NORTH LONDON WASTE AUTHORITY

NORTH LONDON HEAT AND POWER PROJECT

ENVIRONMENTAL STATEMENT: VOLUME 2 APPENDICES 7.1 TO 7.3

AD06.02

nlwa
north london waste authority

NORTH LONDON WASTE AUTHORITY

NORTH LONDON HEAT AND POWER PROJECT

ENVIRONMENTAL STATEMENT: VOLUME 2 APPENDIX 7.1 GROUND CONDITIONS AND CONTAMINATION ASSESSMENT METHODOLOGY

AD06.02

North London Waste Authority

North London Heat and Power Project

Environmental Statement Volume 2 Appendix 7.1 Ground Conditions and Contamination Assessment Methodology

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The Planning Act 2008 The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5 (2)(a)

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1 Ground conditions and contamination assessment methodology

1.1 Introduction

1.1.1 This appendix sets out the methodology for assessing the likely significant effects of the Project on ground conditions and contamination.

1.1.2 This section is divided into the following parts:

a. engagement - describing a summary of comments included in the Scoping Opinion and received on the Preliminary Environmental Information Report (PEIR) and how these comments have been addressed;

b. legislation and guidance - detailing requirements of the relevant National Policy Statements (NPS), how these have been addressed and additional guidance relevant to the assessment;

c. methodology for establishing baseline conditions; and

d. methodology for the assessment of construction, operation, decommissioning and cumulative effects.

1.2 Engagement

1.2.1 Engagement was key to development of the Application Site design and environmental assessment. Vol 2 Appendix 7.1 Table 1 details the stakeholders contacted, a summary of key issues raised and how these have been addressed in the assessment. Engagement commenced during the initial site investigation stages, continued throughout site design stage and scoping, and the risk assessments undertaken in 2015. All site investigation and site assessment reports relevant to the Project were issued to the Environment Agency (EA) for comment.

1.2.2 A summary of the comments on reports issued to the stakeholders, stakeholder consultation meetings and response to the Scoping Opinion relevant to ground conditions and contamination is detailed below. Full details of all the topic-specific comments received during scoping and subsequent technical stakeholder engagement and responses are provided in Vol 2 Appendix 7.1 Table 1.

1.2.3 Discussions have taken place with the EA on the management of potential impacts on groundwater, in particular the Chalk aquifer.

Vol 2 Appendix 7.1 Table 1 Ground conditions and contamination engagement – comments and responses

Organisation and date	**Comment**	**Response**
London Borough of Enfield (LB Enfield) and EA, 2011	Meeting to discuss AMEC [1] site investigation and human health generic risk assessment which	Further site investigations were undertaken to better characterise the Application Site for the proposed

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[1] Note: Prior to 2015, Amec Foster Wheeler company name was AMEC

Organisation and date	Comment	Response
	concluded that there was low risk to human health at the Application Site. LB Enfield was satisfied with the content of the report, but stated that additional assessment may be needed depending upon the future use of the Application Site[2] (i.e. the future land use scenario). EA commented that the 2011 site investigation report adequately characterised the environmental risk posed by the Application Site.	Project design and are considered in the assessment. Human Health Risk was scoped out of the assessment.
EA, 2012	The EA issued a response[3] to the AMEC 2012 Source Protection Zone (SPZ) assessment and AMEC 2012 site investigation. The EA confirmed that they were satisfied with the contents of the 2012 SPZ assessment and that the 2012 site investigation provided useful information on the thickness of the London Clay across the Application Site.	As no unacceptable risks to groundwater receptors were identified, the design of the Project at the Application Site was progressed. A summary of all information relevant to the Project from the Application Site investigation reports and SPZ assessment report are included in Vol 2 Section 7.5 and a summary of all data from the reports are provided in the Hydrogeological Risk Assessment provided as Vol 2 Appendix 7.2 of the Environmental Statement (ES).
EA, 2013	The EA recommended that a thickness of 5 to 8m of London Clay should be retained below any waste-related development on the Application Site.	AMEC was commissioned to undertake further site investigation in 2014 to confirm the geological thicknesses and the data from this investigation are included in Vol 2 Section 7.5 of the ES. As a result of these additional geological data, the Energy Recovery Facility (ERF) bunker was designed in north-east of the Application Site where the London Clay is thickest.
EA, January 2014	On the 2014 Site Investigation, the EA commented that further information regarding the permeability of the London Clay/Lambeth Clay at depth was required to better identify the risk to the underlying aquifer.	Laboratory permeability testing was undertaken on the drilling samples of London Clay and Lambeth Group. The results are summarised in the Vol 2 Section 7.5 of the ES and further details available in the Hydrogeological Risk Assessment provided as Vol 2 Appendix 7.2 of the ES.
EA, March 2014	During consultation on the Project design stage , the following aspects of the scheme were identified by the EA as requiring further assessment:	A Hydrogeological Risk Assessment (Vol 2 Appendix 7.2 of the ES) has been undertaken incorporating the aspects noted by the EA including

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[2] Letter dated 3/10/11, from LB Enfield to AMEC, re: Edmonton SI Report

[3] Letter dated 29/03/12, from Environment Agency to AMEC, re: Enquiry regarding dry Anaerobic Digestion (AD) Plant at Edmonton EcoPark in SPZ1 as part of NLWA Waste Services Procurement Process. Ref: NE/2012/114412/01-L01

Organisation and date	**Comment**	**Response**
	• Disturbance of groundwater flow in the Kempton Park Gravels as a result of the construction of the underground waste bunker which would fully penetrate this aquifer unit; • A groundwater risk assessment and a hydrogeological assessment of groundwater flow; • The need to maintain a minimum thickness of London Clay of 5 to 8m beneath the waste bunker and any other deep structures, to maintain a degree of protection to underlying aquifer units; and • The potential for foundation piles to create pathways for migration of contaminants into aquifer units underlying the London Clay.	requirements for a risk assessment set out in the EA's Groundwater Protection: Principles and practice GP3[4]. Numerical modelling was undertaken to investigate the potential change to groundwater levels in the Kempton Park Gravels as a result of the proposed construction of the underground waste bunker as part of the proposed ERF. These assessments are all incorporated in Vol 2 Section 7.5 of the ES (baseline). The structures and buildings with deepest basements would be located in north-east of the Application Site where the London Clay is thickest to maintain a minimum of 5m London Clay beneath the waste bunker. A Piling Risk Assessment has been undertaken as part of the ES (Vol 2 Appendix 7.3). Detailed piling method statements will be undertaken as part of the detailed design process. The groundwater protection measures within the design will be agreed with the EA.
Scoping response: Secretary of State (November 2014)	"*In view of the current and previous uses of the Application Site the Secretary of State welcomes the proposed assessment of effects on ground conditions and contamination risks. The baseline for the Environmental Statement (ES) should explain in detail the extent of the study area, ensuring that the impacts are considered over a sufficiently wide area and provide the reasons to justify this*."	The baseline for the assessment includes the detail noted by the Secretary of State and effects have been assessed inside and outside of the Application Site boundary where potentially significant effects have been identified.
	"*The Secretary of State notes Table 8.2 which summarises the baseline scoping studies completed to date and which have helped to refine the scope of the assessment. Copies of these documents should be included with the ES if they are relied upon to support the scope and/or the conclusions of the assessment.*"	The Hydrogeological Risk Assessment summarises all data from previous investigations which is relevant to this assessment and is included as Vol 2 Appendix 7.2 of the ES.
	"*Paragraph 8.3.7 states that the assessment will focus on significant*	The assessment takes these comments into account. The pollution

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[4] Environment Agency (2013) Groundwater Protection: Principles and Practice Pollution GP3 August 2013 Version 1.1

Organisation and date	**Comment**	**Response**
	effects to receptors within the Application Site boundary. It is argued that pathways for contaminant migration to offsite receptors require contaminants entering underlying groundwater or existing contaminants in the soil/groundwater being disturbed and migrating elsewhere. The Report states that mitigation measures will prevent this from happening. These measures should be fully described in the ES; including how and why they mitigate all potentially significant adverse effects. It should also be clear how their delivery would be secured through the Design Consent Order [sic]. The potential of the measures to fail and/or not mitigate all potentially significant adverse effects (e.g. due to accidents or spillages/leakages of contaminants) should be addressed."	prevention measures are set out in Vol 2 Section 7 of the ES. The measures have been and will be discussed further with the LB Enfield and the EA through ongoing engagement.
	"*Paragraph 8.3.27 explains that the hydrogeological conceptual site model (CSM) to be produced will identify the mitigation measures proposed. The characteristics and likely effectiveness of these measures should be discussed and agreed with the EA and the outcomes of this process should be explained in the ES.*"	The CSM is included in the assessment presented in Vol 2 Appendix 7.2. The CSM was developed as part of the Hydrogeological Risk Assessment and mitigation measures have been identified. The likely effectiveness of these mitigation measures has also been assessed. Discussions are ongoing with the EA regarding the effectiveness of the measures.
Scoping response: EA (November 2014)	"*We are pleased to see that ground conditions and contamination have been considered within section 8 of the scoping document. Rather than focusing on human health implications which can be managed (e.g. capping or importing clean soils), it looks at the risks to the groundwater as a receptor*."	Groundwater is considered as a receptor in Vol 2 Section 7 of the ES.
	"*As identified, the detailed Hydrogeological Assessment of the Application Site should identify controls which will be in place to break any Source Pathway Receptor linkages during the construction and operational phases. This document does not go into as much detail for the operation phase controls as will be identified for the construction phase, we would suggest this is considered in more detail and how this can be expanded upon. There*	A Source Pathway Receptor conceptual model has been developed and is described in the Hydrogeological Risk Assessment provided as Vol 2 Appendix 7.2 of the ES. For each risk identified in operational phase, associated environmental control measures and mitigation have been identified.

Organisation and date	**Comment**	**Response**
	will be a degree of overlap with any environmental permit requirements, but it is critical to get the appropriate infrastructure in place as it will be difficult and costly to retrofit controls once the Application Site has been developed".	
EA, February 2015	"*Based on the analysis of advantages and disadvantages, we would also prefer to see the bunker removed as it leaves the land in a better position for redevelopment and less of a risk to the environment*".	The assessment now considers that during demolition of the existing Energy from Waste (EfW) facility the bunker would be removed.
Phase Two Consultation response: EA (June 2015)	Hydrogeological Risk Assessment Report Review: EA are satisfied that all their comments raised from their review of the draft report had been addressed in the final report. "*The new Source Protection Zone layers are to due be uploaded onto our website and we would like to reiterate that the Conceptual Site Model will need to be updated in due course to reflect this*"	The new Source Protection Zones were uploaded 13 July 2015. There was only a very minor change on the Application Site. The updated SPZ figure (contained in Vol 2 Appendix 7.2 of the ES) has not resulted in any changes to the assessment in the Hydrogeological Risk Assessment or ES.
Phase Two Consultation response: LB Enfield (June 2015)	"*There will be further work for risk to groundwater in the full EIA as the buildings will require piling which is likely to penetrate the London Clay. The London Clay is important as it is a barrier preventing surface contamination from reaching the chalk aquifer. The EIA will quantify risks and propose mitigation, if required, in order to ensure there are no unacceptable risks to ground water.*"	The assessment includes a Piling Risk Assessment (contained in Vol 2 Appendix 7.3 of the ES).The CoCP (Vol 1 Appendix 3.1 of the ES) contains an undertaking that a Piling Method Statement would be developed before any site works are undertaken.
Phase Two Consultation response: Thames Water (July 2015)	"*No impact piling shall take place until a piling method statement (detailing the depth and type of piling to be undertaken and the methodology by which such piling will be carried out, including measures to prevent and minimise the potential for damage to subsurface sewerage infrastructure, and the programme for the works) has been submitted to and approved in writing by the local planning authority in consultation with Thames Water.*"	The assessment includes a Piling Risk Assessment (contained in Vol 2 Appendix 7.3 of the ES) .The CoCP (Vol 1 Appendix 3.1) contains an undertaking that a Piling Method Statement would be developed before any site works are undertaken.
	"*We would expect the developer to demonstrate what measures he will undertake to minimise groundwater discharges into the public sewer*."	A permit will be obtained for any groundwater discharges which are required to be made to the sewer.

1.3 Legislation and guidance

National policy

1.3.1 National policy requirements relevant to ground conditions and contamination assessment from EN-1: Overarching National Policy Statement for Energy and EN-3: National Policy Statement for Renewable Energy Infrastructure are listed in Vol 2 Appendix 7.1 Table 2 and Vol 2 Appendix 7.1 Table 3.

Vol 2 Appendix 7.1 Table 2: EN-1: Overarching National Policy Statement for Energy

Requirements of NPS EN-1	**How the requirement is addressed**	**Location of where to find further detail**
Para 5.15.4 notes that "*activities that discharge to the water environment are subject to pollution control. The considerations set out in Section 4.10 of this NPS and detailed below on the interface between planning and pollution control therefore apply, and should be considered. These considerations will also apply in an analogous way to the abstraction licensing regime regulating activities that take water from the water environment, and to the control of regimes relating to works to, and structures in, on, or under a controlled water*."		
Para 4.10.2 – "*Pollution control is concerned with preventing pollution through the use of measures to prohibit or limit the releases of substances to the environments from different sources to the lowest practicable levels. It also ensures that water quality meet standards that guard against impacts to the environment or human health*."	Pollution control included in design and detailed in CoCP. Pollution control risk assessed and impacts noted as part of ground conditions and contamination assessment.	CoCP (Vol 1 Appendix 3.1 of the ES)
Para 4.10.6 – "*Applicants are advised to make early contact with relevant regulators including the EA, to discuss their requirements for environmental permits and other consents. This will help ensure count of all relevant environmental considerations and that the relevant regulators are able to provide timely advice and assurance to the Infrastructure Planning Commission. Whenever possible, applicants are encouraged to submit applications for Environmental Permits and other necessary consents at the same time as applying to the Infrastructure Planning Commission for development consent*."	EA and LB Enfield consulted and informed throughout the development of the Application Site plan.	Vol 2 Section 7.2 (Engagement) of the ES
Para 4.10.8 – "*The relevant pollution control authority is satisfied that potential releases can be adequately regulated under the pollution control framework; the effects of existing sources of pollution in and around the Application Site are not such that the cumulative effects of pollution when the proposed development is added would make that development unacceptable, particularly in relation to statutory environmental limits*."	Cumulative impacts considered as part of ground conditions and contamination assessment.	Vol 2 Section 7.12 (Cumulative effects) of the ES

Requirements of NPS EN-1	**How the requirement is addressed**	**Location of where to find further detail**
Para 5.15.7 – It should be considered "*whether appropriate requirements should be attached to any development consent and/or planning obligations entered into to mitigate adverse effects on the water environment*."	Flood risk assessment and hydrogeological risk assessment undertaken. Potential impacts considered as part of ground conditions and contamination assessment.	Flood Risk Assessment (Vol 2 Appendix 10.2 of the ES), hydrogeological risk assessment (Vol 2 Appendix 7.2 of the ES), Water Resources and Flood Risk (Vol 2 Section 11 of the ES) and Ground Conditions and Contamination (Vol 2 Section 7 of the ES).
Para 5.15.8 – It should be considered "*whether mitigation measures are needed over and above any which may form part of the Project application. A construction management plan may help codify mitigation at that stage*."	Potential impacts considered as part of ground conditions and contamination assessment and managed by the CoCP.	CoCP (Vol 1 Appendix 3.1 of the ES) and Ground Conditions and Contamination (Vol 2 Section 7 of the ES)
Para 5.15.9 – "*The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked*."	Water environment considered within the design and CoCP and potential impacts considered as part of ground conditions and contamination assessment.	CoCP (Vol 1 Appendix 3.1 of the ES)
Para 5.10.5 – "*The ES should identify existing and proposed land uses near the Project, any effects of replacing an existing development or use of the Application Site with the proposed Project or preventing a development or use on a neighbouring site from continuing. Applicants should also assess any effects of precluding a new development or use proposed in the development plan*."	Cumulative impacts of neighbouring developments considered as part of ground conditions and contamination assessment.	Vol 2 Section 7.12 (Cumulative effects) of the ES
Para 5.10.8 – "*Applicants should also identify any effects and seek to minimise impacts on soil quality taking into account any mitigation measures proposed. For developments on previously developed land, applicants should ensure that they have considered the risk posed by land contamination*."	Potential effects and impacts considered in hydrogeological risk assessment and as part of ground conditions and contamination assessment.	Hydrogeological Risk Assessment, (Vol 2 Appendix 7.2 of the ES), Water Resources and Flood Risk (Vol 2 Section 11 of the ES) and Ground Conditions and Contamination (Vol 2 Section 7 of the ES)

Requirements of NPS EN-1	How the requirement is addressed	Location of where to find further detail
Para 5.15.2 – "*Where the Project is likely to have effects on the water environment, the Applicant should undertake an assessment of the existing status of, and impact of the proposed Project on, water quality, water resources and physical characteristics of the water environment as part of the ES*."	Assessed under Water resources, which provides baseline for this assessment.	Water Resources and Flood Risk (Vol 2 Section 11 of the ES)
Para 5.15.3 of this NPS notes that the Applicant should include the following in the ES.		
"*the existing quality of waters affected by the proposed Project and the impacts of the proposed Project on water quality*"	Assessed in ground conditions and contamination assessment.	Ground Conditions and Contamination (Vol 2 Section 7 of the ES)
"*existing water resources affected by the proposed Project and the impacts of the proposed Project on water resources*"	Assessed under water resources which provides baseline for this assessment.	Water Resources and Flood Risk (Vol 2 Section 11 of the ES)
"*any impacts of the proposed Project on water bodies or protected areas under the Water Framework Directive and SPZs around potable groundwater abstractions*."	Assessed underground conditions and contamination assessment and water resources, which provides baseline for this assessment.	Ground Conditions and Contamination (Vol 2 Section 7 of the ES) and Water Resources and Flood Risk (Vol 2 Section 11 of the ES)

Vol 2 Appendix 7.1 Table 3: EN-3: National Policy Statement for Renewable Energy Infrastructure

Requirements of NPS EN-3	How the requirement is addressed	Location of where to find further detail
Para 2.5.86 – The Applicant should have "*demonstrated measures to minimise adverse impacts on water quality and resources as described in EN-1 and EN-3*."	Potential impacts considered as part of ground conditions and contamination assessment.	Ground Conditions and Contamination (Vol 2 Section 7 of the ES)

Legislation, guidance and local policy

1.3.2 The basis for the assessment of contaminated land is founded in the legalisation, policy and guidance listed below. These documents define how contaminated land is identified, how contaminated land should be assessed, the requirement to identify and protect receptors, and the use of a conceptual model identifying source-pathway-receptors as an assessment methodology. These documents have therefore defined the methodology of the assessment and give guidance on the assessment outcome. A summary of some of the most pertinent paragraphs and/ or summaries of the relevant sections from these documents have been detailed below. As these documents are applicable to the development of the methodology, they have not been referenced individually in the Assessment.

a. National Planning Policy Framework ;
b. The Groundwater (England & Wales) Regulations (2009);
c. Part 2A of the Environment Protection Act 1990;
d. Department of Environment, Food and Rural Affairs (Defra) Contaminated Land Statutory Guidance (2012);
e. Defra SP1010: Development of Category 4 Screening Levels for Assessment of Land affected by Contamination – Policy Companion Document, March 2014; Risk assessment guidance; and
f. Model procedures for the management of land contamination (CLR11).

1.3.3 Paragraph 109 of the National Planning Policy Framework indicates that the planning system should contribute to and enhance the natural and local environment by:

> *“remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.”*

1.3.4 In this assessment the identification of any land which has potentially polluting substances has been assessed to determine if mitigation will be required as part of the Project. Paragraph 121 states that:

> *“Planning policies and decisions should also ensure that:*

- *the Application Site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation.*
- *adequate site investigation information, prepared by a competent person, is presented.”*

1.3.5 Several site investigations have been undertaken at the Application Site which included soil, gas and water sampling and monitoring and provide the baseline to this assessment.

1.3.6 The Groundwater (England & Wales) Regulations (2009) defines hazardous and non-hazardous substances, and makes it an offence to cause or knowingly permit the discharge of hazardous or non-hazardous substances into groundwater unless it is carried out under and in accordance with a permit granted by the EA. This definition is included as one of the assessment criteria.

1.3.7 The principal legislation governing the identification and remediation of contaminated land is Part 2A of the Environment Protection Act 1990, which was implemented in April 2000. The legislation is supported by the Contaminated Land (England) Regulations (2000), amended in 2006 and 2012, and Statutory Guidance (Defra Circular 01/2006), subsequently updated in April 2012. Together this provides the regulatory regime which sets out the nature of liabilities that can be incurred by owners of contaminated land and groundwater.

1.3.8 Part 2A provides a statutory definition of contaminated land and sets out the nature of liabilities that can be incurred by owners of contaminated land and groundwater and these definitions have been applied in this assessment. According to the Act, contaminated land is defined as:

a. "*any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substance in, on, or under that land, that:*
   - *Significant harm is being caused, or there is significant possibility of such harm being caused; or*
   - *Significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused"*

1.3.9 Central to the regulatory system is a rigorous procedure of risk assessment which is used to determine the existence of 'contaminated land' according to the definition. The approach to undertaking a risk assessment should be in line with the regulations and be based on a tiered framework in accordance with risk assessment guidance[5] and CLR11[6]. This approach was used in this assessment and in the Hydrogeological Risk Assessment which supports the assessment (Vol 2 Appendix 7.2 of the ES).

1.3.10 Following the guidance, a conceptual model has been developed at the preliminary risk assessment (tier 1) stage. The conceptual model represents the characteristics of the Application Site and indicates the possible relations between contaminants, pathways and receptors

1.3.11 For a potential risk to exist at a site all three of the above elements must be present, and linked together so that a contaminant has been identified, a receptor is located on the Application Site and there is an exposure pathway that links the contaminant to the receptor. The term 'pollutant linkage' is used to describe a particular combination of contaminant-pathway-receptor relationship.

1.3.12 For each receptor, a description of the harm that is to be regarded as significant harm for the purposes of the regime is contained in the statutory guidance and has been followed in this assessment. Receptors include human beings, ecological systems in certain protected locations (e.g. Sites of Special Scientific Interest), property such as crops, livestock, domesticated animals, animals maintained for sporting purposes, buildings and their services. Significant harm includes in appropriate cases death, disease, serious injury, specified ecological system effects, substantial diminution of crop yield and structural building failure. Pollution of controlled waters arising from the contaminated condition of land is also included in the regime.

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[5] Department for Environment, Transport and the Regions, Environment Agency and Institute for Environment and Health (2000) Guidelines for Environmental Risk Assessment and Management. July 2000.

[6] Department for the Environment, Food and Rural Affairs and the Environment Agency. (2004) Model Procedures for the Management of Land Contamination. Contaminated Land Report CLR 11. September 2004.

