	0.76	0.74	0.75	0.73	< 0.25
Zinc, Dissolved	DETSC 2306	1.25	ug/l	40	1.55	< 1.25	1.76	< 1.25	< 1.25	1.38	< 1.25	< 1.25	< 1.25
Inorganics													
pH	DETSC 2008				8.7	9.2	8.4	10	10.2	10.9	10.1	9.9	9.1
Sulphate as SO4	DETSC 2055	0.1	mg/l		20	38	50	13	14	20	41	29	20
Petroleum Hydrocarbons													
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	10	1.5	1.5	< 1.0	< 1.0	1.6	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	10	1.7	1.2	< 1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro	DETSC 3072*	10	ug/l		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Benzene	DETSC 3322	1	ug/l	8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	20	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	30	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Key: * -not accredited. n/s -not supplied.

Harbour Facility - Controlled Waters Data Assessment (groundwater)

				Sample ID	BHP2	BHP3
				Sampling Date	05/09/2014	05/09/2014
Test	**Method**	**LOD**	**Units**	**WQS**		
Metals						
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	25	2.1	15
Boron, Dissolved	DETSC 2306*	12	ug/l	7000	3400	5900
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	0.2	0.07	0.08
Calcium, Dissolved	DETSC 2306	0.09	mg/l		400	390
Total Chromium	DETSC 2306*	0.25	ug/l	4.7	35	15
Copper, Dissolved	DETSC 2306	0.4	ug/l	5	33	4.4
Iron, Dissolved	DETSC 2306	5.5	ug/l	1000	41	67
Lead, Dissolved	DETSC 2306	0.09	ug/l	7.2	0.53	1.7
Magnesium, Dissolved	DETSC 2306	0.02	mg/l		1100	1200
Manganese, Dissolved	DETSC 2306	0.22	ug/l		21	15
Mercury, Dissolved	DETSC 2306	0.01	ug/l	0.05	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	20	18	3.6
Potassium, Dissolved	DETSC 2306	0.08	mg/l		320	330
Selenium, Dissolved	DETSC 2306	0.25	ug/l	10	0.29	< 0.25
Sodium, Dissolved	DETSC 2306	0.07	mg/l		9000	9600
Zinc, Dissolved	DETSC 2306	1.25	ug/l	40	820	200
Inorganics						
Conductivity	DETSC 2009	1	uS/cm		40800	41200
pH	DETSC 2008				7.8	7.8
Hydroxide Alkalinity as CaCO3	DETSC 2030*	10	mg/l		< 10	< 10
Total Biochemical Oxygen Demand	DETSC 2031	1	mg/l		2	2.7
Total Chemical Oxygen Demand	DETSC 2032	10	mg/l		13	11
Cyanide total	DETSC 2130	40	ug/l		< 40	< 40
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l		0.45	0.43
Chloride	DETSC 2055	0.1	mg/l		17000	17000
Nitrate as NO3	DETSC 2055	0.1	mg/l		17	15
Nitrite as N	DETSC 2201	0.035	mg/l		0.09	< 0.035
Sulphate as SO4	DETSC 2055	0.1	mg/l		2300	2500
Sulphide	DETSC 2208	10	ug/l		< 10	< 10
Petroleum Hydrocarbons						
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aromatic C5-C7	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	10	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	10	< 1.0	< 1.0
PAHs						
Naphthalene	DETS 074*	0.01	ug/l	1.2	< 0.01	< 0.01
Acenaphthylene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Acenaphthene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Fluorene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Phenanthrene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Anthracene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Fluoranthene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Pyrene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Benzo(a)anthracene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Chrysene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Benzo(b)fluoranthene	DETS 074*	0.01	ug/l	0.015	< 0.01	< 0.01
Benzo(k)fluoranthene	DETS 074*	0.01	ug/l	0.015	< 0.01	< 0.01
Benzo(a)pyrene	DETS 074*	0.01	ug/l	0.05	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETS 074*	0.01	ug/l	0.001	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETS 074*	0.01	ug/l	0.1	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 074*	0.01	ug/l	0.001	< 0.01	< 0.01
PAH	DETS 074*	0.2	ug/l		< 0.20	< 0.20
Phenols						
Phenol	*	0.5	ug/l		< 0.50	< 0.50
VOCs						
Dichlorodifluoromethane	DETSC 3432	1	ug/l		< 1	< 1
Chloromethane	DETSC 3432	1	ug/l		< 1	< 1
Vinyl Chloride	DETSC 3432	1	ug/l		< 1	< 1
Bromomethane	DETSC 3432	1	ug/l		< 1	< 1
Chloroethane	DETSC 3432	1	ug/l		< 1	< 1
Trichlorofluoromethane	DETSC 3432*	1	ug/l		< 1	< 1
1,1-dichloroethylene	DETSC 3432	1	ug/l		< 1	< 1
Trans-1,2-dichloroethylene	DETSC 3432	1	ug/l		< 1	< 1
1,1-dichloroethane	DETSC 3432	1	ug/l		< 1	< 1
cis-1,2-dichloroethylene	DETSC 3432	1	ug/l		< 1	< 1