1.3.13 Other guidelines and standards have been taken into account during the preparation of this assessment, in addition to those named above and include:

Controlled waters

a. Defra, EA Water Framework Directive Thames River Basin Management Plan (2009)

Baseline data for the assessment:

b. British Standards Institute BS10175:2011+A1:2013 Investigation of Potentially Contaminated Sites – Code of Practice was used for site investigations which are included in the baseline of the assessment.

c. British Standards Institute BS5030:1999+A2:2010 Code of Practice for Site Investigations was used for site investigations which are included in the baseline of the assessment.

d. EA Pollution Prevention Guidelines (PPG) (notably PPG1 – Guide to Preventing Pollution, PPG2 – Above Ground Oil Storage Tanks, PPG5 – Works in or Near Water, PPG6 – Working at Construction and Demolition Sites, PPG7 – Refuelling Facilities Good Practice Guidelines, PPG21 – Pollution Incident Response Planning, PPG22 – Dealing with Spills)

Piling design:

e. EA (2001) Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention. NC/99/73

f. EA (2002) Piling into Contaminated Sites

Groundwater risk assessment and assessment methodology

g. EA Groundwater Protection: Principles and Practice Pollution GP3

1.3.14 Other guidelines, policies and plans have been consulted during the preparation of this assessment to ensure all applicable regional and local planning policies have been considered. The policies reference the use of the guidance and legislation which were already considered within the assessment as detailed in Paragraphs 1.3.12 and 1.3.13. Policies considered comprise:

a. London Plan (2011)[7] Policy 5.14 Water quality and waste water infrastructure, which indicates that future developments in London will "*protect and improve water quality having regard to the Thames River Basin Management Plan*";

b. Enfield Council Core Strategy 2010-2025 Section 8,[8] which details the core policies for the Environment Protection for future developments in LB Enfield and are consistent with the national policy;

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[7] Greater London Authority (GLA) (2015) The London Plan, the Spatial Development Strategy for London Consolidated with Alterations since 2015, March 2015.

[8] LB Enfield (2010) The Enfield Plan Core Strategy 2010 – 2025, Adopted November 2010.

c. Enfield Council Development Management Document (2014) Section 11, which details policy on Environmental Protection for future developments in the borough, and also provides guidance on the policies. The document details that contaminated land will be sufficiently assessed to determine that no harm will be caused for use of the Application Site. It also details that risk assessment of all potential effects, the application of suitable safeguards and consultation with the EA or other suitable regulators needs to occur. This document was consistent with the national policy and CLR11 guidance methodology considered in the assessment;

d. Enfield Council Unitary Development Plan (1994) contains the policy on Environmental Protection (G1) which is consistent with the national policy considered in the assessment; and

e. the London Borough Councils and EA have developed a contaminated land strategy in accordance with Part 2A and produced a document, Contaminated Land: A Guide to Help Developers Meet Planning Requirements, dated January 2004, which details the risk assessment methodology for contaminated land for new developments which is considered in the methodology for this assessment. This is consistent with the approach detailed in Part 2A which is used in this assessment.

1.4 Baseline conditions

Current baseline

1.4.1 Extensive work has been undertaken in relation to ground conditions and contamination at the Application Site. This work is summarised in Vol 2 Appendix 7.1 Table 4. The table additionally describes the purpose of each assessment or investigation. A map of the current site groundwater monitoring network and further details of each of the Application Site investigations and assessments are detailed in Vol 2 Appendix 7.2 (Hydrogeological Risk Assessment) of the ES.

Vol 2 Appendix 7.1 Table 4: Baseline data

Year	Relevant baseline data	Purpose
2011	Review of historical information and geological and groundwater vulnerability mapping	To determine the historical and current site conditions from the available literature and location mapping.
2011	Soils data from 56 intrusive locations	To develop geological mapping of the Application Site and soil quality
2011	Two groundwater and six ground gas monitoring rounds	To determine the baseline groundwater and ground gas concentrations
2011	Three ground gas monitoring rounds and risk classification	To establish the potential risk to human health and to the environment.
2012	A screening assessment for the SPZ for nearby public water supply boreholes was undertaken. This study included a CSM and	To establish a CSM and preliminary risk categorisation.

Year	Relevant baseline data	Purpose
	preliminary risk categorisation for the proposed anaerobic digestion plant	
2013	Soils data from four additional boreholes installed into the London Clay and Lambeth Group	To develop geological mapping of the Application Site and groundwater quality in the Lambeth Group.
2013	Additional investigation of groundwater quality, following feedback from the EA.	To confirm the water quality in the Lambeth Group by analysing with lower analytical minimum detection limits.
2014	Soils and geotechnical data from 13 boreholes installed into the London Clay and Lambeth Group	To further develop geological mapping of the Application Site and determine the thickness of London Clay in the north of the Application Site. Geotechnical testing for informing building and foundation design.
2014	Soils analysis from four boreholes installed into the London Clay and Lambeth Group	To further develop geological mapping of the Application Site and determine the land quality.
2015	Ten rounds of groundwater monitoring data from 19 boreholes, collected 2012-14.	Determine the baseline groundwater quality on the Application Site and monitoring for the Application Site Protection Monitoring Plan.
2015	Hydrogeological Risk Assessment for the Application Site and proposed ERF.	Establish the hydrogeological risks for the Application Site.
2015	Piling Risk Assessment for the Application Site.	Establish the potential risks for the Application Site.

Receptor identification and sensitivity

1.4.2 The varying effects of a contaminant on individual receptors depend largely on the sensitivity of the receptor. Receptors include any people, animal or plant populations, or natural or economic resources within the range of the contaminant source which are connected to the source by the transport pathway, although in this instance the assessment is concerned primarily with soils and groundwater.

1.4.3 The receptors for current site activities are identified as part of the ground condition and contamination assessment in the CSM. The sensitivity of each of the receptors has been identified as part of the assessment methodology. Baseline soil and groundwater sampling has been undertaken within the operational area of the Application Site and the boreholes and monitoring network put in place to establish baseline ground, surface water and groundwater quality is shown in Vol 2 Figure 7.1.

1.4.4 Receptors outside the Application Site boundary are also considered as receptors from onsite sources identified. The groundwater in the aquifers underlying the Application Site are sensitive receptors, and the public and private abstractions from these aquifers are sensitive receptors. Salmon’s Brook, which is in hydraulic connectivity with the Application Site groundwater aquifers, is also considered a receptor for this assessment.

1.4.5 Surface water bodies outside the Application Site which have been identified as potential receptors have been assessed and their water quality considered within the Thames River Basin Management Plan (2009) context with reference to improving water quality.

Future baseline

1.4.6 The future baseline of the Application Site considers changes to the baseline due to planned developments in the vicinity of the Application Site which need to be taken into account in the assessment.

1.5 Construction effects

1.5.1 The methodology has been developed using expert judgement in conjunction with the guidance identified in Section 1.3.

Assessment area

1.5.2 The assessment area encompasses the Application Site and considers Principal and Secondary aquifers outside the Application Site, and public and private groundwater abstractions which could be impacted by sources within the Application Site. The surface water body Salmon’s Brook is considered as it is in hydraulic connectivity with the onsite aquifers.

Assessment method and significance criteria

1.5.3 The significance of any impacts caused by the Project on baseline conditions has been assessed qualitatively based on professional judgement and relevant guidance (as detailed in Section 1.3) for contaminated land and water resources. The magnitude of the impact is determined by assessing the severity and likelihood. The sensitivity of the receptor, which is a combination of its relative importance and the degree of anticipated environmental response of the receptor, and the magnitude of any potential impact combine to determine the significance of the impact. Magnitude, severity, sensitivity and significance criteria were developed and are detailed below.

Severity

Severity of the impact is the scale of impact on a receptor, i.e. size, duration, timing or frequency, as defined in Vol 2 Appendix 7.1 Table 5. The likelihood of the impact is detailed in Vol 2 Appendix 7.1 Table 6. The severity of impact is combined with the likelihood of occurrence to give the magnitude of impact as detailed in Vol 2 Appendix 7.1 Table 7.

Vol 2 Appendix 7.1 Table 5: Severity of impact

Severity	**Criteria** (impact size, duration, timing or frequency)
Major	Major change to soil or groundwater conditions (including deterioration in soil or groundwater quality) resulting in temporary or permanent changes (e.g. major spillage resulting in levels of contamination which would cause significant harm to a receptor).
Moderate	Detectable change to soil or groundwater conditions resulting in non-fundamental temporary or permanent changes. Some deterioration in soil quality likely to temporarily affect sensitive receptors.
Minor	Detectable but minor change to soil or groundwater conditions. Soil quality standards less than threshold and unlikely to affect sensitive receptors (e.g. a minor spillage).
Negligible	Unquantifiable change in soil or groundwater conditions.

Vol 2 Appendix 7.1 Table 6: Likelihood of impact

Impact	Definition
Unlikely	An impact which whilst theoretically possible will probably never be realised.
Low likelihood	An impact that is considered possible when considered over the development lifetime.
Likely inevitable	An impact which is considered likely when considered over the development lifetime, but not inevitable.
High likelihood	An impact that is considered to be a direct and inevitable consequence of the Project or which is considered to be probable even when considered in the short term.

Vol 2 Appendix 7.1 Table 7: Magnitude of impact

		Likelihood			
		Unlikely	Low likelihood	Likely inevitable	High likelihood
Severity	Major	Minor	Moderate	Major	Major
	Moderate	Negligible	Minor	Moderate	Moderate
	Minor	Negligible	Negligible	Minor	Minor
	Negligible	Negligible	Negligible	Negligible	Negligible

Sensitivity

1.5.4 Vol 2 Appendix 7.1 Table 8 provides the sensitivity criteria for receptors, which is a combination of their relative importance and the degree of anticipated environmental response.

Vol 2 Appendix 7.1 Table 8: Criteria for sensitivity of receptor

Sensitivity	**Criteria**
Very High	Environment responds to major change(s) e.g. substantial change to groundwater quality in an aquifer used as potable drinking water supply. Potential to cease drinking water supply on long term.

Sensitivity	**Criteria**
High	Environment clearly responds to effect(s) in quantifiable and/or quantifiable manner e.g. change in groundwater quality in an aquifer causing identifiable deterioration in water quality. Potential to cease drinking water supply on medium or short term.
Medium	Environment responds in a minimal way such that only minor changes are detectable e.g. groundwater quality shows only minor changes.
Negligible	Environment is insensitive to impact, no discernible changes e.g. no significant change in water quality detected, or receptor not sensitive to change.

Significance criteria

1.5.5 Magnitude of impact and sensitivity have been combined to provide the significance of impacts on receptors as detailed in Vol 2 Appendix 7.1 Table 9.

1.5.6 The significance assessment is the process of collating known information on a hazard or set of hazards in order to estimate actual or potential impact on receptors. Receptors are connected with the hazard under consideration via one or several exposure pathways Risks are generally managed by isolating or removing the hazard, isolating the receptor, or by intercepting the exposure pathway. Without the three essential components of a source, pathway and receptor, there can be no effect on the receptor. Thus, the mere presence of a hazard at a site does not mean that there will necessarily be attendant risks.

1.5.7 In this assessment the source, pathway and receptor linkage is identified within the CSM. The assessment is made for each contaminant on a receptor by receptor basis with reference to the significance and degree of the risk. In assessing this information, a measure is made of whether the source contamination can reach a receptor, determining whether it is of significance or not.

Vol 2 Appendix 7.1 Table 9: Significance of the impact

		Sensitivity of Receptor			
		Very high	**High**	**Medium**	**Low**
Magnitude of Impact	**Major**	Very Substantial	Substantial	Substantial /Moderate	Moderate
	Moderate	Substantial	Substantial /Moderate	Moderate	Moderate/Slight
	Minor	Substantial /Moderate	Moderate	Moderate/ Slight	Slight
	Negligible	Negligible	Negligible	Negligible	Negligible

Key:	Significant Impact	Not Significant Impact

Vol 2 Appendix 7.1 Table 10 Definition of significance of impacts

	Significance	Definition
Not significant impact	Negligible	The presence of an identified hazard does not give rise to the potential to cause significant harm to a receptor.
	Slight/Moderate	It is possible that harm could arise to a receptor from an identified hazard but it is likely that, at worst, this harm, if realised, would normally be minor.
Significant impact	Substantial	It is possible that, without appropriate remedial action, harm could arise to a receptor. It is relatively unlikely that any harm would be high, and if any harm were to occur it is more likely that such harm would be minor.
	Very Substantial	Harm is likely to arise to a receptor from an identified hazard at the Application Site without appropriate remedial action.

1.5.8 Where the risk of significant impact is assessed to be substantial or above, mitigation/management will normally be required to reduce the level of risk to slight or negligible levels. In any situations where it is not possible, or reasonable, to mitigate the impacts down to this level, these residual risks have then been assessed. The summary for each significance category is detailed in Vol 2 Appendix 7.1 Table 10.

1.6 Operational effects

1.6.1 The assessment method is the same as that applied for the construction assessment and described in Section 1.5.

1.7 Decommissioning effects

1.7.1 The assessment method is the same as that applied for the construction assessment and described in Section 1.5.

1.8 Cumulative effects

1.8.1 Cumulative effects of other developments within the local area are identified below, and their effects are considered qualitatively during the different phases of the Project.

1.8.2 The potential effects for the construction and operational phases of each of the developments are identified and these effects are considered in addition to the potential effects from the Project. The cumulative effects of the developments are assessed to indicate if there are any likely significant impacts.

a. The North London (Electricity Line) Reinforcement (Development Consent Order) Project is located approximately 60m from the Application Site and extends along the north-east, east, south-east and south of the Application Site. Upgrade work to an existing overhead line between Waltham Cross and Tottenham Substations, and its operation at a higher voltage. The upgrading will involve works at each substation along the route. This includes a substation located partially within the Application Site boundary. No information is available regarding the nature of the upgrade work however any construction required has the potential to increase hardstanding within that area.

b. Meridian Water, approximately 300m south of the Application Site. It is anticipated that these works will include excavations, piles and dewatering and therefore may have effect on the flow and water quality in the underlying aquifers. Any change of use to residential is likely to extend the amount of soft landscaping and hence would influence infiltration rates at that site.

NORTH LONDON WASTE AUTHORITY

NORTH LONDON HEAT AND POWER PROJECT

ENVIRONMENTAL STATEMENT: VOLUME 2 APPENDIX 7.2 HYDROGEOLOGICAL RISK ASSESSMENT

AD06.02

North London Waste Authority

North London Heat and Power Project

Hydrogeological Risk Assessment

AD06.02

The Planning Act 2008 The Infrastructure Planning
(Applications: Prescribed Forms and Procedure)
Regulations 2009 Regulation 5 (2)(a)

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Amec Foster Wheeler Environment & Infrastructure UK Ltd.

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Executive summary

i.i.i Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler) was commissioned by North London Waste Authority (the Applicant) to undertake a hydrogeological risk assessment at Edmonton EcoPark. The Applicant is seeking a Development Consent Order (DCO) for the North London Heat and Power Project (the Project), which includes a proposed Energy Recovery Facility (ERF) and associated infrastructure to replace the existing Energy from Waste (EfW) facility. As part of the DCO Application, an Environmental Impact Assessment (EIA) has been undertaken. The Environment Agency (EA) has identified a hydrogeological risk assessment as a requirement to support the EIA.

i.i.ii The Project consists of a proposed ERF in the northernmost section of the Edmonton EcoPark that will comprise:

a. a waste reception area;

b. a storage bunker;

c. the main combustion and boiler plant;

d. an ash recycling facility; and

e. a turbine, as well as administration buildings.

i.i.iii The waste stream will be derived from domestic and business sources and will not include separately collected hazardous wastes. In the south and east, a one storey Recycling and Fuel Preparation Facility (RFPF) and two storey EcoPark House office building are proposed.

i.i.iv The existing EfW facility and below ground bunker will be demolished and backfilled as well as the current Waste Water Treatment Plant once the proposed ERF is fully operational.

i.i.v For the proposed ERF, the significant considerations for groundwater are: introduction of new hazards at the Edmonton EcoPark; and creation of new pathways from sources of potentially polluting substances to the underlying Principal Aquifer and public water abstraction from that aquifer. The Edmonton EcoPark lies within the inner Source Protection Zone (SPZ) for a public water abstraction.

i.i.vi The Project raises the following considerations for groundwater protection:

a. changes in groundwater levels and flow directions in the Kempton Park Gravels due to the impermeable ERF bunker structure;

b. maintenance of the protection to underlying sensitive aquifers provided by the low permeability London Clay and/or Alluvium; and

c. the potential for foundation piles to create new pathways for contaminant migration from the surface to sensitive aquifers at depth.

i.i.vii The Edmonton EcoPark is generally flat and low-lying. It has been used as a waste management site since the 1960s.

i.i.viii The Edmonton EcoPark is underlain by Made Ground, a thin layer of Alluvium and then the Kempton Park Gravels (River Terrace Deposits), beneath this is the London Clay, Lambeth Group, Thanet Sands and Chalk.

i.i.ix The Alluvium, Kempton Park Gravels, Thanet Sands and the sandier horizons in the Lambeth Group are Secondary Aquifers and the Chalk is a Principal Aquifer.

i.i.x The Edmonton EcoPark is within an inner (zone 1) and outer (zone 2) groundwater SPZ for a public water supply borehole at Chingford 400m east of the Edmonton EcoPark, which abstracts groundwater from the Chalk.

i.i.xi The low permeability layers in the Lambeth Group and the London Clay provide protection to the underlying Chalk by limiting downward movement of groundwater from the surface.

i.i.xii In the centre of the Edmonton EcoPark, the London Clay is absent where it was removed to permit construction of the existing EfW facility bunker.

i.i.xiii Groundwater is found at shallow depth in the Kempton Park Gravels and generally flows to the southwest.

i.i.xiv Groundwater quality in the Chalk is anticipated to be good, reflecting its use for potable water supply. The Thanet Sand is commonly found to be in hydraulic connectivity to the Chalk and therefore its water quality is therefore also anticipated to be good.

i.i.xv There is some contamination in the Kempton Park Gravels and Lambeth Group (exceedences of water quality standards) for ammonium, chloride, sulphate, metals and metalloids (aluminium, arsenic, boron, cadmium, chromium, copper, mercury, iron, nickel, and selenium), phenols and vinyl chloride.

i.i.xvi The Edmonton EcoPark sits between the Enfield Ditch to the east and Salmon’s Brook immediately west of the Edmonton EcoPark. The River Lee Navigation is further to the east of the Edmonton EcoPark. Water quality monitoring of Salmon’s Brook and the River Lee Navigation found no exceedances of the freshwater EQS but elevated ammonium was identified in Salmon’s Brook at concentrations of 4.1mg/L upstream and 2.1mg/L downstream. As the concentration is lower downstream it does not suggest that the Edmonton EcoPark is a source of ammonium to the watercourse.

i.i.xvii A conceptual site model has been developed that links sources, pathways and receptors. A range of potential sources associated with existing and Project activities have been identified.

i.i.xviii Current pathways, and pathways which may be developed due to the Project, have also been identified in association with the proposed ERF bunker, deep foundation piles, dewatering to permit excavations and existing EfW facility bunker demolition.

i.i.xix The main receptors that are potentially at risk from the Project are: current and future commercial site users; construction workers; groundwater in the Kempton Park Gravels; Lambeth Group, Thanet Sands; Chalk aquifers; and public supply boreholes.

i.i.xx Separate preliminary risk assessments have been undertaken to consider human health and groundwater.

i.i.xxi The results of the human health risk assessment found a small number of exceedences of generic assessment criteria for lead, chromium (total) and benzo(a)pyrene. The presence of asbestos was noted in a small number of samples. The majority of GAC (General Assessment Criteria) exceedances are at depths below 0.7m and therefore there is unlikely to be an exposure pathway which could affect human health. The shallow exceedences were in areas covered in hard standing, mitigating a potential exposure pathway.

i.i.xxii The results of the hydrogeological risk assessment found that after mitigation measures the risk for the majority of possible hazard events is low, with the exception of where the impermeable surface or bund is breached by subsidence in which case the risk is considered to be medium. Such an event would also need to coincide with another event (e.g. ruptures of a pipeline) and the likelihood of such an event is considered to be very remote. The risk could further be reduced by:

a. regular inspection of bunds and impermeable surfaces; and

b. emergency response procedure in the event of a failure.

1 Introduction

1.1 Terms of reference and purpose of this report

1.1.1 Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler) has been commissioned by North London Waste Authority (the Applicant) to undertake a hydrogeological risk assessment at Edmonton EcoPark.

1.1.2 The Applicant is seeking a Development Consent Order (DCO) for the North London Heat and Power Project (the Project), which includes a proposed Energy Recovery Facility (ERF) and associated infrastructure to replace the existing Energy from Waste (EfW) facility. As part of the DCO application, an Environmental Impact Assessment (EIA) has been undertaken. The Environment Agency (EA) has identified a hydrogeological risk assessment as a requirement to support the EIA.

1.1.3 The DCO Application Site boundary includes the existing Edmonton EcoPark, a Temporary Laydown Area to the east of the Edmonton EcoPark, part of Lee Park Way and land to the west of the River Lee Navigation, an area in the northwest around the existing water pumping station, part of Ardra Road. This assessment has been undertaken for the Edmonton EcoPark only.

1.2 Summary of the Proposed Project

1.2.1 The Project consists of a proposed ERF, which will be developed in the northernmost section of Edmonton EcoPark and will comprise:

a. a waste reception area including a storage bunker;

b. the main combustion and boiler plant;

c. an ash recycling facility; and

d. a turbine, as well as administration buildings.

1.2.2 The waste stream will be derived from domestic and business sources and will not include separate hazardous wastes. The buildings currently in the north of the Edmonton EcoPark are to be demolished.

1.2.3 In the south of the Edmonton EcoPark a one storey Resource Recovery Facility (RRF) is proposed, and in the area to the east of the Edmonton EcoPark a two storey EcoPark House office building is proposed.

1.2.4 The existing EfW facility and below ground bunker will be demolished and backfilled, as well as the current Waste Water Treatment Plant once the proposed ERF is fully operational. The detailed EfW facility demolition design has yet to be finalised and therefore, the demolition stage is not considered in this hydrogeological risk assessment. However, the current Edmonton EcoPark site condition and post bunker removal stages are considered.

1.2.5 For the proposed construction, the significant considerations for groundwater are: introduction of new hazards to the Edmonton EcoPark; and creation of new pathways from sources of potentially polluting substances to the underlying Principal Aquifer and public water abstraction from the aquifer. The Edmonton EcoPark lies within the inner Source Protection Zone (SPZ) for the public water abstraction which indicates that groundwater underlying the Edmonton EcoPark is within 50 day travel time to the abstraction.

1.2.6 From consultation with the EA, the Project raised the following considerations for groundwater protection:

a. changes in groundwater levels in the Kempton Park Gravels due to the installation of an impermeable ERF bunker structure;

b. disturbance of groundwater flow in the Kempton Park Gravels as a result of the construction of an underground waste bunker for the proposed ERF that will fully penetrate that aquifer;

c. maintaining the protection to underlying, sensitive aquifers provided by the low permeability London Clay. The EA requires that a minimum thickness of London Clay (5m) is maintained beneath the waste bunker and other deep structures; and

d. the potential for foundation piles to create pathways for migration of contaminants from the surface into sensitive aquifers underlying the London Clay.

1.3 Sources of Information

1.3.1 This hydrogeological risk assessment is based on information contained in the reports listed in Table 1.1 and on publicly available sources of information. Previous reports comprise desk studies, site investigation reports and regulatory liaison.

Table 1.1 Sources of Information

Report Reference Number	Report Title	
Site Investigations		
29541rr009i2 (March 2011)	Entec (now Amec Foster Wheeler), 2011. North London Waste Authority. ISDS Baseline Geo-environmental Site Investigation Report.	This investigation comprised of the drilling and installation of 22 boreholes, and drilling of 34 window sample holes (the majority of which were also installed as groundwater monitoring points). Six boreholes were progressed into the Lambeth Group. The depths to this stratum were found to vary between 11.2m bgl, (0.36m above Ordnance Datum (AOD)) in the south of the Edmonton EcoPark, and 24.2m bgl (-12.45m AOD), in the north, indicating a marked variation in the thickness of the London Clay.
29541rr036i3 (February 2012)	AMEC, 2013. North London Waste Authority. ISDS Baseline Geo-environmental Supplementary Site Investigation Report.	The 2012 investigation was designed to provide clarification of the profile of the upper surface of the Lambeth Group by means of 4 boreholes progressed to the Lambeth Group to aid interpretation of the geological structure
29541rr037i2	AMEC, 2012. Technical Note: SPZ Screening Assessment – Discussion Document.	In 2012, Amec Foster Wheeler undertook an SPZ Screening Assessment (29541rr037i2). This detailed the risk to controlled water posed by the proposed waste activities at a dry anaerobic digestion plant at the Edmonton EcoPark.
35180r010i2 (June 2014)	AMEC, 2014. North London Waste Authority. Geotechnical Ground Investigation.	This investigation, comprised of 13 boreholes, which were designed to provide further clarification of the geological structure and geotechnical properties of the geology beneath the north of the Edmonton EcoPark. Groundwater monitoring standpipes were installed at five locations, four within the Lambeth Group and one within the Kempton Park Gravels to supplement the existing groundwater monitoring network
29541rr084i2 (December 2014)	Amec Foster Wheeler, 2015. North London Waste Authority. Supplementary Ground Investigation - Energy for Waste Area.	This investigation was undertaken to confirm the geology in the vicinity of the existing EfW facility. Two boreholes were drilled to between 8 and 25m bgl.
29541rr086i2 (December 2014)	Amec Foster Wheeler, 2015. North London Waste Authority. Geoenvironmental Desk Study and Supplementary Ground Investigation - Wharf Area	This was undertaken to investigate baseline geo-environmental ground conditions in the Wharf Area which is located along the eastern Edmonton EcoPark margin. Two boreholes were drilled to 25m bgl, one borehole was installed in the Kempton Park Gravels.

Report Reference Number	Report Title	
29541rr058i2	AMEC, 2014. North London Waste Authority. Edmonton-site Protection and Monitoring Programme. Final 2013 Annual Report, Year 2 of 2.	The aim of the SPMP is to assess whether Edmonton EcoPark activities have a significant effect on groundwater and to highlight potential issues. The baseline groundwater conditions for the Edmonton EcoPark were established through two years of quarterly groundwater monitoring (2012 and 2013) for key potentially polluting substances (PPS). These baseline concentrations form the basis for comparison with all future monitoring results under the Environmental Permitting Regulations (EPR).
29541rr085i1	Amec Foster Wheeler, 2015. North London Waste Authority. Edmonton-site Protection and Monitoring Programme. Draft 2014 Annual Report, Year 1 of 3.	Between 2012 and December 2014, as part of the SPMP, ten rounds of groundwater monitoring were carried out. Two surface water monitoring rounds at four locations have been undertaken on the River Lee Navigation and Salmon's Brook. The Kempton Park Gravel aquifer was identified to be potentially most at risk from the current Edmonton EcoPark activities within the SPMP, and therefore only Kempton Park Gravels groundwater monitoring locations are monitored.

1.3.2 All boreholes in the above studies were drilled using cable percussive methodology with two hour and 24 hour bentonite and grout seal approved by the EA, to ensure no pollutant pathways were created by the ground investigation boreholes.

2 Edmonton EcoPark - location, descriptions and setting

2.1.1 The description provided in the following section is a summary to provide background information pertinent to this report. Further details are provided in the reports listed in Table 1.1.

2.1 Site location and description

Site Name and Address:	London Waste Ltd (LWL), EcoPark, Advent Way, Edmonton, London N18 3AG		
Grid Reference:	TQ 35750 92860	Site Area:	15.6 ha
Current Site Use:	Waste operations comprising: existing EfW facility, ash recycling facility, composting plant, waste transfer station and bulky waste facility. There is also a lorry park and open landscaped areas.		
Proposed Site Project:	Waste operations comprising: proposed ERF and associated infrastructure		

2.1.1 This assessment has been undertaken for the Edmonton EcoPark, as shown in Figure 1.

2.1.2 The Environmental Impact Statement has been undertaken for the DCO Application Site, shown in Figure 1, which includes a Temporary Laydown Area to the east of the Edmonton EcoPark and an area in the northwest related to the pump station pipework. As the groundwater data available is for the Edmonton EcoPark and no groundworks are anticipated at the Temporary Laydown Area, this assessment has been undertaken on the Edmonton EcoPark only.

2.2 Edmonton EcoPark topography and existing land use

2.2.1 The Edmonton EcoPark is generally flat and low lying at approximately 11m AOD, with the exception of raised areas in the northeast. The south of the Edmonton EcoPark, where the main entrance is located, is generally landscaped areas with surfaced roads and car parks. The main process areas of the Edmonton EcoPark are in the centre and north and there is further landscaping in the east. The main process plant can be divided into four operational areas:

a. existing EfW facility in the centre of the Edmonton EcoPark. It comprises a large building incorporating a tipping hall, waste storage bunkers and waste treatment technology;

b. ash recycling facility to the north of the existing EfW facility area. It comprises sheds and open areas of ash storage;

c. composting plant in the north west of the Edmonton EcoPark. This area comprises several storage and composting sheds; and

d. waste transfer station in the north eastern corner of the Edmonton EcoPark, comprising storage areas for combustible waste (used to fuel the existing EfW facility), recyclables and non-recyclables.

2.2.2 The existing Edmonton EcoPark layout is shown in Figure 2.

2.3 Adjacent land use

2.3.1 The Edmonton EcoPark is in a commercial/ industrial setting. Land uses adjoining the Edmonton EcoPark are outlined below:

Direction	Land uses
North	Immediately north of the Edmonton EcoPark are commercial/ light industrial properties. Beyond these is the Deephams Sewage Treatment Works.
East	The Enfield Ditch borders the majority of the Edmonton EcoPark. Beyond this is ‘Lee Park Way’, an access road which forms part of National Cycle Route 1. The River Lee Navigation is immediately to the east of this road, then there is an area used for recycling construction and demolition wastes.
South	The North Circular (A406) is immediately to the south. Beyond this are commercial properties and the planned Meridian Water development scheme.
West	Salmon’s Brook is immediately to the west. Beyond this is the Eley Industrial Estate.

2.4 Edmonton EcoPark history

2.4.1 This Edmonton EcoPark has been used as a waste management site since the late 1960s. The Edmonton EcoPark had very limited use prior to its current function, although the northern part of the Edmonton EcoPark was formerly occupied by sludge beds. The surrounding area, particularly to the south and west, has had significant industrial development from at least 1896.

2.5 Regional geology and hydrogeology

2.5.1 The British Geological Survey (BGS) boreholes and regional mapping record the geological sequence identified in Table 2.1 at the Edmonton EcoPark as Made Ground overlying natural deposits in the vicinity of the Edmonton EcoPark. The Edmonton EcoPark is mapped as London Clay overlain by superficial deposits of Alluvium. The published data indicates London Clay is approximately 7.5 to 10m bgl (below ground level). The thickness of the Lambeth Group and Thanet Sands is not identified for the Edmonton EcoPark, although BGS borehole records to the south-west of the Edmonton EcoPark identify the base of the Lambeth Group at 22m bgl and base of the Thanet Sand at 27m bgl. BGS borehole logs in the vicinity of Edmonton EcoPark record Chalk between 32.5m bgl and 36m bgl, whilst a borehole to the east of the Edmonton EcoPark identifies Chalk at 43m bgl.

Table 2.1 Regional Geological Summary and Aquifer Designation

Strata	Typical Constituents	Estimated Thickness	Aquifer Status
Made Ground	Variable historic demolition rubble, including ash and clinker	Generally <5m	Not Applicable
Alluvium	Silty clay	Absent to <3m	Secondary Aquifer
Kempton Park Gravels (River Terrace Deposits)	Variably sandy, silty and clayey gravels	<5m	Secondary Aquifer
London Clay	Grey, occasionally sandy or silty clay	7.5-10m	Unproductive Strata
Lambeth Group (formerly known as the Woolwich & Reading Beds)	Grey, sandy clay	Unknown	Secondary Aquifer
Thanet Sand	Silty or clayey sand	Unknown	Secondary Aquifer
Upper Chalk	Off-white carbonaceous limestone with flints	>30m	Principal Aquifer

2.5.2 The Edmonton EcoPark falls within an EA-designated inner (zone 1) and outer (zone 2) groundwater SPZ for a public water supply borehole at Chingford 400m east of the Edmonton EcoPark, as shown in Figure 4. The public water supply source abstracts groundwater from the Chalk aquifer which is defined as a principal aquifer by the EA. This aquifer is overlain by the Thanet Sands, Lambeth Group and London Clay. The low permeability layers in the Lambeth Group and the London Clay provide protection to the underlying Chalk by limiting downward movement of groundwater from the surface.

2.5.3 There are no licensed groundwater abstractions within 250m of the Edmonton EcoPark. In addition to the Chingford public water supply there are is also a private potable water supply ~400m to the east. Three sites are related to water bottling with a further site for general use all located to the west.

2.5.4 Groundwater flow within the Kempton Park Gravels is expected to be towards the east or south-east to discharge to the River Lee. Groundwater flow within the deeper Chalk aquifer is likely to be towards the abstraction wells to the east as indicated by the SPZ.

2.6 Edmonton EcoPark geology

2.6.1 A summary of the ground conditions at the Edmonton EcoPark based on data obtained in ground investigations undertaken at the Edmonton EcoPark between March 2011 and December 2014 is provided in Table 2.2. Borehole logs are provided in Appendix A2 of Vol 2 Appendix 7.2 of the ES.

Table 2.2 Edmonton EcoPark Geological Summary and Aquifer Designation

Strata	**Typical Constituents**	**Approximate Thickness**	**Aquifer Status**
Made Ground	Variable historic demolition rubble, including ash and clinker	1.0 -7.5m	NA
Alluvium	Silty clay	Absent to 3.8m	Secondary Aquifer
Kempton Park Gravels (River Terrace Deposits)	Variably sandy, silty and clayey gravels	1.1 - 4.6m	Secondary Aquifer
London Clay	Grey, occasionally sandy or silty clay	0.7 - 18.1m	Unproductive Strata
Lambeth Group (formerly known as the Woolwich and Reading Beds)	Grey, mottled brown, sandy clay	Unknown	Secondary Aquifer
Thanet Sand	Silty or clayey sand	Unknown	Secondary Aquifer
Upper Chalk	Off-white carbonaceous limestone with flints	>50m	Principal Aquifer

2.6.2 Site investigation has confirmed the geological sequence. A thin layer of Alluvium was identified across much of the Edmonton EcoPark overlying the Kempton Park Gravels (River Terrace Deposits) but at a number of locations the Alluvium was absent. No water strikes were encountered in the Alluvium.

2.6.3 The Kempton Park Gravels underlies the Alluvium. They have a thickness of 1.1 to 4.6m (average 3m). The base of the Kempton Park Gravels (top of the London Clay) was between 3.5 and 7.9m AOD.

2.6.4 The London Clay was found to be a stiff to hard grey/ brown silty clay with occasional flint gravel. The base of the London Clay falls from 3.2m AOD, in the south at BH402 to -12.5m AOD in the north of the Edmonton EcoPark at BH116); a difference of 15.6m over a distance of approximately 400m. This variation suggests a more complex structure than typically anticipated at the interface between these strata.

2.6.5 The Lambeth Group comprised very dense clayey sand and sandy clay with shell fragments with sandy silt and clay bands. The base of this stratum was not proven in exploratory holes. Sand layers were identified within the Lambeth Group and were often associated with water strikes.

2.7 Made Ground

2.7.1 Made Ground was encountered at all intrusive locations to a depth that varied between 6.9 and 9.5m AOD. All boreholes were drilled through hardstanding of asphalt or concrete, followed by hardcore and gravel. Beneath this Made Ground generally comprised clayey sand or gravelly, sandy clay, with brick and concrete. Asphalt and clinker were encountered in several boreholes and asbestos may be associated with these demolition materials. There was very little visual/olfactory evidence of contamination in the Made Ground, although hydrocarbon odours were noted in BH301 and BH308. Boreholes drilled within the existing EfW facility bunker excavation found Made Ground down to 2.1 to 4.5m AOD, which is much deeper than elsewhere on-site. This thickness is a result of the backfilling of the bunker as detailed in Section 2.9.

2.8 Natural Ground

Alluvium

2.8.1 Alluvium was encountered beneath the Made Ground in the majority of locations but was absent at BH109, BH304, BH312, BH403 and BH404. It generally consisted of very soft to soft, silty, frequently organic clay, with soft fibrous peat present. The base of the alluvium where present, was at 6.4 to 9.0m AOD.

Kempton Park Gravels

2.8.2 This comprised medium dense silty, gravelly sand and silty sandy gravel. Gravels were predominantly flint. It was encountered at all locations with the exception of BH403 and BH404 in the existing EfW facility bunker area. The base was between 3.5 to 7.9m AOD.

London Clay

2.8.3 This stratum comprised firm to stiff clay with local laminations, silty clay and slightly sandy clay. The base varied from 3.2 to -12.5m AOD. Generally the London Clay is thickest in the north-east of the Edmonton EcoPark, varying from 10.8m at BH301 in the north-west to 17.9m at BH313 in the north-east. The London Clay thins to the south to 3.1m at BH124 and 0.7 m at BH402 in the Wharf area in the south-east.

2.8.4 Contours of the upper and lower surfaces of the London Clay, as well as the thickness of London Clay, are shown in Figures 5, 6 and 7. Geological cross-sections from south-south-west to north-north-east through the Edmonton EcoPark (Section A – A') and from west to east across the proposed ERF area in the north of the Edmonton EcoPark (Section B – B') are provided as Figure 8 and Figure 9 respectively. The location of the cross-sections is shown in Figure 5.

2.8.5 Cross section A - A' shows that the base of the London Clay is shallowest in the southwest and deepest in the northeast.

2.8.6 Cross section B – B' shows that the thickness of the London Clay is greatest towards the eastern Edmonton EcoPark boundary.

Lambeth Group

2.8.7 The Lambeth Group comprises very dense clayey sand and sandy clay with shell fragments, with some stiff to very stiff sandy silt bands. The base of the stratum was not encountered to prevent the creation of potential pathways to the Chalk aquifer. From the geological sequence identified from borehole logs to the south-west of the Edmonton EcoPark, the thicknesses of the Kempton Park Gravels and London Clay are similar to those recorded in the south of the Edmonton EcoPark. The off-site boreholes identify the base of the Lambeth Group at approximately 22m bgl (-11m AOD assuming a ground level of 11m AOD) and therefore its base may be at a similar depth to that in the south of the Edmonton EcoPark. As the London Clay thickens in the north of the Edmonton EcoPark, the base of the Lambeth Group is anticipated to be at a lower elevation there. The borehole logs indicated that the Lambeth Group had increased sand content with depth, which could indicate an increased hydraulic conductivity and a possible hydraulic connection with the underlying Thanet Sands.

2.9 Energy from Waste facility excavation area

2.9.1 The existing EfW facility and underlying bunker were built in the 1960s. The only details of the construction are from the design drawings, shown in Appendix E and building surveys.

2.9.2 The design drawings for the existing EfW facility bunker indicate that it was constructed as a benched open excavation to a depth of approximately 14m bgl. Bentonite walls are shown set back from the excavation to stop inflows from the Kempton Park Gravel aquifer. After the construction of the vertical concrete walls and horizontal base the remaining excavation void outside the walls was backfilled. No information was retained on the material used as backfill. No information on the bentonite wall is available: it is therefore not known if it was constructed, and if it was built, what its location is or whether it was retained post construction.

2.9.3 The backfill was investigated in BH403 and BH404 in December 2014. The investigation found that the infill material at those locations was clayey sand and gravelly clay with concrete and brick fragments. The source of this material is unknown, but it is likely that the backfill consisted predominantly of the soils excavated for the construction the bunker. Water strikes were noted in BH403 and BH404 at 3.5m and 6m bgl respectively in gravelly backfill. The groundwater level is comparable with the groundwater level within the Kempton Park Gravels and therefore, there may be a hydraulic connection between the backfill and the Kempton Park Gravels. No deeper water strikes or groundwater inflows were recorded in the backfill. Backfill was identified to depths of 8.6 and 6.5m bgl. It was underlain by mottled silty clay, probably of the Lambeth Group. BH404 encountered 10.5m of silty clay and then a water bearing sand layer. BH403 was terminated 2m into the Lambeth Group and did not have a water strike. No Alluvium, Kempton Park Gravel or London Clay was recorded in BH403 and BH404.

3 Hydrogeology

3.1 Groundwater levels

Made Ground

3.1.1 Made Ground is not designated as an aquifer. There were several water strikes within Made Ground. These are likely to be perched water in water bearing strata overlying the clays and low permeability peaty silt layers within the Alluvium. These water bearing Made Ground layers are laterally discontinuous and are not in hydraulic connection with the Kempton Park Gravel Aquifer.

Alluvium

3.1.2 The Alluvium is a Secondary Aquifer. No water strikes were encountered in the Alluvium at the Edmonton EcoPark. Due to the low permeability of the peaty silts, this layer does not appear to transfer water but rather act as an aquiclude or aquitard and is likely to provide some protection to the underlying aquifer, where present.

Kempton Park Gravels

3.1.3 The Kempton Park Gravels is a Secondary Aquifer. They have been identified in all boreholes as water bearing, with the exception of BH403 and BH404 where it is believed that the gravels were removed to permit excavation for the existing EfW facility bunker. Groundwater levels are between 7.12 and 9.45m AOD. Groundwater level data for 2012 to 2014 have been interpreted to understand flow directions. Flow was generally in a southerly to south-south-westerly flow direction. However, in between July 2013 and May 2014 flow onto the Edmonton EcoPark occurred at the north-western boundary. The flow direction in November 2014 showed a change due to a fall in water levels across the north of the Edmonton EcoPark and was to the north across the northern part of the Edmonton EcoPark, but a general south-south-westerly flow direction in the southern half of the Edmonton EcoPark. This indicates flow off-site through the northern boundary at that time. Groundwater contours for May 2014 and November 2014 are shown in Figure 10 and Figure 11.

3.1.4 The Kempton Park Gravels are absent around the existing EfW facility bunker. It is believed that they were excavated during construction of the bunker and that the resulting void was backfilled with gravelly clay and clayey sand and gravel. Water strikes in BH403 and BH404 in the backfill were at a similar level to groundwater level in the Kempton Park Gravel. This may indicate a hydraulic connection between the Kempton Park Gravel and backfill. No further water strikes or groundwater inflows were recorded below this depth.

London Clay

3.1.5 The London Clay is categorised as Unproductive Strata. No water strikes or water bearing strata were identified within the London Clay on-site.

3.1.6 The results of laboratory permeability testing (Table 3.1) indicate that the clay has a low permeability (mean value 2.9×10^{-11} m/s) across the Edmonton EcoPark. The London Clay is therefore an aquitard that provides protection to the underlying aquifers by limiting vertical movement of groundwater.

3.1.7 The London Clay thins from the north to the south of the Edmonton EcoPark. The areas where the London Clay is thickest provide the greatest protection to the underlying aquifers. In the EfW facility bunker excavation area, the London Clay is absent. It is believed that the London Clay was excavated in this location.

Table 3.1 Results of Laboratory Triaxial Permeability Testing of Clay Formations

Sample Location	Geology and Depth	Date of test	Permeability m/sec
BH204	London Clay (10 m bgl)	Dec 2011	1.9×10^{-11}
BH201	London Clay (18.5 m bgl)	Dec 2011	1.1×10^{-11}
BH203	London Clay (12.5 m bgl)	Dec 2011	1.8×10^{-11}
BH202	London Clay (13.0 m bgl)	Dec 2011	1.5×10^{-11}
BH301	London Clay (16 m bgl)	June 2014	6.78×10^{-11}
BH306	London Clay (21.6 m bgl)	June 2014	4.16×10^{-11}
BH307	London Clay (20.5 m bgl)	June 2014	9.39×10^{-11}
BH309	London Clay (15.1 m bgl)	June 2014	3.46×10^{-11}
Mean value (geometric mean)			2.91×10^{-11}
BH401	Lambeth Group (17.0 m bgl)	Dec 2014	8.6×10^{-11}
BH402	Lambeth Group (15.5 m bgl)	Dec 2014	6.06×10^{-11}
BH403	Lambeth Group (9.5 m bgl)	Dec 2014	8.52×10^{-11}
BH404	Lambeth Group (10.0 m bgl)	Dec 2014	1.45×10^{-10}
BH404	Lambeth Group (13.0 m bgl)	Dec 2014	8.49×10^{-11}
BH404	Lambeth Group (16.0 m bgl)	Dec 2014	9.87×10^{-11}
Mean value (geometric mean)			9.02×10^{-11}

Lambeth Group

3.1.8 The Lambeth Group is a Secondary A Aquifer. Beneath the Edmonton EcoPark it consists of clayey sand and sandy clay and sandy silt layers. Water strikes were encountered in the sandy silt layers. However, the sand layers do not appear to be laterally continuous across the Edmonton EcoPark.

3.1.9 Groundwater level monitoring in the Lambeth Group is limited to four boreholes (BH201, BH202, BH203 and BH204) for which data is available for 2011 and 2012. Water levels are shown in Appendix C2. These boreholes monitor groundwater at different depths but are all within sandy silt layers. There does not appear to be any consistency in the levels, suggesting that there is not any lateral hydraulic connectivity across the Edmonton EcoPark in this stratum. However, this interpretation is based on a limited data set. The base of the Lambeth Group has not been proven on-site.

3.1.10 The results of laboratory permeability testing (Table 3.1) on samples of silty clay found low hydraulic conductivity (mean 9.02×10^{-11} m/s), similar to the London Clay. These results indicate that the Lambeth Group clays are likely to provide protection to underlying aquifers, where present.

Chalk and Thanet Sand Formations

3.1.11 No site-specific information is available for the Thanet Sand or Chalk Formations. These formations are believe to be in hydraulic connection with each other. Groundwater flow directions within the deeper Chalk aquifer are likely to be towards abstraction wells to the east.

3.2 Groundwater quality

3.2.1 Groundwater monitoring has been undertaken at the operational site during site investigations and as part of Environmental Permitting to characterise groundwater quality and establish baseline concentrations for potentially polluting substances.

3.2.2 Site-specific groundwater quality monitoring data is limited to the Kempton Park Gravels and Lambeth Group.

3.2.3 Groundwater quality in the deeper aquifers (Thanet Sands and Chalk) is anticipated to be good, reflecting its use for potable water supply.

3.2.4 Groundwater quality in the Kempton Park Gravels is the most likely to have been affected by contamination from the existing processes at the Edmonton EcoPark and Made Ground, and from neighbouring sites due to its proximity to surface activities.