2,2-dichloropropane	DETSC 3432	2	ug/l		< 2	< 2
Bromochloromethane	DETSC 3432	4	ug/l		< 4	< 4
Chloroform	DETSC 3432	1	ug/l		< 1	< 1
1,1,1-trichloroethane	DETSC 3432	1	ug/l		< 1	< 1
1,1-dichloropropene	DETSC 3432	1	ug/l		< 1	< 1
Carbon tetrachloride	DETSC 3432	1	ug/l		< 1	< 1
Benzene	DETSC 3432	1	ug/l	8	< 1	< 1
1,2-dichloroethane	DETSC 3432	1	ug/l		< 1	< 1
Trichloroethylene	DETSC 3432*	1	ug/l		< 1	< 1
1,2-dichloropropane	DETSC 3432	1	ug/l		< 1	< 1
Dibromomethane	DETSC 3432	1	ug/l		< 1	< 1
Bromodichloromethane	DETSC 3432	4	ug/l		< 4	< 4
cis-1,3-dichloropropene	DETSC 3432	1	ug/l		< 1	< 1
Toluene	DETSC 3432	1	ug/l	40	< 1	< 1
trans-1,3-dichloropropene	DETSC 3432	1	ug/l		< 1	< 1
1,1,2-trichloroethane	DETSC 3432	1	ug/l		< 1	< 1
Tetrachloroethylene	DETSC 3432	1	ug/l		< 1	< 1
1,3-dichloropropane	DETSC 3432	1	ug/l		< 1	< 1
Dibromochloromethane	DETSC 3432	1	ug/l		< 1	< 1
1,2-dibromoethane	DETSC 3432	1	ug/l		< 1	< 1
Chlorobenzene	DETSC 3432	1	ug/l		< 1	< 1
1,1,1,2-tetrachloroethane	DETSC 3432	1	ug/l		< 1	< 1
Ethylbenzene	DETSC 3432	1	ug/l	20	< 1	< 1
m+p-Xylene	DETSC 3432	2	ug/l		< 2	< 2
o-Xylene	DETSC 3432	1	ug/l		< 1	< 1
Styrene	DETSC 3432	1	ug/l		< 1	< 1
Bromoform	DETSC 3432	1	ug/l		< 1	< 1
Isopropylbenzene	DETSC 3432	1	ug/l		< 1	< 1
1,1,2,2-tetrachloroethane	DETSC 3432	1	ug/l		< 1	< 1
Bromobenzene	DETSC 3432	1	ug/l		< 1	< 1
1,2,3-trichloropropane	DETSC 3432	1	ug/l		< 1	< 1
n-propylbenzene	DETSC 3432	1	ug/l		< 1	< 1
2-chlorotoluene	DETSC 3432	1	ug/l		< 1	< 1
1,3,5-trimethylbenzene	DETSC 3432	1	ug/l		< 1	< 1
4-chlorotoluene	DETSC 3432	1	ug/l		< 1	< 1
Tert-butylbenzene	DETSC 3432	1	ug/l		< 1	< 1
1,2,4-trimethylbenzene	DETSC 3432	1	ug/l		< 1	< 1
sec-butylbenzene	DETSC 3432	1	ug/l		< 1	< 1
p-isopropyltoluene	DETSC 3432	1	ug/l		< 1	< 1
1,3-dichlorobenzene	DETSC 3432	2	ug/l		< 2	< 2
1,4-dichlorobenzene	DETSC 3432	1	ug/l		< 1	< 1
n-butylbenzene	DETSC 3432	1	ug/l		< 1	< 1
1,2-dichlorobenzene	DETSC 3432	1	ug/l		< 1	< 1
1,2-dibromo-3-chloropropane	DETSC 3432	1	ug/l		< 1	< 1
1,2,4-trichlorobenzene	DETSC 3432	1	ug/l		< 1	< 1
Hexachlorobutadiene	DETSC 3432	1	ug/l		< 1	< 1
1,2,3-trichlorobenzene	DETSC 3432	1	ug/l		< 1	< 1
SVOCs						
Phenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Aniline	DETS 071*	1	ug/l		< 1.0	< 1.0
2-Chlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Benzyl Alcohol	DETS 071*	1	ug/l		< 1.0	< 1.0
2-Methylphenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Bis(2-chloroisopropyl)ether	DETS 071*	1	ug/l		< 1.0	< 1.0
3&4-Methylphenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Bis(2-chloroethoxy)methane	DETS 071*	1	ug/l		< 1.0	< 1.0
2,4-Dimethylphenol	DETS 071*	1	ug/l		< 1.0	< 1.0
2,4-Dichlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
1,2,4-Trichlorobenzene	DETS 071*	1	ug/l		< 1.0	< 1.0
4-Chloro-3-methylphenol	DETS 071*	1	ug/l		< 1.0	< 1.0
2-Methylnaphthalene	DETS 071*	1	ug/l		< 1.0	< 1.0
1,2-Dinitrotoluene	DETS 071*	1	ug/l		< 1.0	< 1.0
Hexachlorocyclopentadiene	DETS 071*	1	ug/l		< 1.0	< 1.0
2,4,6-Trichlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
2,4,5-Trichlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
2-Chloronaphthalene	DETS 071*	1	ug/l		< 1.0	< 1.0
2-Nitroaniline	DETS 071*	1	ug/l		< 1.0	< 1.0
2,4-Dinitrotoluene	DETS 071*	1	ug/l		< 1.0	< 1.0
3-Nitroaniline	DETS 071*	1	ug/l		< 1.0	< 1.0
4-Nitrophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Dibenzofuran	DETS 071*	1	ug/l		< 1.0	< 1.0
2,6-Dinitrotoluene	DETS 071*	1	ug/l		< 1.0	< 1.0
2,3,4,6-Tetrachlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Diethylphthalate	DETS 071*	1	ug/l		< 1.0	< 1.0
4-Chlorophenylphenylether	DETS 071*	1	ug/l		< 1.0	< 1.0
4-Nitroaniline	DETS 071*	1	ug/l		< 1.0	< 1.0
Diphenylamine	DETS 071*	1	ug/l		< 1.0	< 1.0
4-Bromophenylphenylether	DETS 071*	1	ug/l		< 1.0	< 1.0
Hexachlorobenzene	DETS 071*	1	ug/l		< 1.0	< 1.0
Bis(2-ethylhexyl)ether	DETS 071*	1	ug/l		< 1.0	< 1.0
Pentachlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Di-n-butylphthalate	DETS 071*	1	ug/l		< 1.0	< 1.0
Butylbenzylphthalate	DETS 071*	1	ug/l		< 1.0	< 1.0
Bis(2-ethylhexyl)phthalate	DETS 071*	1	ug/l		< 1.0	< 1.0
Di-n-octylphthalate	DETS 071*	1	ug/l		< 1.0	< 1.0
1,4-Dinitrobenzene	DETS 071*	1	ug/l		< 1.0	< 1.0
Dimethylphthalate	DETS 071*	1	ug/l		< 1.0	< 1.0