3.2.5 An assessment of groundwater contamination in the Kempton Park Gravels has been undertaken by comparing the results of groundwater sampling with water quality standards (WQS), taken form Environmental Quality standards (EQS) and Drinking Water Standards (DWS). The full results are given in Appendix C1 and summarised in Table 3.2 (Kempton Park Gravels) and Table 3.3 (Lambeth Group). The values highlight in grey in Table 3.2 and Table 3.3 represent water quality results which exceed the DWS.

Table 3.2 Summary of exceedance of Water Quality Standards in Groundwater in the KPG

Contaminants	**Unit**	**DWS**	**BH119**	**BH101**	**BH101**	**BH102**	**BH106**	**BH106**	**BH107**	**BH109**	**BH109**	**BH110**	**BH110**	**BH113**	**BH114**	**BH114**	**BH114**
Sulphate as SO_4	mg/l	250	146	155	53	147	237	202	204	204	119	209	174	142	227	126	179
Sulphide	µg/l	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	250	470	350	490	250	240	200	240	240	140	330	260	270	230	130	300
Ammonium as NH_4	µg/l	500	17000	8100	2000	7000	5500	5100	7900	7900	1800	5400	7300	8800	9200	6400	10000
Aluminium	mg/l	0.2	< 0.0010	0.47	0.09		0.22	0.12	0.058	0.058	0.031	0.32	0.072	0.062	0.41	0.15	0.013
Arsenic	µg/l	10	0.65	20	27	13	11	7.7	15	15	8.4	8.8	13	8.8	13	11	8.1
Barium	µg/l	-	49	53	69	20	85	73	62	62	58	44	38	47	39	13	43
Boron	µg/l	1000	550	320	1200	210	240	360	350	350	330	250	310	330	340	300	500
Cadmium	µg/l	5	< 0.02	< 0.10	< 0.08	< 0.10	< 0.08	< 0.08	< 0.10	< 0.10	< 0.08	< 0.10	< 0.08	< 0.08	< 0.10	< 0.08	< 0.08
Chromium	µg/l	50	0.4	0.5	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.4	< 0.4	0.8	0.8	0.5
Copper	µg/l	2000	< 0.5	1.5	4.2	< 0.7	1.4	1.3	< 0.7	< 0.7	1.2	0.9	1.5	< 0.7	1.7	1.5	1
Iron	mg/l	0.2	0.25	2.7	0.28		0.23	0.86	7.4	7.4	0.64	0.85	0.45	0.28	1.9	0.42	0.94
Lead	µg/l	10	< 0.2	2.5	3.3	< 1.0	< 1.0	2.2	< 1.0	< 1.0	1.1	1.2	< 1.0	1.5	4.3	2.3	2.6
Mercury	µg/l	1	0.51	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Nickel	µg/l	20	9.8	5.2	23	7.2	22	2.8	2.6	2.6	1.5	4.2	2.9	2.9	3.9	5.1	3.2
Selenium	µg/l	10	2.9	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Zinc	µg/l	-	< 0.5	7.4	19	< 0.4	< 0.4	3.5	1.4	1.4	1.5	7.3	< 0.4	1.6	9.9	< 0.4	1
Total Phenols (monohydric)	µg/l	0.5	< 10	< 10	42	< 10	< 10	17	< 10	< 10	11	< 10	< 10	21	< 10	< 10	25
Vinyl Chloride	µg/l	0.5	< 1.0	< 10.0	< 10.0	10.4	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Total EPA-16 PAHs	µg/l	-	0.21	< 0.20	< 0.20	< 0.20	< 0.20	2.06	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Grey shading: DWS exceeded

Table 3.3 Summary of exceedance of Water Quality Standards in Groundwater in the Lambeth Group

Contaminant	Units	DWS	BH201	BH202	BH204	BH202	BH201	BH203	BH204
Sulphate as SO_4	mg/l	250	51.2	612	401	650	89	77	260
Sulphide	µg/l	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	250	87	300	170	250	110	73	130
Ammonium as NH_4	µg/l	500	680	3700	990	2000	730	1900	1300
Aluminium	mg/l	0.2	1.5	0.44	0.41	0.37	0.18	1.2	0.28
Iron	mg/l	0.2	0.84	0.2	0.26	0.16	0.075	1.5	0.19
Selenium	µg/l	10	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	15	< 4.0

Grey shading: DWS exceeded

Made Ground

3.2.6 Leachate samples for Made Ground soils were screened against DWS and fresh water EQS. Concentrations of ammonium, dissolved metals (aluminium, arsenic, boron, iron, lead, mercury and nickel) and total cyanide exceeded DWS and dissolved metals (cadmium, chromium, copper and zinc) exceeded the fresh water EQS. This is consistent with the parameters that exceeded these standards in the Kempton Park Gravel aquifer and indicate Made Ground may be a source of contamination to shallow groundwater.

Kempton Park Gravels

3.2.7 Ammonium, chloride, sulphate, metals and metalloids (aluminium, arsenic, boron, cadmium, chromium, copper, mercury, iron, nickel, and selenium), phenols and vinyl chloride have been found above DWS and/ or EQS. There is no drinking water standard for total PAH but they were detected above in two samples.

Lambeth Group

3.2.8 Groundwater in the Lambeth Group (Table 3.3) shows water quality standard exceedances of ammonium in every sample and some exceedances for sulphate, chloride, aluminium, chromium, iron and selenium.

3.2.9 The concentration of ammonium is highest in the northeast which may imply a source to the north outside the Application Site. However, these concentrations may represent a natural baseline and may indicate that groundwater in the Lambeth Group is under reducing (low quantity of oxygen) conditions.

3.2.10 The bunker of the existing EfW facility in the centre of the Edmonton EcoPark is a potential vertical pathway for contaminant migration. However, the groundwater quality data show ammonium concentrations down-gradient of the existing EfW facility to be lower than up gradient.

4 Hydrology

4.1 Surface water

4.1.1 There is a plastic-lined ornamental pond in the eastern landscaped area which would be removed as part of the Project.

4.1.2 The following surface water features have been identified within the surrounding area:

e. Enfield Ditch, which is classified as a controlled water. It runs close to the eastern boundary of Edmonton EcoPark discharges to Salmon's Brook;

f. Salmon's Brook – immediately west of the Edmonton EcoPark;

g. River Lee Navigation - immediately east of the Edmonton EcoPark in the Wharf area and ~50m east of the main Edmonton EcoPark boundary;

h. The River Lee - ~400m to the east, where there are also associated drains and an aqueduct;

i. William Girling Reservoir - ~200m to the north-east; and

j. Banbury Reservoir - ~750m to the south-east.

4.2 Surface water quality

4.2.1 Under the Water Framework Directive (WatFD), the EA has produced nine River Basin Management Plans for England to manage water quality targets and river basin planning. The aim of the WatFD is for all waterbodies (rivers, lakes and groundwater) to achieve good ecological status, unless they are heavily modified in which case they must achieve good ecological potential and ensure no deterioration from current status/potential.

4.2.2 The River Lee Navigation and surrounding area is located within the London catchment of the Thames River Basin District. The EA website shows the status of watercourses based on the 2009 River Basin Management Plan. All the water features are identified as 'heavily modified' under the WatFD, only being able to achieve good ecological potential rather than status because of substantial changes to the physical character of the waterbody resulting from physical alterations caused by human use.

Table 4.1 WatFD Waterbody designations

Waterbody Name	Current ecological quality	Biological elements (reason for status)	Supporting elements (reason for status)
River Lee	Moderate potential	Moderate (invertebrates)	Poor (phosphate)
Salmon's Brook (includes Salmon's Brook, Lee Navigation)	Poor potential	Poor (phytobenthos)	Poor (phosphate)
Pymmes Brook (Salmon's Brook to Lee)	Moderate Potential	Bad (invertebrates)	Poor (phosphate)

Waterbody Name	Current ecological quality	Biological elements (reason for status)	Supporting elements (reason for status)
William Girling Reservoir	Poor potential	Poor (phytoplankton)	Bad (phosphorus)
Banbury Reservoir	Good potential	No data	No data

4.2.3 Enfield Ditch is located within the Salmon's Brook waterbody and therefore has the same classification as given to all watercourses within that waterbody.

4.2.4 Salmon's Brook waterbody is classified as having Poor ecological potential, with high or moderate quality in terms of pH, Ammonia Fish and Macrophytes, but the poor status relates to diatoms, dissolved oxygen and phosphates. This waterbody has an objective to reach 'good' ecological potential by 2027, with planned mitigation measures to achieve this including sediment management strategies, preservation and where possible enhancement of ecological value of marginal aquatic habitat, banks and riparian zone[1].

4.2.5 The River Lee waterbody is classified as having moderate ecological potential, for the reasons given in Table 4.1, for all other parameters (such as fish, Ammonia, dissolved oxygen) the classification is good or high. This waterbody has an objective to reach 'good' ecological potential by 2027.

4.2.6 Pymmes Brook is classified as having moderate ecological potential for the reasons given in Table 4.1, other supporting elements such as ammonia and dissolved oxygen are of moderate status. This waterbody has an objective to reach 'good' ecological potential by 2027, with planned mitigation measures to achieve this including improving floodplain connectivity, preserve and where possible enhancing the ecological value of marginal aquatic habitat, banks and riparian zone and sediment management strategies.

4.2.7 William Girling Reservoir is classified as having Poor ecological potential for the reasons given in Table 4.1. This waterbody also has an objective to reach 'good' ecological potential by 2027.

4.2.8 Banbury Reservoir is classified as having 'good' ecological potential. There will be a requirements as part of the WatFD that this is maintained at 'good' status.

4.3 Surface water quality from the Environmental Permit Regulations monitoring

4.3.1 As part of EPR monitoring samples of surface water are collected and subject to analysis at four locations upstream and downstream of the Edmonton EcoPark on Salmon's Brook (SW1 and SW2) and the River Lee Navigation (SW3 and SW4) respectively (see Figure 3 for monitoring locations).

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[1] Annex B Thames River Basin District, December 2009

4.3.2 Surface water quality data have been reviewed against EQS and DWS to identify any potential contaminants. The results are detailed in Appendix C1.

4.3.3 No exceedances of the freshwater EQS were identified but elevated ammonium was identified in Salmon's Brook at concentrations of 4.1mg/L upstream and 2.1mg/L downstream. As the concentration is lower downstream it does not suggest that the Edmonton EcoPark is a source of ammonium to the watercourse. The concentration of ammonium in the Lea Navigation is lower at 0.5mg/L at both upstream and downstream locations.

4.3.4 There are increases in the concentration of a number of dissolved metals between upstream and downstream locations for both Salmon's Brook and the River Lee Navigation. The 2014 samples indicate the largest increases down-stream are for Copper, Zinc and Calcium, contrasting to the 2011 samples where Copper and zinc showed no change or a reduction downstream.

4.4 Flood risk

4.4.1 The existing EfW facility area and parts of the southern landscaped area are at risk from extreme flooding from rivers without flood defences (Zone 2) according to the EA. Further information on flooding is available in the Flood Risk Assessment report (Vol 2 Appendix 11.2 of the ES).

4.5 Groundwater - surface water interactions

4.5.1 The Enfield Ditch is ephemeral and is often dry or with little flow, suggesting that it does not receive significant inflows from groundwater. The ditch is believed to be unlined. The elevation of the base of the ditch has been measured as approximately 8.5m AOD at the entrance to the Wharf area on the Edmonton EcoPark, which is above groundwater levels in this area suggesting that the ditch loses water to ground.

4.5.2 Groundwater levels in the Kempton Park Gravels at the Edmonton EcoPark (Figure 10 and Figure 11), indicate that there appears be a hydraulic connection with Salmon's Brook. This flow appears to be into the Edmonton EcoPark in November 2014 in the northwest, but in May 2014 the flow was in the off-site direction.

4.5.3 The River Lee Navigation is canalised adjacent to the Edmonton EcoPark and does not appear to be in hydraulic connection with groundwater.

4.5.4 Other surface water bodies (River Lee and William Girling Reservoir or Banbury Reservoir) are unlikely to be in hydraulic connection with Edmonton EcoPark groundwater due to their distance, and in the case of reservoirs, the likely presence of low permeability liners.

5 Conceptual site model

5.1 Conceptual model

5.1.1 The conceptual model is developed at the Preliminary Risk Assessment tier and reviewed and refined during subsequent risk assessment tiers. The conceptual model represents the characteristics of the site and indicates the possible relations between contaminants, pathways and receptors, where:

a. a contaminant is a substance which is present in, on, or under the land and has the potential to cause harm;

b. a receptor is which could be adversely affected by the contaminant, including human beings; and

c. a pathway is a route or means by which a receptor could be exposed to, or affected by, a contaminant.

5.1.2 For a potential risk to exist at a site all three of the above elements must be present, and linked together so that a contaminant has been identified, a receptor is located on-site and there is an exposure pathway that links the contaminant to the receptor. The term contaminant linkage is thus used to describe a particular combination of contaminant-pathway-receptor relationship.

5.1.3 The proposed Edmonton EcoPark usage is a waste facility (non-landfill) within a SPZ1 for a potable groundwater abstraction in the Principal Aquifer beneath the Edmonton EcoPark. A conceptual model block diagram is shown in Figure 12 and the Edmonton Eco-Park site conceptual model cross section showing the Project effects is shown in Figure 13.

5.1.4 The geology beneath the Edmonton EcoPark consists of Made Ground overlying Alluvium. This overlies the Kempton Park Gravels, then the London Clay, Lambeth Group, Thanet Sands and Chalk.

5.1.5 Shallow perched water is found in the Made Ground above low permeability peaty silts layers within the Alluvium. The Alluvium on-site was found to have a low permeability and did not produced any water strikes. It is therefore likely to provide protection to the underlying Kempton Park Gravel aquifer where present. However, in areas where the Alluvium is absent infiltration from the surface and lateral flows of perched water may enter the Kempton Park Gravel aquifer.

5.1.6 The Kempton Park Gravels are a permeable sand and gravel Secondary Aquifer. Groundwater level data indicate flows in a southerly to south-south-westerly direction. Groundwater levels and flow directions suggest that the Kempton Park Gravels are in hydraulic connectivity with Salmon’s Brook along the western Edmonton EcoPark boundary.

5.1.7 The Kempton Park Gravels overlie the London Clay which is an unproductive low permeability clay with a laboratory permeability of approximately 10^{-11}m/sec. The London Clay is thickest in the northeast (approximately 18m) and thins to approximately 3m in the south of the Edmonton EcoPark and less than 1m in the southeast. It acts as an aquitard and provides protection to the underlying Principal and Secondary Aquifers. This protection is greatest where the London Clay is thickest.

5.1.8 The London Clay confines groundwater in the underlying Lambeth Group Secondary Aquifer. Groundwater has been identified in the Lambeth Group in sand layers but these layers do not appear to be laterally continuous across the Edmonton EcoPark. The base of the Lambeth Group was not proven on-site but the basal sands of the Lambeth Group are regionally mapped as having hydraulic connection with the underlying Thanet Sands and Chalk. From the geological sequence identified from borehole logs to the south-west of the Edmonton EcoPark, the thicknesses of the Kempton Park Gravels and London Clay are similar to those recorded to that in the south of the Edmonton EcoPark. The off-site boreholes identify the base of the Lambeth Group at approximately 22m bgl (-11m AOD assuming a ground level of 11m AOD) and therefore its base may be at a similar depth in the south of the Edmonton EcoPark. As the London Clay thickens in the north of the Edmonton EcoPark and Lambeth Group is identified in on-site boreholes to approximately -14m AOD, the base of the Lambeth Group is anticipated to be at a much lower elevation here. Much of the shallower Lambeth Group on-site is also low permeability clay which could itself provides some protection to the underlying Principal and Secondary Aquifers. Boreholes in the vicinity of the Edmonton EcoPark have recorded Chalk at between 32.5 m bgl and 36 m bgl (approximately -21.5 to -25 mAOD).

5.1.9 The most stringent groundwater protection measures are considered necessary at the Edmonton EcoPark due to the underlying SPZ1. With these measures in place, future changes to the SPZ area or the addition of further abstractions in the vicinity of the Edmonton EcoPark are not foreseen to introduce any requirement for further groundwater protection measures.

5.1.10 It appears that the construction of the existing EfW facility bunker was undertaken in a large, deep excavation which went down into the Lambeth Group. The Kempton Park Gravels and London Clay are therefore absent in the area of the excavation. Once the bunker was constructed the remaining void outside the bunker was infilled. Investigation has found that the backfill is gravelly clay Made Ground. As the London Clay has been excavated in this area, a potential pathway through the backfill material to the Lambeth Group exists. However, groundwater quality in the Lambeth Group does not indicate the presence of organic contaminants (e.g. PAH, VOCs, TPH or phenols). In addition, the concentration of ammonium is greater in the north upgradient and lower in the south downgradient of the bunker, therefore there is no water quality evidence of a contamination pathway to the Lambeth Group. The infill material in this area was found to be low permeability Clay and also the top 10m of Lambeth Group was found to be low permeability mottled clay and therefore is likely to limit vertically downwards groundwater flow.

5.1.11 The Enfield Ditch is believed to be unlined and to be able to drain to the underlying aquifers.

5.1.12 The River Lee Navigation is canalised adjacent to the Edmonton EcoPark and does not appear to be in hydraulic connectivity with the on-site aquifers and therefore is not considered further within the risk assessment.

5.1.13 No groundwater pathway has been identified to the following water bodies; River Lee, William Girling Reservoir or Banbury Reservoir and they are therefore are not considered further within the risk assessment.

5.1.14 Made Ground soils and ground gas have been identified at the Edmonton EcoPark and these are potential sources for human health receptors and therefore will be assessed in Section 6 of the ES.

5.2 Potential sources

5.2.1 The detailed design for the proposed ERF has not been yet undertaken. However, it is assumed that the proposed ERF will represent a similar source to the existing EfW facility i.e. it will not introduce any new sources of potentially polluting substances.

5.2.2 Any potential sources introduced during construction will be controlled through good practice as set out in the Code of Construction Practice (CoCP) (Vol 1 Appendix 3.1 of the ES) and as such are unlikely to present a significant risk to groundwater.

5.2.3 Potential sources on-site are detailed in Table 5.1.

Table 5.1 Potential Contaminant Sources

Source	**Description**	**Potentially polluting substances**
Waste within reception area, compost and storage bunker	Waste is stored on-site in sealed bunker. Recycling is stored on-site on hardstanding.	Elevated concentration of: chloride, ammonium, BOD, dissolved metals, phenols, PAH, VOCs. Low risk of some pathogenic organisms.
Ash recycling facility	Recycling facility on hardstanding.	Dissolved metals and dioxins.
Water treatment facility	Plant for the treatment of on-site waste water.	Chloride, ammonium, dissolved metals, acids used for cleaning and pH balancing.
Fuel storage	Fuel storage on hardstanding.	TPH, BTEXs.
Drainage system	Receives various low strength liquors and building washdowns.	Cleaning detergents and low strength liquors.
Emergency water use	Fire water and disposal.	May become contaminated dependant on the emergency.
Made Ground perched groundwater	Perched groundwater found in the Made Ground has been identified to have potentially polluting substances and high vulnerability to pollution.	Ammonium, dissolved metals, phenols and potential PAH, TPH and VOCs.
EfW facility excavation infill	The materials used to infill the excavation were not detailed in the construction notes and therefore potentially polluting substances may be present.	Potential ammonium, dissolved metals, phenols, PAH, TPH and VOCs.

Source	Description	Potentially polluting substances
Kempton Park Gravel aquifer	Water from the Kempton Park Gravel aquifer has been identified to have lower quality than that of the underlying aquifers and high vulnerability to pollution.	Ammonium, dissolved metals, phenols and potential PAH, TPH and VOCs.
Made Ground soils	Edmonton EcoPark is underlain by a layer of Made Ground soils.	Ammonium, dissolved metals, phenols, asbestos and potential PAH, TPH and VOCs.
Ground gas	Potential ground gas due to presence of Made Ground and industrial history of the area.	Ground gases and volatiles.

5.3 Potential pathways

5.3.1 Current pathways, and pathways which may be developed due to the Project are identified in Table 5.2. As the pathways which are created during the construction will remain during the operational stage, the pathways for both stages can be considered together.

5.3.2 The additional potential pathways which may be introduced due to the Project are:

Energy Recovery Facility bunker

5.3.3 During construction of the bunker for the proposed ERF, a thickness of London Clay will be excavated reducing the protection provided, and potentially creating a vertical pathway to underlying aquifers. However, a substantial thickness (>5m) of London Clay will remain beneath the excavation.

5.3.4 The bunker will be constructed from impermeable materials and will create a barrier to lateral flow in the Kempton Park Gravel. This will change the flow pattern in the gravels potentially creating new pathways or altering existing pathways.

5.3.5 Possible vertical and lateral pathways created between aquifers along the outside walls and supporting structures of the bunker.

5.3.6 Disturbance of groundwater flow is anticipated in the Kempton Park Gravels as a result of the construction of the underground waste bunker for the proposed ERF which will fully penetrate this aquifer unit.

5.3.7 Potential changes in the water levels due to the installation of an impermeable ERF bunker structure have been investigated through the use of a numerical groundwater model using MODFLOW-2005. This modelled the proposed ERF and immediate surrounding area (Appendix D of Vol 1 Appendix 7.2 of the ES). Following construction of the bunker the model predicts that up-gradient groundwater levels will increase slightly by up to 0.02m in the area immediately north of the bunker. Conversely, groundwater levels to the south of the bunker are predicted to fall slightly by approximately the same height. The changes to groundwater elevation are predicted to be localised to within 150m of the bunker location. Beyond this distance groundwater elevations are predicted to be essentially identical (<0.005m difference).

Deep foundation piling

5.3.8 Construction of piled foundations, other deep structures and excavations may create vertical pathways between aquifers, particularly where they fully penetrate low permeability layers. Piles may be required for three separate buildings: to the north of the Edmonton EcoPark at the proposed ERF building, at the south of the Edmonton EcoPark at the RRF building and at EcoPark House in the Wharf area.

Excavations

5.3.9 Where dewatering is required for deep excavations, pumping has the potential to draw in contaminated groundwater from elsewhere on-site or from off-site sources creating new pathways or altering existing pathways.

Energy from Waste facility bunker demolition

5.3.10 It is proposed to remove the existing EfW facility bunker. However, as the civil engineering strategy for this activity and associated liaison with the EA will take place during detailed design stage, the bunker demolition stage is not considered in this risk assessment. The current Edmonton EcoPark condition and post bunker removal stages are considered.

5.3.11 After removal of the bunker, it is assumed that the excavation will be backfilled in a manner than recreates the hydrogeological conditions existing before the bunker was built. This means that low permeability materials will be placed at the location of the low permeability clays in the Lambeth Group and London Clay and more permeable granular material will be placed at the location of aquifers.

5.3.12 The bunker is a barrier to groundwater flow and its removal will result in changes to the groundwater flow regime in this part of the Edmonton EcoPark, potentially creating new pathways for migration of existing contamination or altering existing pathways.

5.3.13 The bunker removal and backfilling removes some potential preferential vertical pathways between shallow groundwater and the Lambeth Group.

Table 5.2 Receptors and pathways

Receptor	Pathway
Groundwater in the Kempton Park Gravels aquifer (secondary aquifer)	Drainage of contaminants to ground and vertical migration through Made Ground and Alluvium. Vertical migration via artificial pathways (e.g. foundations, services). Lateral groundwater flow. Potential of mobilisation of PPS with changes in hydraulic gradient due to dewatering or constructed barriers.
Groundwater in the Lambeth Group and Thanet Sands aquifer (secondary aquifer)	Vertical migration of contaminants through London Clay. Vertical migration via artificial pathways (e.g. foundations, deep piles). Vertical migration in existing EfW facility excavation area from Made Ground through historic excavation infill. Lateral groundwater flow.

Receptor	Pathway
Groundwater in the Chalk aquifer (principal aquifer)	Vertical migration through Lambeth Group and Tertiary Sands. Vertical migration via artificial pathways (e.g. deep piles, deep boreholes). Lateral groundwater flow.
Public water supply boreholes in the Chalk aquifer	As above.
Private water supply boreholes	As above for Lambeth Group, Thanet Sands and Chalk aquifers (assuming boreholes abstract water from these deeper boreholes).
Surface water in Salmon's Brook	Overland flow of contaminants. Discharge of contaminated groundwater through lateral flow in Made Ground and Kempton Park Gravels. Surface water discharge to Salmon's Brook.
Surface water in the Enfield Ditch	Overland flow of contaminants. Discharge of contaminated groundwater.
Human Health: site workers, construction workers, workers on adjacent sites, local residences	Made Ground - dermal contact, ingestion, inhalation. Ground Gas – inhalation.

5.4 Potential Receptors

5.4.1 The main receptors that are potentially at risk from the proposed Project are summarised in Table 5.2 and detailed below:

a. current and future commercial site users, construction workers;

b. groundwater in the Kempton Park gravels (Secondary Drift aquifer);

c. groundwater in the Tertiary deposits (Lambeth Group and Thanet Sands) (Secondary aquifers);

d. groundwater in the Chalk aquifer (Principal aquifer);

e. groundwater public supply boreholes (the Edmonton EcoPark lies within SPZ1 and SPZ2);

f. groundwater private supply boreholes (29541rr086i1 indicated that there are 7 boreholes within 500 m of the Edmonton EcoPark);

g. surface water – Salmon's Brook. This brook is located on the western margin of the Edmonton EcoPark and is fed by groundwater discharge from the Kempton Park gravels. A surface water drain is located along the eastern and southern boundaries of the Edmonton EcoPark and this discharges to Salmon's Brook;

h. Enfield Ditch - located on-site and along the eastern and southern boundaries of the Edmonton EcoPark, designated as a controlled surface water; and

i. human health of and commercial neighbouring site users. There are no residential receptors sufficiently close to be considered at risk from

Made Ground and ground gas sources. Human health risk regulations consider sources up to 0.6m bgl as potential risk.

5.4.2 Receptors which are not considered in the risk assessment as no pathway has been identified are:

a. surface water: River Lee Navigation. The River Lee is canalised adjacent to the Edmonton EcoPark; it is not believed to be in hydraulic continuity with the Edmonton EcoPark. Therefore risks to this surface water body from the Edmonton EcoPark can be considered insignificant and this receptor is not considered further; and

b. surface water: River Lee. The river is located some 500m from the Edmonton EcoPark and is therefore unlikely to be a risk and has not been considered in the risk assessment.

5.4.3 The likely significant effects from ground conditions on designated ecological receptors (i.e. William Girling and King George's reservoirs, part of the Chingford Reservoirs Site of Special Scientific Interest) will not be assessed. This is on the basis that the identified ecological receptors are located upstream of the Edmonton EcoPark. Also, any additional mitigation measures identified as outcomes of the assessment of impacts on groundwater underlying the Edmonton EcoPark will also be protective of migration pathways through groundwater to the reservoirs.

6 Human health risk assessment

6.1 Approach

6.1.1 A human health risk assessment has been undertaken to identify potential risks from historical land contamination to people at the site and to enable appropriate risk management actions to be undertaken in accordance with the regulatory context of the site. There is a range of technical approaches to risk assessment of chemical contaminants, all of which broadly fit within a tiered approach. The tiered approach to assessing risks from land contamination is set out in the Defra and EA publication Model Procedures for the Management of Land Contamination CLR11. This section summarises a Tier 2 Generic Quantitative Risk Assessment.

6.1.2 An assessment of risks to human health from soils is included to ensure that one technical report provides support to both the Water Resources and Land Quality Environment Statements.

6.1.3 Soil samples collected during the ground investigation were analysed using the analytical suite listed in Table 6.1.

Table 6.1 Soil Analysis

Type	Parameter
Inorganics	Metals (Al, As, Ba, B, Cd, Cr, Cu, Fe, Hg, Pb, Ni, Se, Zn), ammonium, pH, water soluble sulphate, total sulphate, sulphides, asbestos (Made Ground only), total and free cyanide.
Organics	Total petroleum hydrocarbons (TPH – CWG), speciated polycyclic aromatic hydrocarbons (PAH) and phenol.

6.1.4 Soil samples were taken and analysed as part of each site investigation listed in Table 1.1, with the exception of the June 2014 investigation. Separate Generic Quantitative Risk Assessments were undertaken for the results of the 2011, 2012 and December 2014 site investigations. The results of these Generic Quantitative Risk Assessments are detailed in the reports on each investigation.

6.1.5 The reporting of the June 2014 site investigation did not include a Generic Quantitative Risk Assessment. A Generic Quantitative Risk Assessment for this investigation is provided in Appendix B.

6.1.6 The most recent Generic Assessment Criteria (GAC) as set out in the Defra and EA at time of each report publication were used, supplemented with Amec Foster Wheeler-derived GACs; Chartered Institute of Environmental Health/LQM (CIEH/ LQM) GAC; and The Environmental Industries Commission/Association of Geotechnical and Geoenvironmental Specialists/CL:AIRE (EIC/AGS/CL:AIRE) GAC. As the sites existing and future land uses are commercial, the commercial GAC were used.

6.2 Results

6.2.1 A summary of soil GAC exceedances is shown in Table 6.2.

Table 6.2 Examples of Soil GAC Exceedances

Determinand	**Location (depth in mbgl)**	**GAC (mg/kg)**	**Concentration (mg/kg)**
Chromium (total)	BH401 (0.7-0.9) BH402 (0.6-0.8) BH404 (6.7-6.8) BH404 (9.0-9.4)	35	40 37 38 36
Lead	WS123 (1.3-1.4)	2330	2700
Benzo(a)pyrene	BH113 (0.2-0.4)	14	20

6.2.2 The results show exceedences of GACs for lead, chromium (total) and benzo(a)pyrene. The presence of asbestos was noted in a small number of samples.

6.2.3 The majority (5 out of 6) of GAC exceedances are at depths below 0.7m and therefore there is unlikely to be an exposure pathway which could affect human health. The shallow exceedence for benzo(a)pyrene was in an area covered in hard standing, mitigating a potential exposure pathway.

6.2.4 It is assumed that construction workers will follow industry practice and PPE to minimise potential exposure to contaminants. The contractor should be informed of the presence of asbestos, which was identified in soils at BH116, WS1233, BH303 and BH404, so that they can take appropriate mitigation methods to prevent exposure.

6.2.5 An exposure pathway for future site users is unlikely due to the planned presence of hard standing and landscaping. The re-use of soils impacted by elevated contaminants should be avoided, they should either be placed at depth or covered by a clean cover layer to mitigate potential human exposure pathways.

6.2.6 In the existing EfW facility area analysis of backfill did not identify any exceedances of commercial GAC but there were a number of detections of asbestos. The only SVOCs detected were phenanthrene and anthracene in a sample from BH403 from 2.1 to 2.3m bgl at concentrations well below their respective GAC. TPH fractions were present in several samples however all were well below their respective GAC. Fractions in the C5 to C10 range were not present in any samples.

6.2.7 Toluene and m&p xylene were above the laboratory limit of detection in one sample taken in BH404 at 17.0 to 17.2m bgl but were well below their respective GACs.

6.2.8 The results of the GAC screening indicate that there were two exceedances for chromium in BH404 in the Lambeth Group (6.7 to 6.8 and 9.0 to 9.4m bgl). The chromium analysis did not distinguish between chromium III and chromium VI meaning that the worst case value of 35mg/kg for chromium VI has been used. The average value for chromium is 33.6mg/kg across the three samples taken in the Lambeth Group in BH404 indicating that chromium contamination in the Lambeth Group is unlikely to be a problem in this location. It is also unlikely that all of the chromium present is in the chromium VI state and the results are only marginally higher than the GAC value. In addition, the soils are at depth in the Lambeth Group and covered with hardstanding and as such these exceedances are deemed unlikely to present a significant risk to human health in the current Edmonton EcoPark layout.

6.3 Ground gas assessment

6.3.1 A ground gas assessment was conducted in 2011 covering up to 33 locations across the Edmonton EcoPark over nine monitoring rounds.

6.3.2 A semi-quantitative approach was adopted for the assessment of ground gas data, following CIRIA C665. In order to provide a conservative assessment, a Gas Screening Values (GSV) for the Edmonton EcoPark have been calculated by taking the maximum borehole flow rate (l/hr) (including peak flow) and multiplying it with the maximum gas concentration (per cent) at each location. The calculation is carried out for both methane and carbon dioxide and the worst case GSV adopted. The GSV is used to determine the Characteristic Situation (CS), as detailed in the guidance document.

6.3.3 Elevated carbon dioxide and/or methane concentrations were recorded in locations WS110, WS111, WS117, WS122, WS124 and WS130. CS2 typically applies at these locations (see Figure 3 for monitoring locations).

6.3.4 As a result of the presence of methane and carbon dioxide in some areas of the Edmonton EcoPark, the risk assessment has identified that CS2 applies, or should be applied, in some areas of the Edmonton EcoPark. This classification provides guidance on the requirement for gas protection measures in future buildings.

7 Hydrogeological Risk Assessment

7.1.1 A Risk Assessment following the EA guidance GP3 has been carried out using the Edmonton EcoPark conceptual source-pathway-receptor linkages identified. The site activity is identified as waste management and the receptors considered are groundwater and controlled waters.

7.2 Hazard Identification and Risk Register

7.2.1 Hazard identification has been undertaken for the current waste Edmonton EcoPark and for the planned future Project at the Edmonton EcoPark to evaluate whether the Project (with appropriate mitigation measures) is acceptable in terms of the risk to the receptors. The following was undertaken:

a. identification of sources that could give rise to pollution reaching receptors;

b. identification of pathways that could release contaminants to the environment covering both acute (short-term, catastrophic) and chronic (long-term, less-severe) mechanisms;

c. assessment of the likelihood of a release occurring;

d. assessment of the consequence of a release to receptors;

e. identification of mitigation measures that would be put in place to stop contaminants escaping into the environment;

f. assignment of a relative measure to each of the above parameters to enable a qualitative assessment of the overall risk level (low, medium, high, critical); and

g. recommendations for additional measures or monitoring where a residual risk has been identified.

7.3 Risk register

7.3.1 The risk register (Appendix G of Vol 2 Appendix 7.2 of the ES) considers the on-site sources which have potential to cause contamination at a controlled water receptor in Table 7.1. No change to potential sources is identified during construction or during operation of the proposed ERF.

7.3.2 A risk assessment was previously undertaken for the existing waste plant activities and the risk tables used in that assessment are provided in Appendix F of Vol 2 Appendix 7.2 of the ES. The risk to groundwater and surface waters for each of these waste facility activities was found to be low and therefore the risk assessment has not been repeated for these activities. The sources considered in Appendix F are listed in Table 7.1. The remaining sources considered within this risk assessment are detailed in Table 7.2.

Table 7.1 Potential Sources previously assessed (Appendix F)

Activity	Description
Process water system	Collects stores and distributes various liquors generated on-site. Process water is a low strength liquor.
Feedstock preparation	Organic fraction from Dano drums is washed clean, dry solids are adjusted and sludge is stored.
Drainage system	Receives various low strength liquors and building washdowns.
Gas system and hot water systems	Cleans and dries the digester gas for supply to CHP and boiler plant that provides process heat in the form of hot water.
Digestion and pasteurisation system	Treats feedstock sludge biologically to produce digester gas and Whole Digestate, heat treats the Whole Digestate to kill pathogens.
Rejects from pulper	Grit and screenings handling system.
Odour scrubbers	Part of odour control system.

Table 7.2 Potential Sources (not including previous sources already assessed)

Source	Description	Potentially polluting substances
Waste storage bunker (existing EfW and proposed ERF)	Waste is stored on-site in sealed bunker.	Could contain ammonium, high BOD, dissolved metals, phenols, PAH, VOCs. Low risk of some pathogenic organisms.
Ash recycling facility	Recycling facility on hardstanding.	Dissolved metals, VOCs and dioxins.
Fuel storage	Fuel storage on hardstanding.	TPH, BTEXs.
Made Ground perched groundwater	Perched groundwater found in the Made Ground has been identified to have potentially polluting substances and high vulnerability to pollution.	Ammonium, dissolved metals, phenols and potential PAH, TPH and VOCs.
Existing EfW facility excavation infill	The materials used to infill the previous bunker excavation were not detailed in the construction notes and therefore potentially polluting substances may be present.	Potential ammonium, dissolved metals, phenols, PAH, TPH and VOCs.
Kempton Park Gravel aquifer	Water from the Kempton Park Gravel aquifer has been identified to have lower quality than that of the underlying aquifers and high vulnerability to pollution.	Ammonium, dissolved metals, phenols and potential PAH, TPH and VOCs.
Made Ground	Made Ground sandy clay with potential sources of contamination stockpiled or stored during construction.	Potential ammonium, dissolved metals, phenols, PAH, TPH and VOCs.

7.3.3 For each source, the risk register considers the hazard (e.g. event causing a release of a contaminated substance to the environment), the consequence of the release (e.g. pollution at a receptor), the likelihood of the event, the mitigation measures that can be implemented to prevent or reduce the consequence of the event. The assessment considers the risk before and after safeguards are put in place.

7.3.4 Where the overall risk is identified as high or above then the proposed Project is considered to represent an unacceptable risk unless further mitigation measures can be implemented.

7.4 Hazards

7.4.1 For each of the identified sources, the conceptual model identifies possible mechanisms that could result in the release of contaminants to the environment by assessing each of the categories: Location, Failures, Maintenance, Operational, and Other where applicable. Contamination due to surface water flooding and flood water management has been considered in the Flood Risk Assessment (Vol 2 Appendix 11.2 of the ES) and therefore will not be considered in this assessment.

7.4.2 The main failure mechanisms that could result in a release to the environment for the sources considered for the Edmonton EcoPark are:

a. leak from underground bunker;

b. infiltration from ash recycling area though failure in hardstanding surface;

c. failure or overtopping of bunds or concrete floors/hardstanding;

d. spillages of effluent;

e. ground subsidence or heave; and

f. earth and groundworks during demolition and construction.

7.4.3 Additional failure mechanisms that could result in an increased risk to the environment during the construction and operational stages of the Project are:

a. possible vertical and lateral pathways would be generated between aquifers along the outside walls and supporting structures of the proposed ERF bunker due to installation method or corrosion of materials;

b. creation of vertical groundwater pathways between aquifers through piled foundations, other deep structures and excavations;

c. mobilisation of groundwater within the Kempton Park Gravels, in the event that de-watering is required during construction of the proposed ERF or demolition of the existing EfW Facility bunker demolition. As no detailed designed is available at this time for the existing EfW facility bunker removal the demolition stage is not considered in this risk assessment. The current Edmonton EcoPark condition and post bunker removal stages are considered;

d. changes to the Kempton Park Gravel groundwater pathway as a result of removal of the existing EfW facility bunker;

e. the bunker removal also removes the possible pathways between the Made Ground and Lambeth Group where the clay barrier between aquifers created.

7.5 Mitigation measures

7.5.1 Proposed mitigation measure for the waste facility sources are summarised below. A fuller inventory is provided in Appendix F and Appendix G. Standard mitigation measures in line with good practice and guidance will be implemented where appropriate, including measures to manage flood risk and drainage which will be set out in the FRA (Vol 2 Appendix 11.2 of the ES). The prevention of leakage and spillage of hazardous materials stored or used on-site will be addressed through environmental permitting during the operational stage. Mitigation measures will be documented in a future Construction Environmental Management Plan (CEMP) for the Edmonton EcoPark. The prevention of pollution from construction and demolition groundworks will be implemented though mitigation measure identified in the CoCP (Vol 1 Appendix 3.1 of the ES). The main mitigation measures that have been considered appropriate for the Project are:

a. greater than 5m thickness of London Clay will be maintained beneath deep excavations. The proposed ERF bunker location, in the north-east of the Edmonton EcoPark, was chosen through consultation with the EA and took into account the hydrogeological risks. In particular, its location on-site was selected because geological mapping identified that the London Clay is thickest in this part of the Edmonton EcoPark, as shown in Figure 13. The bunker design allows a thickness of London Clay greater than 5m below the bunker and therefore minimising risks of creating vertical pathways to underlying aquifers;

b. all pipework to be above ground or, if not, to be CCTV accessible to allow identification of leaks/failures;

c. segregation of contaminated water and clean water (e.g. roof run-off);

d. dewatering or flow barriers for groundwater in the Made Ground during groundworks so that flow into the Kempton Park Gravel is prevented;

e. groundwater flow in the Kempton Park Gravel to be taken into account in the design of deeper structures and in the selection of infill materials;

f. all structures to have impermeable bases;

g. contained drainage system;

h. all structures, including tank bases, designed and constructed to appropriate standards;

i. treatment of contaminated water prior to discharge to sewer;

j. design of required tank bunds to provide 110 per cent storage capacity based on largest tank capacity with allowance for 1:100 rainfall event;

k. discharge of treated water and clean water to sewer rather than to ground;

l. all overflows run to impermeable bunded areas or contained within building drainage system;

m. use of control levels and alarms to identify leaks or overflows;

n. deliveries of any ERF process chemicals to be to designated, bunded, areas;

o. monitoring of the Edmonton EcoPark by instruments, inspections and daily walk around;

p. documented maintenance and inspection procedures;

q. environmental monitoring of surface and groundwater; and

r. piles will be designed to minimise hydrogeological risk by (1) not penetrating low permeability layers unless necessary; and (2) using piling techniques that minimise disturbance of low permeability layers and that also provide good seals with those layers.

7.6 Risk matrix

The risk matrix combines the likelihood of a hazard event occurring with the consequence of the event to derive an overall risk (low, moderate, high, critical). The likelihood and consequence categories are summarised in Table 7.3 and 7.4 respectively and the combined risk table is set out in Table 7.5.

Table 7.3 Likelihood of an Event

	Likelihood					
	1	**2**	**3**	**4**	**5**	**6**
	Remote	**Highly Unlikely**	**Unlikely**	**Possible**	**Likely**	**Highly Likely**
Historical:	'Unheard of in the industry'	'Has occurred one or twice in the industry'	'Has occurred many times in the industry, but not in the Company'	'Has occurred once or twice in the Company'	'Has occurred frequently in the Company'	'Has occurred frequently at the location'
Frequency: (Continuous Operation)	Once every 10,000 - 100,000 years at location	Once every 1,000 - 10,000 years at location	Once every 100 - 1,000 years at location	Once every 10 - 100 years at location	Once every 1 - 10 years at location	More than once a year at location or continuously
Probability: (Single Activity)	1 in 100,000 - 1,000,000	1 in 10,000 - 100,000	1 in 1,000 - 10,000	1 in 100 - 1,000	1 in 10 - 100	> 1 in 10

Table 7.4 Environmental Consequence of an Event

Consequence		**Description**
A	Catastrophic	GW: Large scale impact (100s m). Exceedance of drinking water standards in PWS boreholes with need to shut down supply or implement additional treatment. Long term/permanent impact.
B	Massive	SW: Large scale impact (100s to 1,000s m). Exceedance of drinking water in abstraction with need to shut down supply or implement additional treatment. Deterioration in ecological status of water body. Fish kill.
C	Major	GW: Large Scale (10-100m) impact on river gravel with exceedance of water quality standards, impact on deeper Tertiary and Chalk aquifers with exceedance of drinking water standards. Long term (months/years) impact
D	Moderate	SW: Large scale (100s m) impact on surface water with exceedance of water quality standards. Fish kill in surface water. Potable abstractions need to be taken out of supply. Medium term impact (days/weeks)
E	Minor	GW: Medium Scale (10s m) impact on river gravel aquifer with exceedance of water quality standards and impact on deeper Tertiary and Chalk aquifers with risk to groundwater abstractions. Medium term (months) impact
F	Slight	SW: Medium scale (100s m) impact on surface water with exceedance of water quality standards. Fish kill. Short term (days/weeks) impact

Table 7.5 Risk Matrix

		1	2	3	4	5	6
		Remote	**Highly Unlikely**	**Unlikely**	**Possible**	**Likely**	**Highly Likely**
A	**Catastrophic**	**16**	**22**	**27**	**31**	**34**	**36**
B	**Massive**	**11**	**17**	**23**	**28**	**32**	**35**
C	**Major**	**7**	**12**	**18**	**24**	**29**	**33**
D	**Moderate**	**4**	**8**	**13**	**19**	**25**	**30**
E	**Minor**	**2**	**5**	**9**	**14**	**20**	**26**
F	**Slight**	**1**	**3**	**6**	**10**	**15**	**21**

Risk Management Controls		
27 - 36	**CRITICAL**	Risks must be reduced for Controlled Waters and other Risks. Significant and urgent actions required.
16 - 26	**HIGH**	Assess risk in more detail and look to reduce further, as appropriate. In accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
7 - 25	**MEDIUM**	Look to reduce further in accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
1 - 6	**LOW**	Continue to manage and monitor risksby effective Risk Management.

7.7 Results

7.7.1 The results of the assessment are set out in the hazard risk register (Appendix G of Vol 2 Appendix 7.2 of the ES). The assessment identifies that, without mitigation measures, a number of hazard events could result in a moderate to high risk to groundwater and surface water receptors. After mitigation measures the risk for the majority of hazard events is low, with the exception of where the impermeable surface or bund is breached by subsidence in which case the risk is considered to be medium (Appendix F of Vol 2 Appendix 7.2 of the ES). Such an event would also need to coincide with another event (e.g. ruptures of a pipeline) and the likelihood of such an event is considered to be very remote.

7.7.2 The risk could further be reduced by:

a. regular inspection of bunds and impermeable surfaces; and

b. emergency response procedure in the event of a failure.

7.7.3 Residual effects are not considered for temporary works during the construction such as temporary excavations and stockpiling of soils. A CoCP will be produced to manage activities during construction, and it is expected that an Environmental Management Plan (EMP) will be produced for the operation of the Project. Mitigation measures outlined in the CoCP, EMP and FRA should aim to ensure that the EA’s ability to achieve Good Potential in Salmon’s Brook (under the WatFD) is not compromised.

7.7.4 Consideration of the hydrogeological risks before Project layout design has allowed designers to minimise the risks from the proposed ERF bunker. The geological mapping at the Edmonton EcoPark identified that the London Clay is thickest in the north-east of the Edmonton EcoPark and therefore this location was selected for the proposed ERF bunker. The bunker design allows a thickness of London Clay greater than 5m below the bunker, therefore minimising risks of creating vertical pathways to the underlying aquifer.