1,3-Dinitrobenzene	DETS 071*	1	ug/l		< 1.0	< 1.0
2,3,5,6-Tetrachlorophenol	DETS 071*	1	ug/l		< 1.0	< 1.0
Azobenzene	DETS 071*	1	ug/l		< 1.0	< 1.0
Carbazole	DETS 071*	1	ug/l		< 1.0	< 1.0

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APPENDIX C

Limitations

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Limitations

The direct assessments and judgements given in this report are limited by both the finite data on which they are based and the proposed works to which they are addressed. The acquisition of data is constrained by both physical and economic factors and, by definition, is subject to limitations.

Conditions at the site will change over time due to natural variations and may be affected by human activities. In particular, groundwater, surface water and soil gas conditions should be anticipated to change with diurnal, seasonal and meteorological variations. Soil and water chemistry may change due to the actions of groundwater flows and microbiological activity etc. The likely variations in the data with time can be assessed following extended periods of measurement and statistical analyses. Unless specifically discussed in the text, such extended measurement and analysis have not been carried out and the data collected are taken to be representative.

Both the finite data on which they are based and the proposed works to which they are addressed direct the assessments and judgements given in this report. The acquisition of data is constrained by both physical and economic factors and, by definition, is subject to the limitations imposed by the methods of investigations employed. In this instance, the data have been obtained from samples and tests from both mechanically and manually excavated exploratory holes, which by their nature only provide information about small discrete volumes of soil. They cannot provide data on every section of the ground beneath the site but the data are taken to be spatially representative of the zones of materials between exploratory hole locations.

This document has been prepared for the titled project and should not be relied upon or used for any other project. Royal HaskoningDHV accepts no responsibility or liability for the consequences of this document being used for a purpose other than that purpose for which it was commissioned. The assessments and judgements contained herein should not be relied upon as legal opinion.

The findings and opinions are relevant to the dates of the site work and should not be relied upon to represent conditions at substantially later dates. The opinions included herein are based on the information obtained from the investigations undertaken at the site and from our experience. If additional information becomes available which might impact our environmental conclusions, we request the opportunity to review the information, reassess the potential concerns, and modify our opinion, if warranted.

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