7.7.5 The Project at the Edmonton EcoPark will require piling for building foundations in the north and south of the Edmonton EcoPark. The choice and piling technique will need to consider the risk to the deeper Tertiary and Chalk aquifers and will need to reference documents such as Piling and Preventative Ground Improvement Methods on Land Affected by Contamination: guidance on Pollution Prevention (National Groundwater and Contaminated Land Centre report NC/99/73) and Piling into contaminated sites (EA publication). The exact construction and foundation method will be determined during future design and will have to be confirmed by geotechnical and structural engineers. The design will require approval by the EA.

8 Conclusions

8.1.1 A qualitative risk assessment has been undertaken for the Project at Edmonton EcoPark in relation to groundwater, surface water and human health. The assessment first summarises the Edmonton EcoPark geology, hydrology and hydrogeology. This information is used to develop a conceptual site model that identifies the potential sources of contamination, pathways and receptors.

8.1.2 Through consultation with the EA and consideration of the hydrogeological risks, the location for the proposed ERF bunker was chosen in the northeast of the Edmonton EcoPark where the London Clay is the thickest. This reduces the potential to create a vertical pathway at the Edmonton EcoPark to the underlying aquifer with >5m London Clay underlying the planned ERF bunker.

8.1.3 A numerical groundwater model investigated the potential changes to the hydraulic gradient from the installation of the proposed ERF bunker in the northeast of the Edmonton EcoPark. The model predicts a slight increase in up-gradient groundwater levels immediately north of the bunker and a slight fall in to the south.

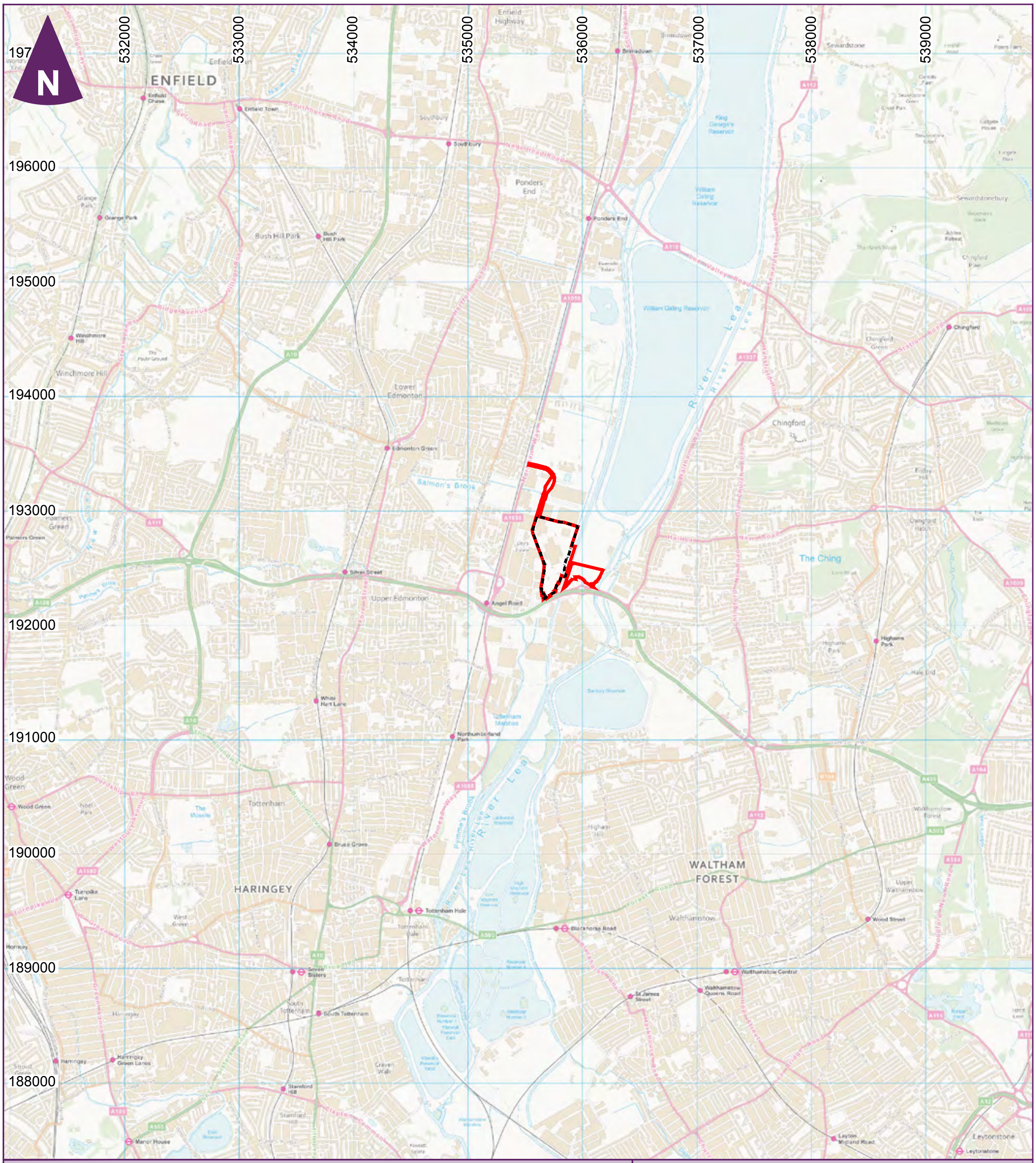
8.1.4 A Generic Quantitative Risk Assessment for human health considered risks from land contamination for sources from Made Ground and Ground Gas. It concluded that an exposure pathway for future site users is unlikely due to limited evidence of contamination and the absence of pathways due to the planned presence of hard standing and landscaping. However, any soils impacted by elevated contaminant concentrations should be placed at depth or beneath clean cover to further mitigate potential human exposure pathways.

8.1.5 The Generic Quantitative Risk Assessment assumes that construction workers will follow industry practice and use PPE to minimise potential exposure to contaminants. The contractor should be informed of asbestos identified in soils at BH116, WS1233, BH303 and BH404 (see Figure 3 for monitoring locations), so that they can take appropriate mitigation methods to prevent exposure.

8.1.6 The hydrogeological risk assessment has identified hazard events that could result in a release of contaminants to the environment, the consequence of the release and the likelihood of the event occurring. A number of significant hazard events have been identified and for each an appropriate set of mitigation measures (safeguards) have been proposed such that the residual risk is concluded to be low. The exception is where a hazard event (failure of a tank) coincides with a failure of a bund and/or impermeable surface as a result of subsidence. However, the likelihood of this event is considered to be very remote. A set of additional recommendations have been made to further reduce the risk.

Appendix A: Borehole figures, logs and geotechnical analysis results

A1 Figures



Key

🟥 Application site boundary

▭ Edmonton EcoPark Operational site boundary

0 km 3 km

Scale 1:50,000 @ A3

Client

nlwa
north london waste authority

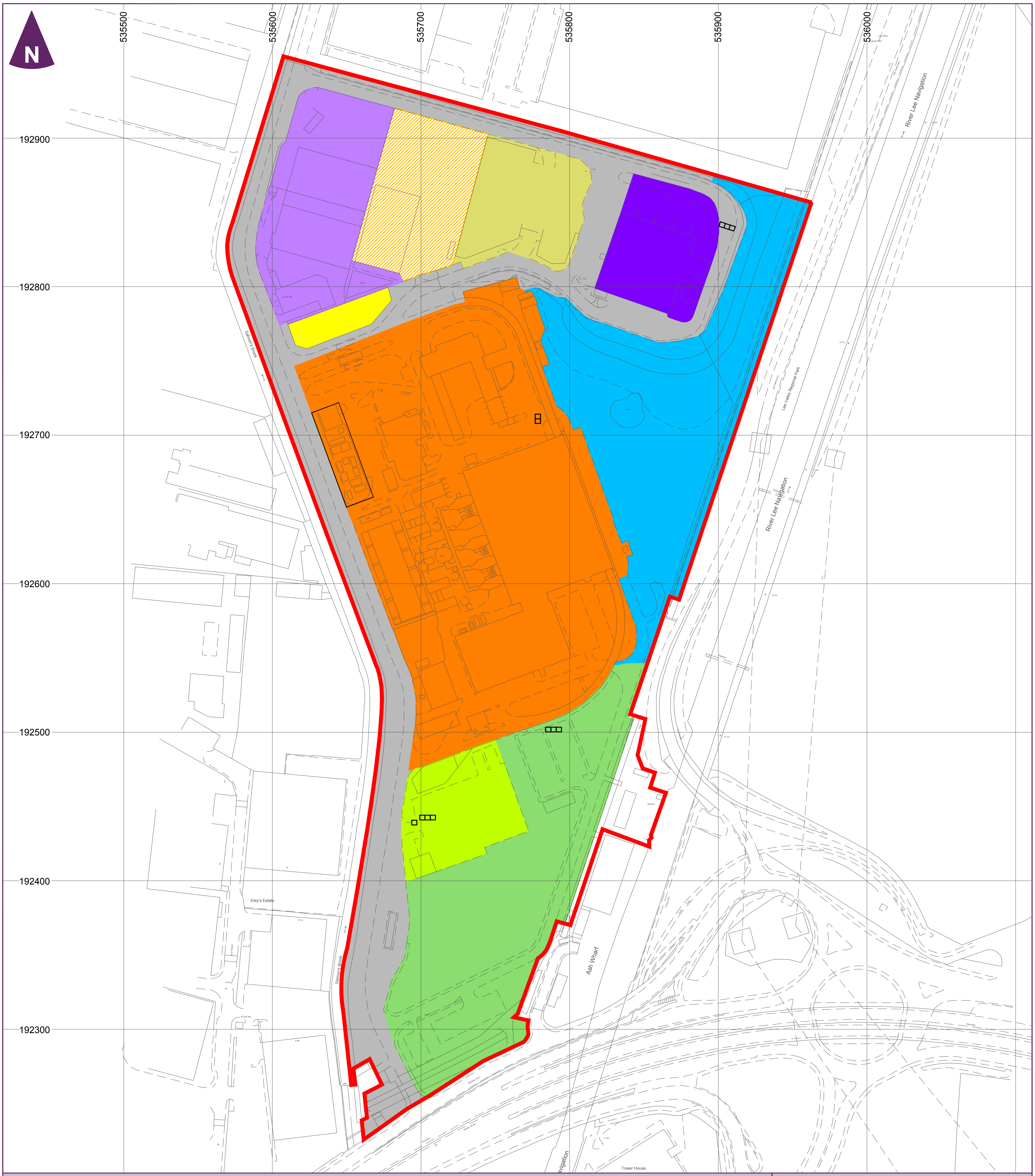
Hydrogeological Risk Assessment

amec foster wheeler

Figure 1
Site location

May 2015

35180-Rea22.dwg lowec



Key

▭	Edmonton EcoPark Operational site boundary
🟪	Composting plant
▨	Ash recycling facility
🟨	Disused area
🟨	Materials recycling facility
🟪	Waste transfer station
🟦	Eastern landscaped area
🟧	Incinerator area
🟩	Lorry park
🟩	Southern landscaped area
⬜	Mains access roads* and softstanding/service runs

* There are other on-site roads within the incinerator and southern landscaped area

0 m 150 m

Scale 1:2500 @ A3

Client

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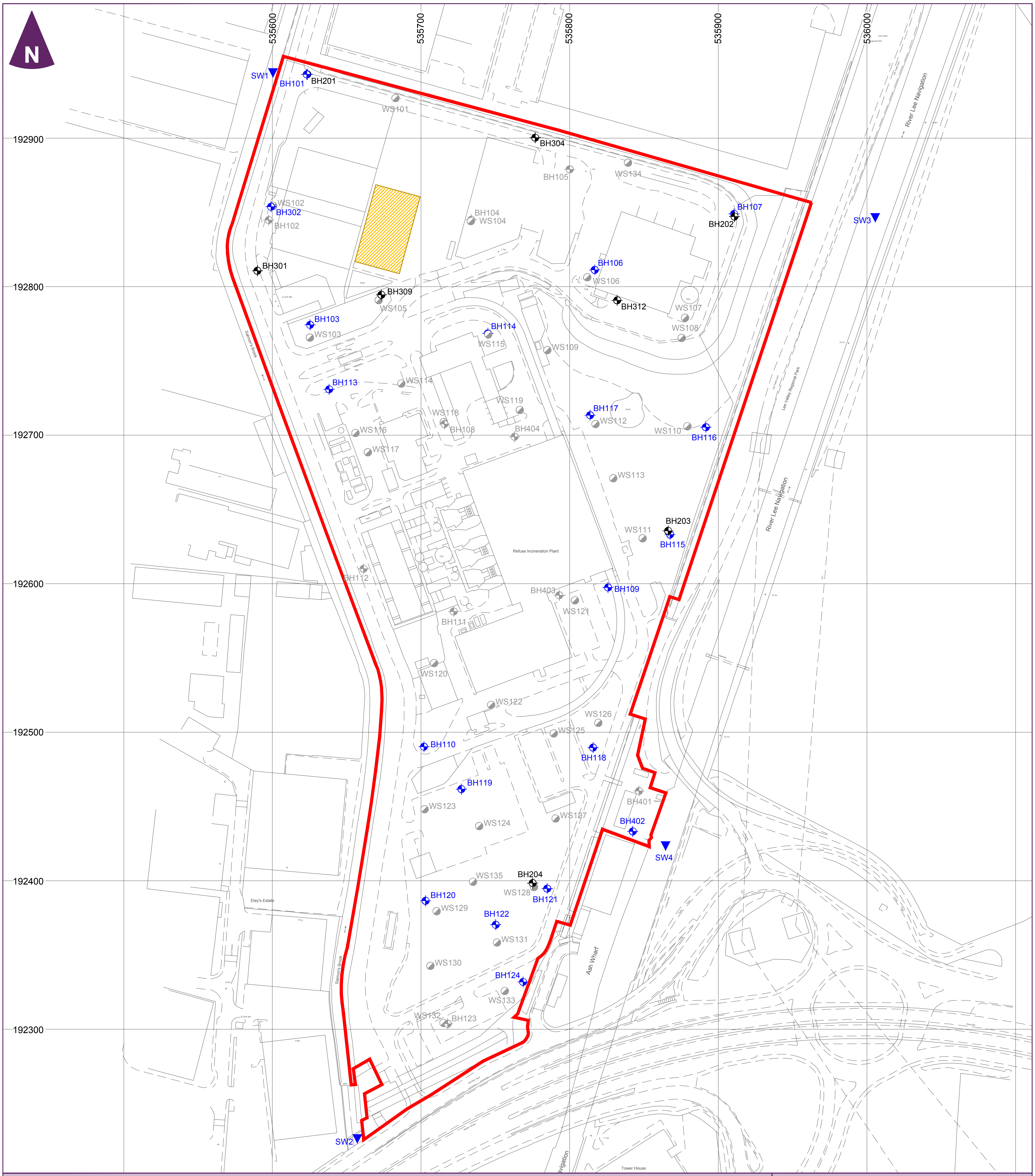
Figure 2
Site layout

May 2015

35180-Rea23.dwg lowec



Key

—	Edmonton EcoPark Operational site boundary
⊕	Groundwater monitoring borehole (KPG)
⊕	Groundwater monitoring borehole (Lambeth)
⊕	Borehole not installed/ decommissioned/ selected for monitoring
◐	Window sample not installed/ decommissioned/ selected for monitoring
▼	Surface water sampling location
▨	Area with an underlying protective membrane

0 m
150 m
Scale 1:2500 @ A3

Client

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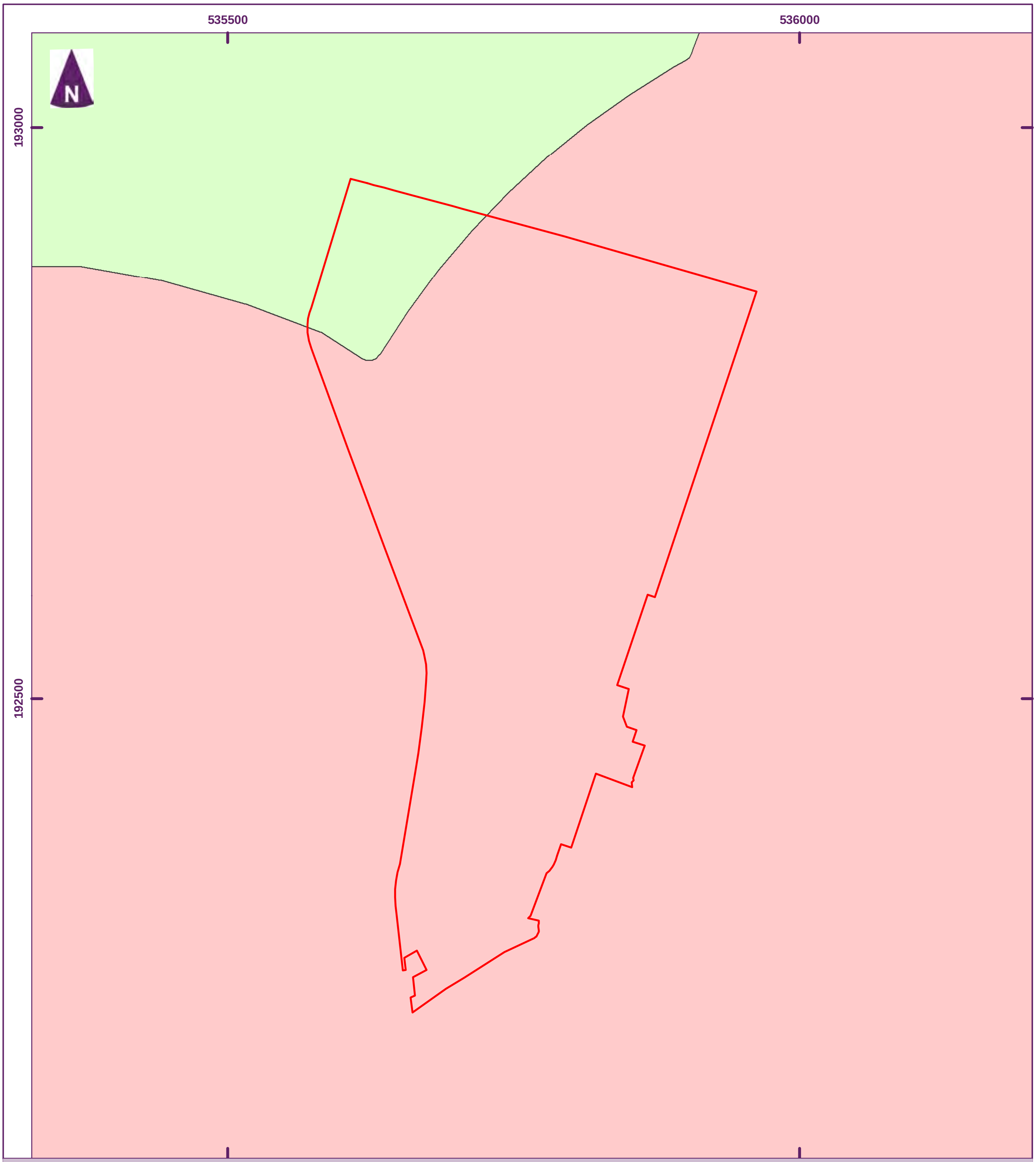
Figure 3
Borehole location plan

May 2015
35180-Rea24.dwg lowec



Key

▭ Edmonton EcoPark Operational site boundary

Source Protection Zones

🟥 SPZ 1

🟩 SPZ 2

0 50 100 200
Metres
Scale at A4: 1:5,000

Client

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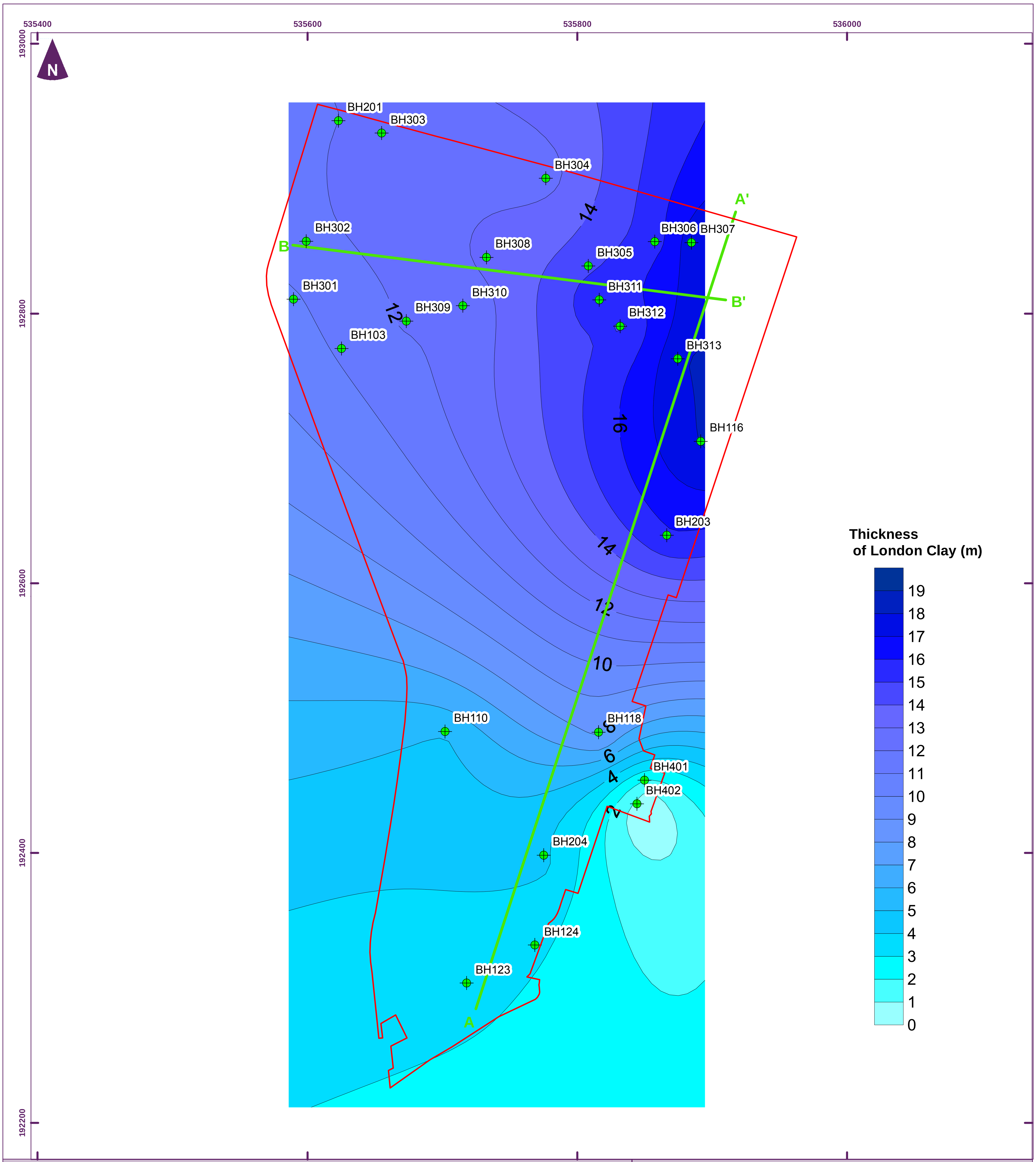
Figure 4
Source Protection Zones

Contains Environment Agency information © Environment Agency and database right.

August 2015

35180-Rea26a.mxd parkj

file: R:\Projects\35180 NLWA SUBFILE\35180 - 16 Edmonton HYDRA\Calcs\ArcGIS\35180-Rea26a.mxd



Key

▭ Edmonton EcoPark Operational site boundary

⊕ Site Investigation Borehole
(Note: Only boreholes used to generate
contours are shown on this figure)

— Geological Cross Sections

— Thickness of London Clay (m)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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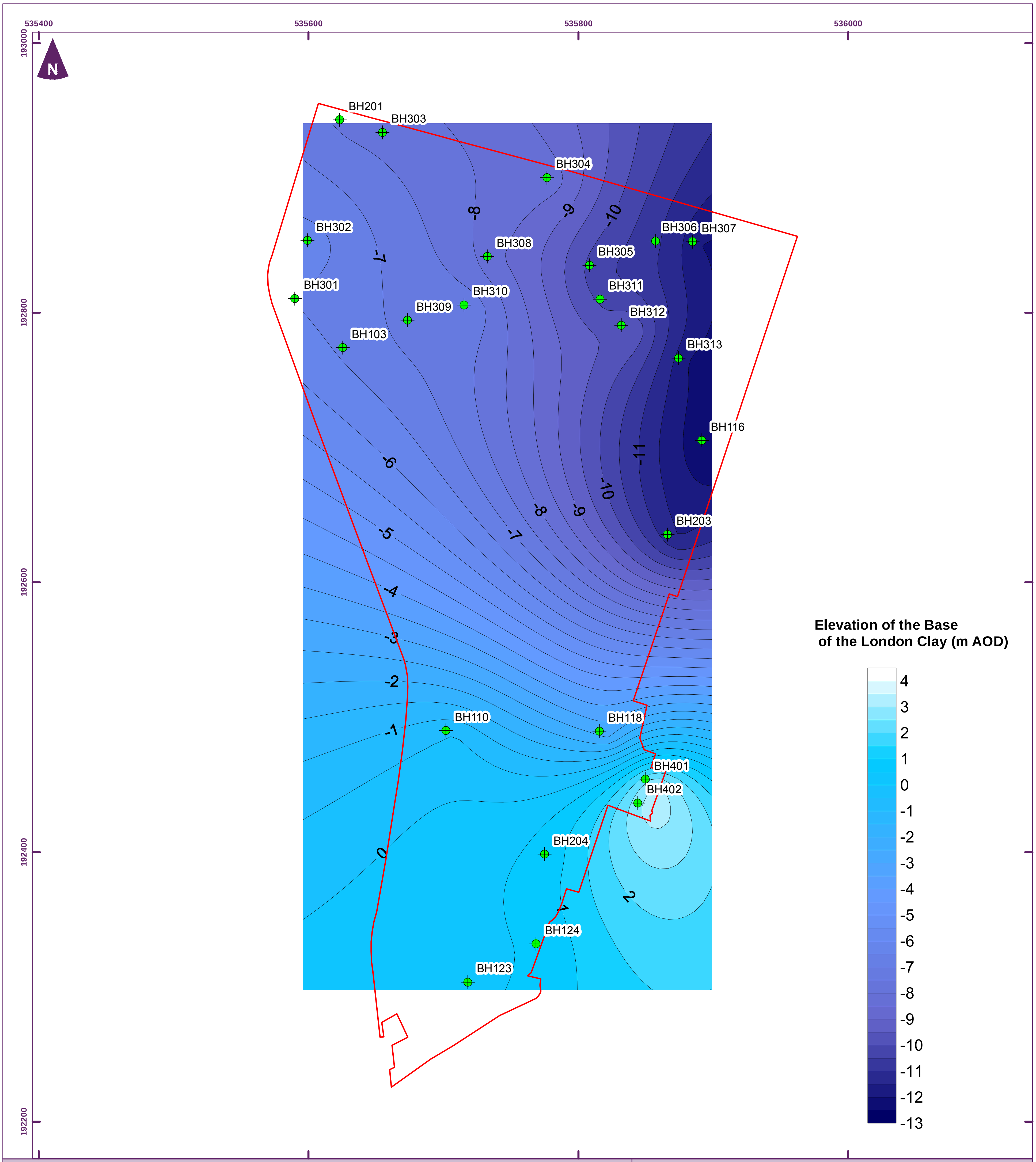
Figure 5
Thickness of London Clay and geological cross section location

May 2015

35180-Rea27.mxd barkr

file: R:\Projects\35180 NLWA SUBFILE\35180 - 16 Edmonton HYDRA\Calcs\ArcGIS\35180-Rea27.mxd



Key

▭ Edmonton EcoPark Operational site boundary

⊕ Site Investigation Borehole
(Note: Only boreholes used to generate
contours are shown on this figure)

— Base of London Clay (m)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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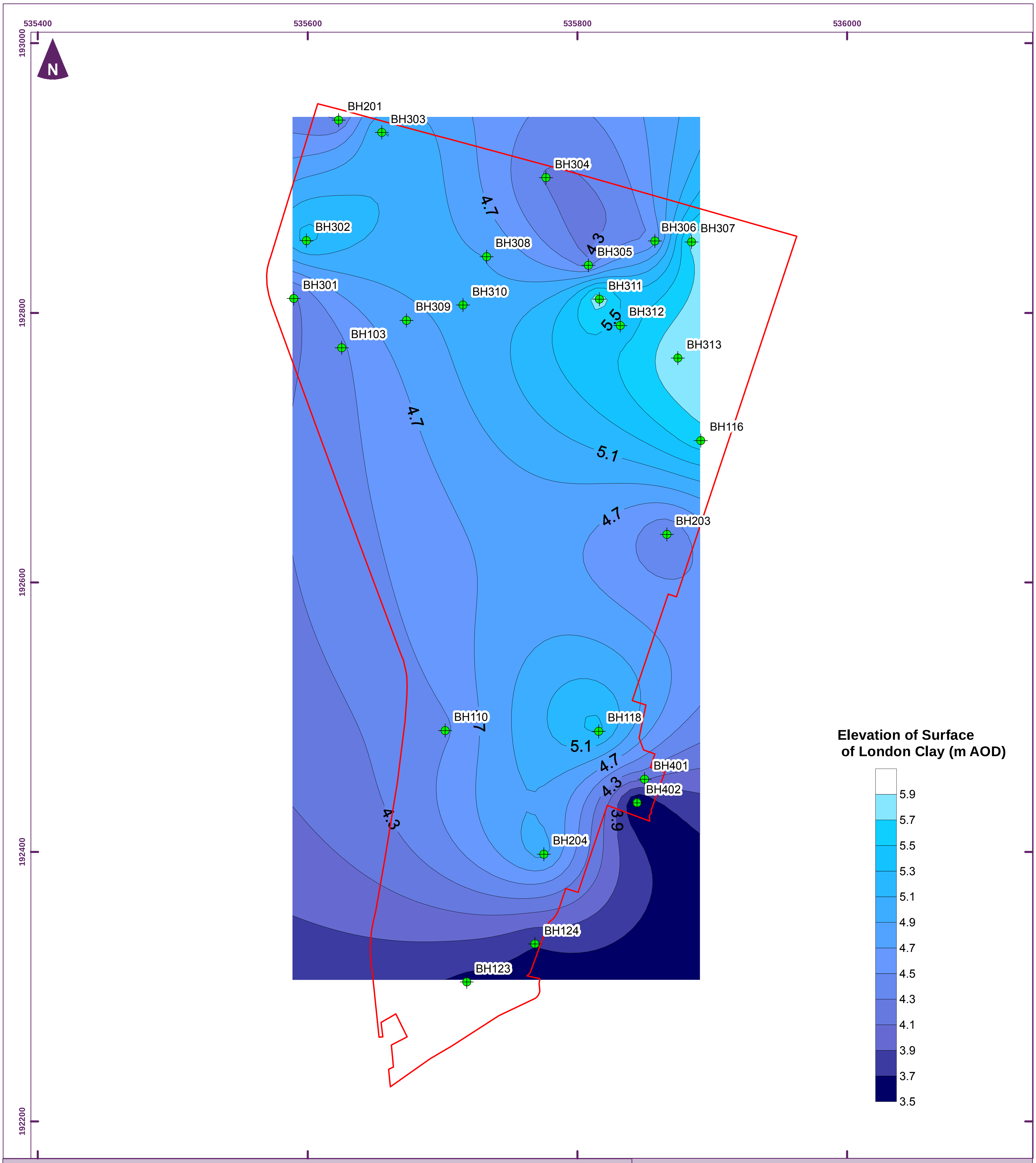
Figure 6
Base of the London Clay

May 2015

35180-Rea28.mxd barkr

file: R:\Projects\35180 NLWA SUBFILE\35180 - 16 Edmonton HYDRA\Calcs\ArcGIS\35180-Rea28.mxd



Key

🟥 Edmonton EcoPark Operational site boundary

Site Investigation Borehole
(Note: Only boreholes used to generate contours are shown on this figure)

Surface of London Clay (m)

0 25 50 100 150
Metres
Scale at A4: 1:3,000

Client

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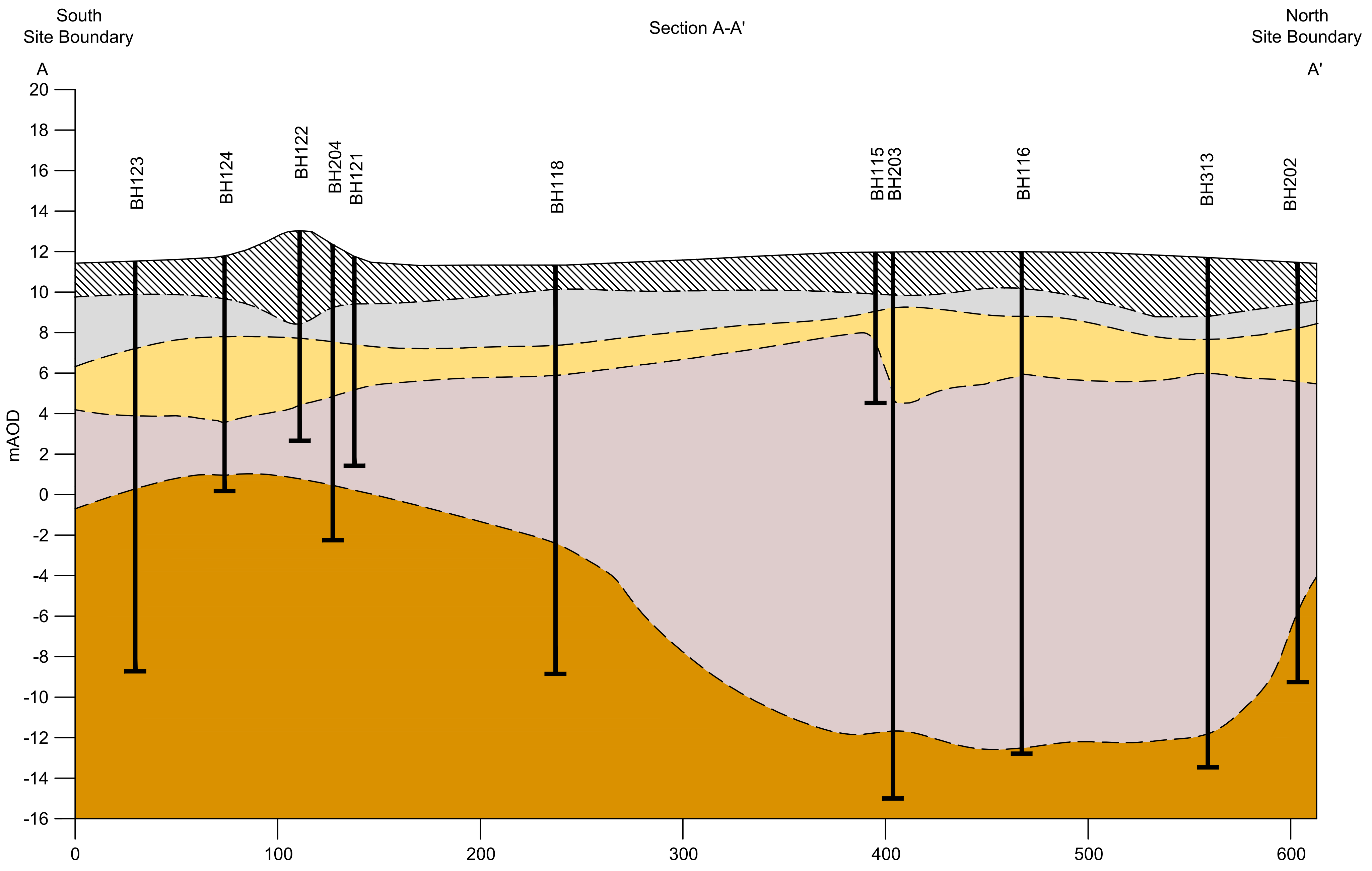
Figure 7
Surface of the London Clay

May 2015

35180-Rea29.mxd barkr

file: R:\Projects\35180 NLWA SUBFILE\35180 - 16 Edmonton HYDRA\Calcs\ArcGIS\35180-Rea29.mxd



Key

▨ Made Ground

▒ Alluvium

🟨 Kempton Park Gravel

░ London Clay

🟧 Lambeth Group

– – – Assumed strata boundary

0 m 150 m

Scale 1:2500 @ A3
10 x vertical exaggeration

Client

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north london waste authority

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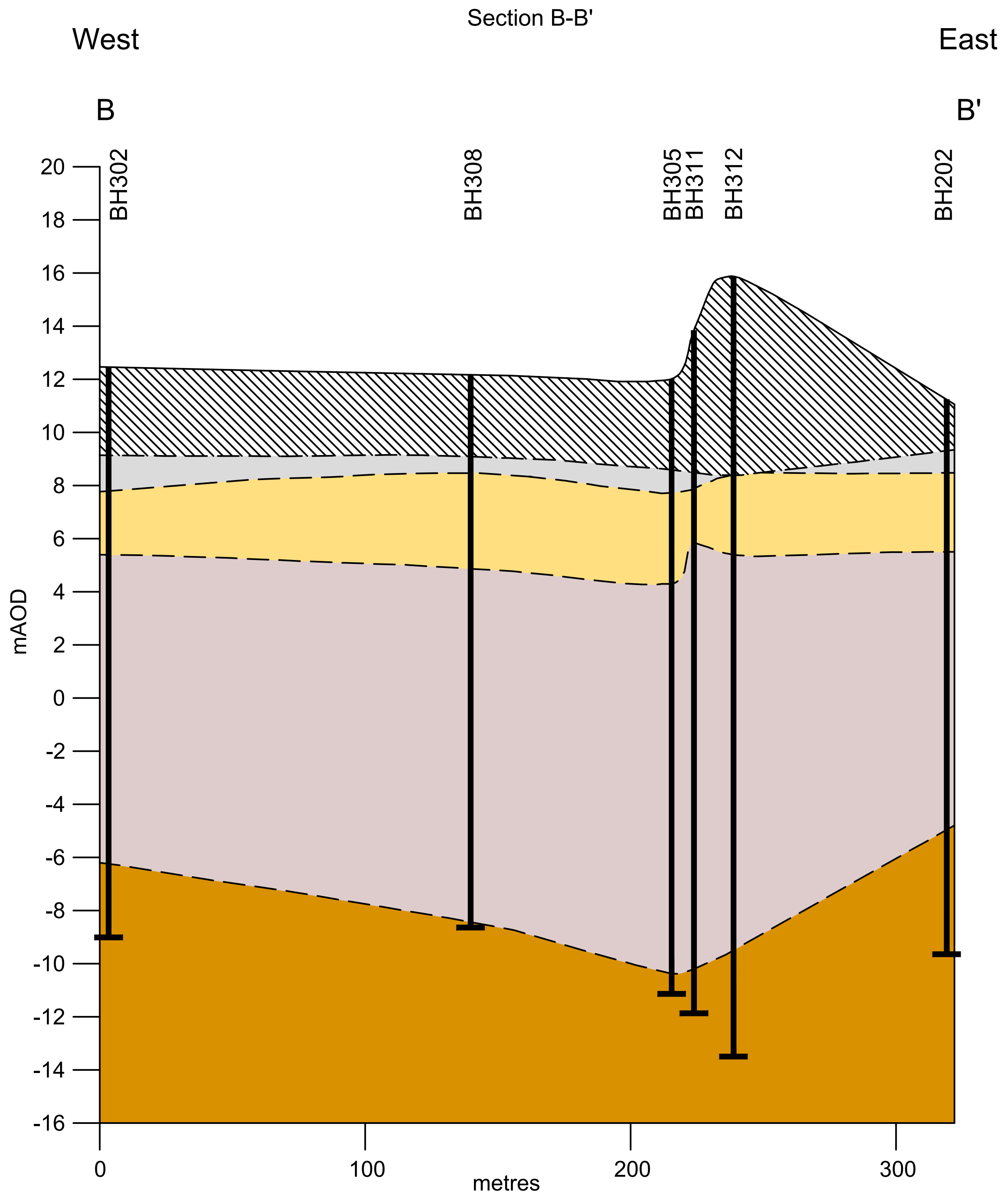
amec foster wheeler

Figure 8
Cross section B-B'

May 2015

35180-Rea30.dwg lowec



Key

▨	Made Ground
▧	Alluvium
🟨	Kempton Park Gravel
▧	London Clay
🟧	Lambeth Group
— — —	Assumed strata boundary

0 m 150 m

Scale 1:2500 @ A3
10 x vertical exaggeration

Client

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north london waste authority

Hydrogeological Risk
Assessment

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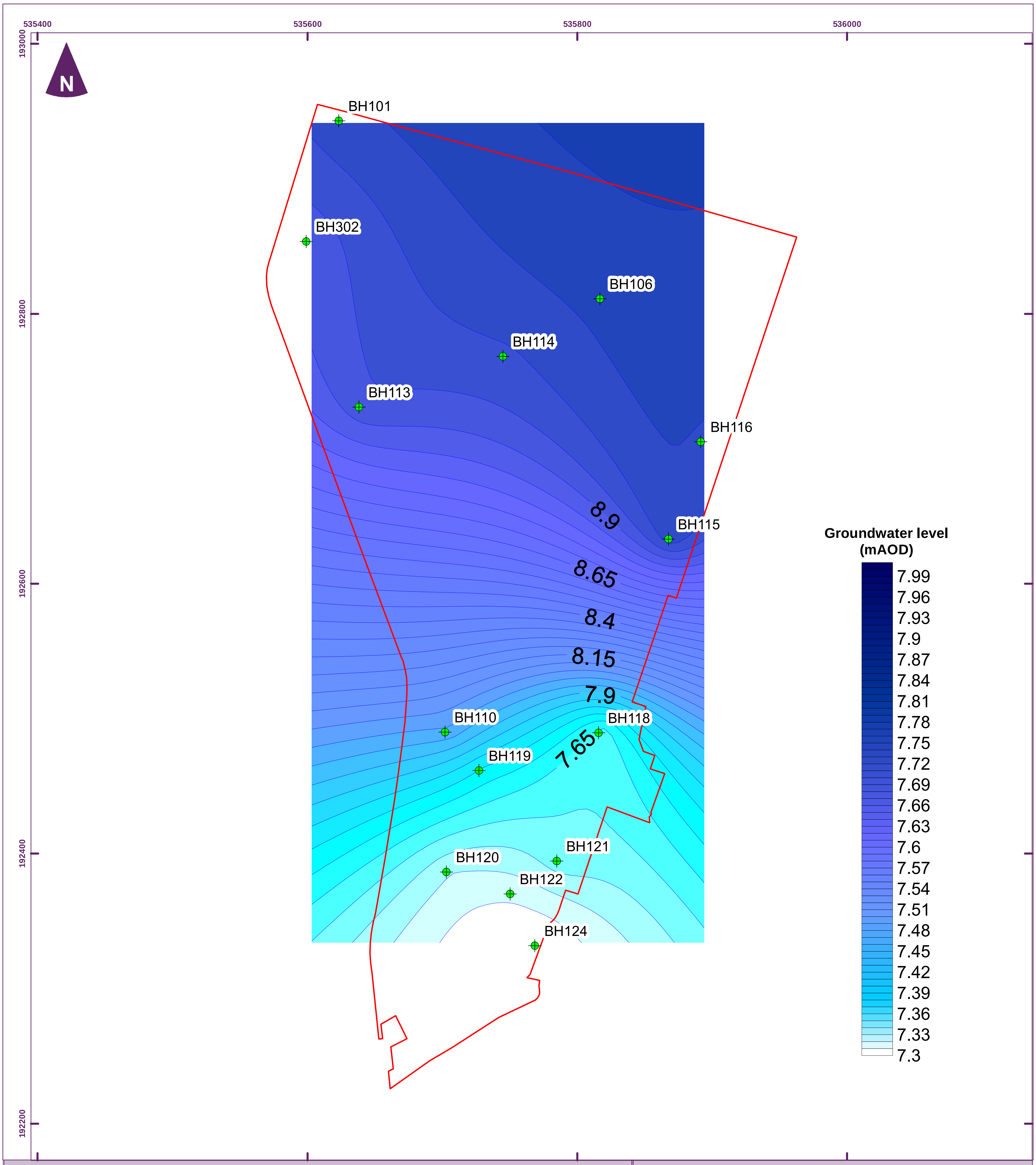
foster
wheeler

Figure 9
Cross section B-B'

May 2015

35180-Rea31.dwg lowec



Key

▭ Edmonton EcoPark Operational site boundary

⊕ Borehole
(Note: Only boreholes used to generate
contours are shown on this figure)

— Groundwater level in Kempton Park
Gravel (mAOD)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

Client

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north london waste authority

Hydrogeological Risk
Assessment

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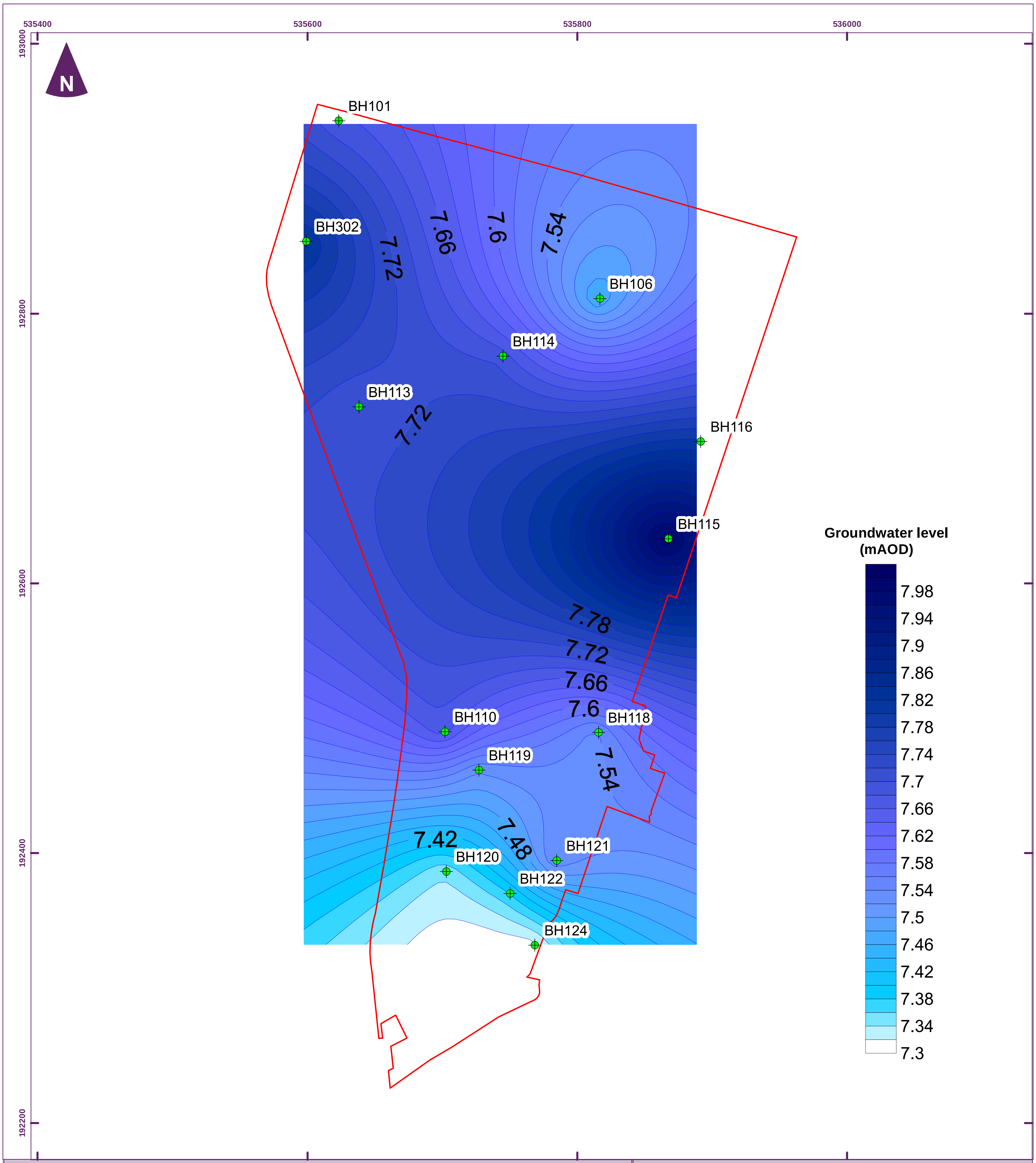
foster
wheeler

Figure 10
Groundwater levels in Kempton Park Gravel (May 2014)

May 2015

35180-Rea32.mxd parkj



Key

🟥	Edmonton EcoPark Operational site boundary
●	Borehole (Note: Only boreholes used to generate contours are shown on this figure)
—	Groundwater level in Kempton Park Gravel (mAOD)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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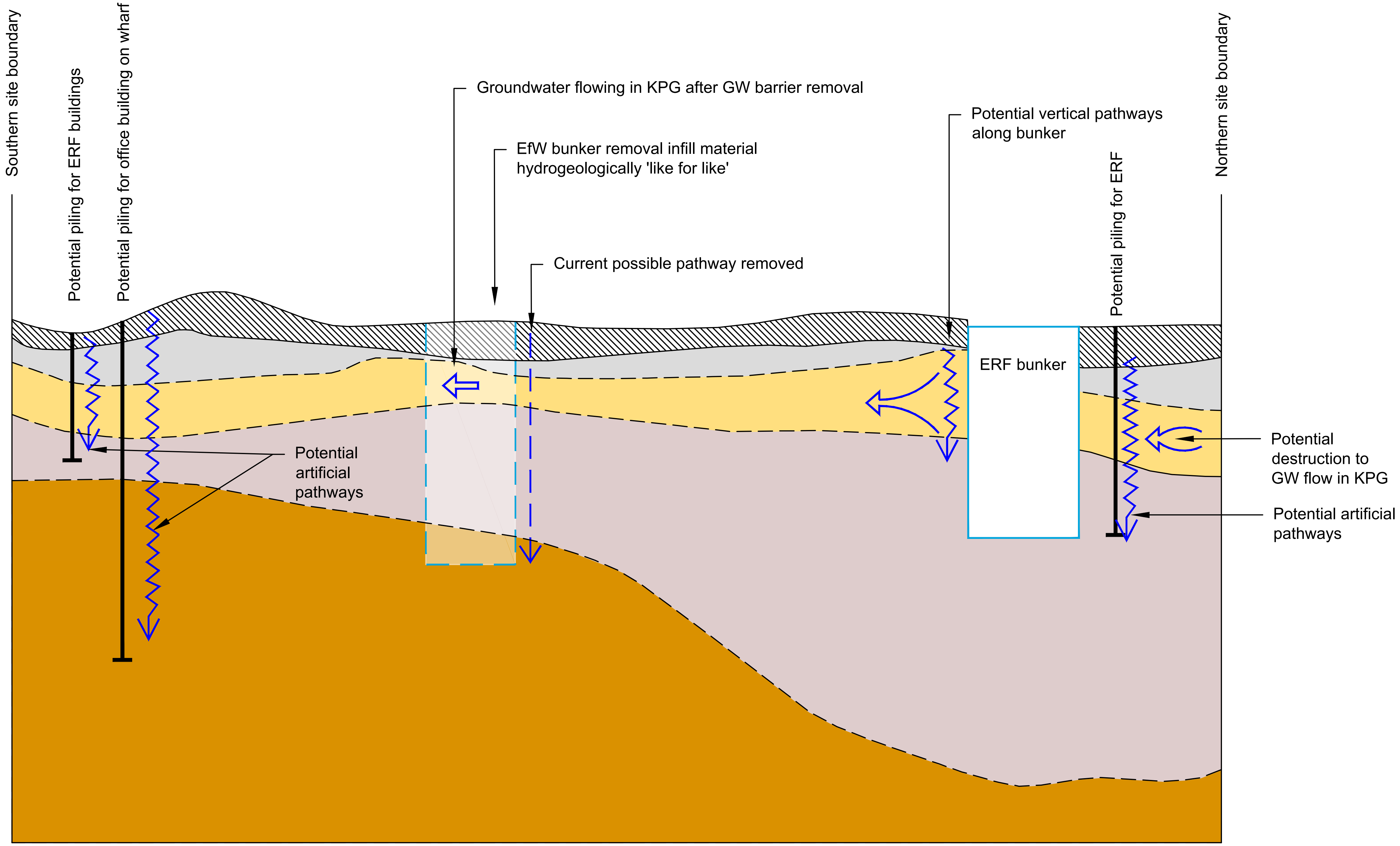
Figure 11
Groundwater levels in Kempton Park Gravel (November 2014)

May 2015

35180-Rea33.mxd parkj

file: R:\Projects\35180 NLWA SUBFILE\35180 - 16 Edmonton HYDRA\Calcs\ArcGIS\35180-Rea33.mxd



Key

▨ Made Ground
⬜ Alluvium
🟨 Kempton Park Gravel
⬜ London Clay
🟧 Lambeth Group
- - - Assumed strata boundary

Note:
Chalk underlying Lambeth Group at approximately 32 - 43 mbgl

Not to scale

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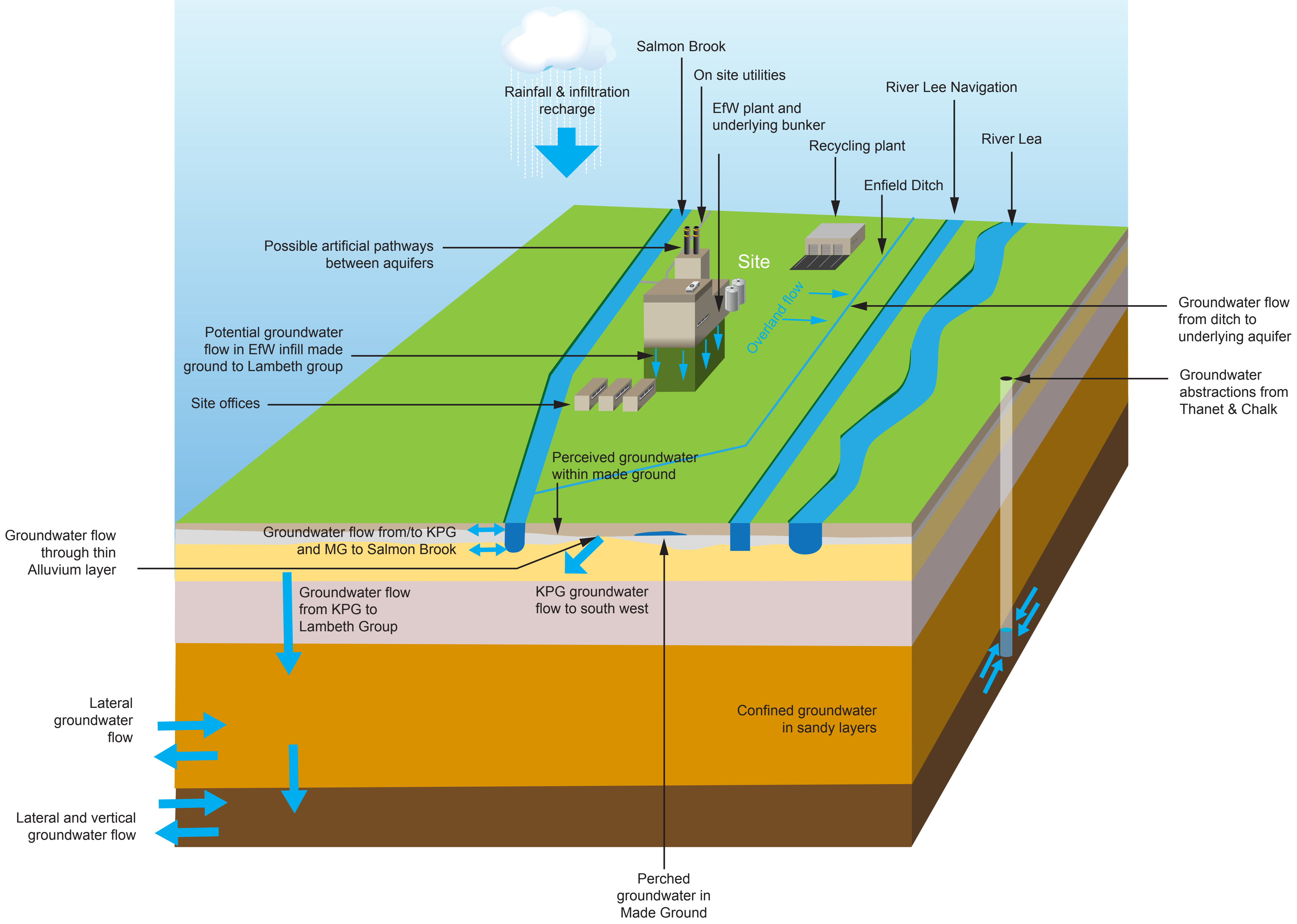
Figure 12
Conceptual model block diagram

May 2015

35180-Rea34.dwg pattn



Key

▨	Made Ground
▨	Alluvium
▨	Kempton Park Gravel
▨	London Clay
▨	Lambeth Group
▨	Thanet Sand & Chalk

Not to scale

Client

nlwa
north london waste authority

Hydrogeological Risk Assessment

amec foster wheeler

Figure 13
Site conceptual model cross section

May 2015

35180-Rea35.ai pattn

A2 Borehole logs and geotechnical analysis results

ENGINEERING & PROJECT SERVICES

FINAL FACTUAL REPORT
Site Investigation Report No. SI1688
Site: LondonWaste EcoPark, Edmonton
Client: Entec UK Limited

SITE INVESTIGATION

MAY GURNEY

FINAL FACTUAL REPORT

May Gurney Report No. SI1688

May 2011

Site:

**LondonWaste EcoPark,
Edmonton**

Client:

Entec UK Limited

Prepared by:

May Gurney Professional Services
Site Investigation
Ayton Road, Wymondham
Norfolk, NR18 0RH
Tel: 01953 609844 Fax: 01953 609819
www.maygurney.co.uk

DOCUMENT CONTROL

May Gurney Report No.:	SI1688
Site:	LondonWaste EcoPark, Edmonton
Client:	Entec UK Limited
Date:	May 2011

Report Written by:
P LEWIN BSc
Geotechnical Engineer

Checked and Authorised for issue:
B ARMSTRONG BSc MSc FGS
Site Investigation Manager

GENERAL CONDITIONS / LIMITATIONS RELATING TO SITE INVESTIGATIONS

The recommendations of this report are based on the findings of a series of exploratory holes carried out at specified locations across the site. It is possible that conditions exist other than those encountered and therefore no guarantee can be given as to the extent to which the findings are representative.

It should be noted that groundwater conditions fluctuate according to seasonal and other factors, which cannot be predicted with certainty. In low permeability soils equilibrium ground water levels are rarely established during the period of fieldwork.

All recommendations made are subject to any relevant statutory regulations in force concerning design methods and safe construction practice. In addition unless specifically stated no account has been taken of possible subsidence due to mineral extraction.

This report is for the sole and specific use of the client and May Gurney Professional Services shall not be responsible for any use of the report or its contents for any purpose other than that for which it was prepared and provided. Should the client require to pass copies of the report to other parties for information, the whole report should be so copied, but no professional liability or warranty shall be extended to other parties by May Gurney Professional Services in this connection without written consent.

CONTENTS

APPENDICES

APPENDIX A **EXPLORATORY HOLE RECORDS AND FIELD TEST RESULTS**

- Exploratory Hole Record Key
- Summary of Exploratory Holes
- Cable Percussive Borehole Records
- Window Sample Records

APPENDIX B **INSTRUMENTATION**

- Summary of Instrumentation

APPENDIX C **GEOTECHNCIAL LABORATORY TEST RESULTS**

- Summary Chain of Custody
- Geotechnical Laboratory Test Results

APPENDIX C **SITE PLANS**

- Site Location Plan
- Exploratory Hole Location Plan

1 INTRODUCTION

May Gurney Professional Services were instructed by Entec UK Limited, to carry out a site investigation in order to obtain information on the geotechnical and chemical composition of the underlying soils at LondonWaste Ecopark, Edmonton, North London

The specification for the site investigation was completed by Entec UK Limited and details the full scope of works. May Gurney Professional Services were appointed as Ground Investigation Contractor for the intrusive investigation.

The site investigation comprised twenty two cable percussion boreholes and thirty four window sample boreholes. In addition, geotechnical laboratory testing was also completed on recovered samples. The fieldwork was carried out between the 7th and 25th March 2011.

This report contains a record of the fieldwork conducted, strata encountered and laboratory test results.

May Gurney Professional Services also provide onsite storage and office facilities, as part of the site investigation works.

2 THE SITE

2.1 Location and Description

The site is situated west of the River Lee Navigation and bordered to the south by the North Circular Road, in Edmonton within the London Borough of Enfield.

At the time of the intrusive investigation the site comprised a municipal waste incinerator and waste-to-energy power station which burns London's waste to provide electricity for the National Grid. The site was divided into various waste sorting locations, with numerous associated buildings to sort and contain waste. A composting facility was also present within the waste facility.

The site is centred on National Grid Reference 535750 192650, as shown on the site location plan presented within Appendix D.

2.2 Geology

The available information[1] indicates the solid geology underlying the site is the London Clay Formation, of the Eocene period. The London Clay Formation comprises grey, weathering to brown fine sandy silty CLAY and clayey SILT. The sequence becomes increasingly sandy towards the base, with occasional glauconitic sands.

Underlying the London Clay Formation is the Lambeth Group, which is made up of the Reading, Woolwich and Upnor Formations. The Reading Formation includes the Upper Mottled Clay and the Lower Mottled Clay; the Woolwich Formation includes the Upper Shelly Clay, the Laminated Beds, the ‘Striped Loams’ and the Lower Shelly Clay; the Upnor Formation includes the Pebble Bed.

This solid geology is masked by drift deposits of the Kempton Park Gravels which generally comprise sand and gravel, locally with lenses of clay, silt and peat. The post diversionary Thames deposit is generally 5-6m thick, however locally can be encountered deeper due to infilling of deep hollows.

Overlying the Kempton Park Gravels at the site, Alluvium is indicated associated with the River Lea and small tributaries of the River Lea.

2.3 Hydrology

The River Lea Navigation, which is canalised, forms part of the eastern boundary of the site flowing southwards. Within this area the River Lea is extensively managed and consequently the river does not follow its natural course. This main River Lea is tidal however due to canalisation in this area the River Lea Navigation is not influenced by tidal water fluctuations.

A tributary of the River Lea, identified as Salmons Brook, forms part of the western boundary of the site.

2.4 Hydrogeology

The Hydrogeology of the site is likely to be characterised by the Kempton Park Gravels, which is a Secondary A Aquifer. A secondary A Aquifer contains permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The underlying solid geology of the London Clay Formation is designated as unproductive strata and acts as an aquiclude to the underlying Lambeth Group.

The hydrology of the Lambeth Group is dependant on the substrata but is also classified as a Secondary A Aquifer.

At depth below the site, the Upper Chalk Formation is designated a principle aquifer. A principle aquifer has high intergranular and/or fracture permeability - meaning that they usually provide a high level of water storage. These may support water supply and/or river base flow on a strategic scale.

The site is also situated within a Source Protection Zone One (SPZ1), inner zone protection defined as a 50 day travel time from any point below the water table to the source.

3 FIELDWORK

3.1 Scope of Works

The scope of the field work was specified by Entec UK Limited and was undertaken in general accordance with Eurocode 7 Part 2[2], The Steering Group Specification (1993)[6] and where there is no conflict BS 5930:1999[7] and BS10175:2001[21]. The soil descriptions used in the exploratory hole records are in broad accordance with the relevant European Standards[3&4] and Section Six of BS 5930: 1999[7]. All exploratory hole records have been amended by Entec UK Limited and checked and approved for issue by May Gurney Professional Services

The prevailing ground conditions were determined by:

- 22 No. Cable Percussion Boreholes (BH)
- 34 No. Window Sampler Boreholes (WS)

A summary of the exploratory holes is presented within Appendix A. (To be included in the final report).The exploratory hole locations were positioned by Entec UK Limited as shown on the exploratory hole location plan presented in Appendix D.

Prior to any intrusive works a service and utility survey was completed by Site Vision Surveys Limited, appointed by Entec UK Limited. The location of services surrounding exploratory holes was marked up on the ground and all exploratory holes were positioned accordingly. Before commencement of drilling and excavation all the exploratory hole positions were scanned using a cable avoidance tool (CAT). Within all exploratory hole locations a 1.20m deep hand excavated trail pit was completed to check for the presence of any near surface services that may have been damaged by the investigation.

3.2 Cable Percussive Boreholes

Twenty two cable percussive boreholes (BH101-BH124, excluding BH111 and BH112) were sunk to a depth of 24.40mbgl (BH116), utilising a Dando 2000 Rig, between the 7th and 25th March 2011. These were supported, where necessary, by the use of 250mm, 200mm and 150mm diameter temporary steel casing.

Due to the environmental risks of creating a contamination pathway it was necessary to add bentonite seals at each reduction of casing. In instances where the Lambeth Group was to be encountered, a 2.00m seal of bentonite and cement grout was utilised, and allowed to set for between 12 and 48hrs before drilling commenced.

Standard Penetration Tests (SPT) were carried out at regular intervals using either a split spoon sampler or solid 60° cone (CPT). The results of these tests are given as an SPT or CPT "N" value or as a blow count for a given penetration at the appropriate position on the borehole record.

Undisturbed samples (U100s) were taken at regular depth intervals in cohesive materials. The sampling frequency was carried out as specified by Entec UK Limited. Blow counts for each sample were recorded. During the excavation of the boreholes evidence of any groundwater ingress and subsequent standing levels were recorded.

The exposed strata were recorded and disturbed samples recovered during boring, as an aid to the production of a detailed borehole record. The recovered samples were logged by an engineering geologist from May Gurney Professional Services or Entec UK Limited. The engineer verified logs are contained within Appendix A, and are based upon the laboratory test results and the descriptions of recovered samples.

On completion the boreholes were installed with gas and groundwater monitoring standpipes as detailed in section 3.4.

3.3 Window Sampler Boreholes

Thirty four window sampler boreholes (WS101 – WS135, excluding WS114) were sunk to a maximum depth of 6.00mbgl by the use of a drive-in window sampler (Terrier), between the 14th and 22nd March 2011.

The recovered core samples were logged (Appendix A) by an engineering geologist from Entec UK Limited. Environmental samples were obtained to allow chemical analysis to be completed. The depth and frequency of samples was determined by Entec UK Limited.

All obtained environmental samples were placed in cool boxes and dispatched to a chemical laboratory for storage until chemical schedules had been completed.

Window sample borehole WS118 was terminated at 2.00mbgl due to a possible drain being located at 1.80mbgl. Consequently the borehole was not installed and was backfilled with bentonite as requested by Entec UK Limited.

Following completion all window sample boreholes (with the exception of WS118) were installed with gas and groundwater monitoring standpipes as detailed in section 3.4.

3.4 Instrumentation and Monitoring

HDPE 50mm gas and groundwater monitoring standpipes were installed in all boreholes with response zones within the Kempton Park Gravels. HDPE 32mm gas and groundwater monitoring standpipes were installed within all boreholes (with the exception of WS118). A summary of the instrumentation is presented in Appendix B.

Reference should be made to the exploratory holes records in Appendix A for full details of the installations completed within the boreholes and window sampler boreholes

4. LABORATORY TESTS

4.1 Geotechnical Testing

A schedule of geotechnical laboratory testing was prepared and completed by Entec UK Limited. The scheduled tests were carried out in accordance with BS1377:1990[5] as noted below:

TEST DESCRIPTION	PART	METHOD
Moisture Content	2	3
Liquid Limit	2	4
Plastic Limit and Plasticity Index	2	5
Particle Size Distribution		
Coarse Grained (wet sieve)	2	9.2
Fine Grained (sedimentation)	2	9.4
Oedometer	5	3
Multi Stage Consolidated Drained Triaxial with measurement of pore pressure	8	8

In addition, forty four samples were also tested for a Brownfield Suite which includes pH, Water Soluble Sulfate, Water Soluble Magnesium, Water Soluble Chloride and Water Soluble Nitrate.

The results of the above tests are contained in Appendix C. A summary chain of custody identifies results that have been obtained up to the date of issue of this draft report. At present the received lab results have not been reflected within the borehole strata descriptions. Subsequent report revisions will be issued in include updated descriptions.

4.2 Chemical Testing

A detailed chemical testing regime was completed by Entec UK Limited on the environmental samples obtained during the investigation. The results from the chemical testing are not presented within this report.

5 GROUND CONDITIONS

5.1 Physical Soil and Groundwater Conditions

Reference should be made to the appended exploratory hole logs for full details of the strata encountered by this investigation, however a brief summary has been included below.

The site was underlain by a layer of Made Ground, which varied in thickness from 0.90 to 4.85mbgl (WS106). The Made Ground comprised mixed granular and cohesive layers and contained brick, concrete, flint, pottery, wood, metal, ash, quartzite, clinker. Occasional brick and concrete cobbles were noted.

Underlying the Made Ground, a thin layer of Alluvium was encountered in the vast majority of locations, which was subsequently underlain by the Kempton Park Gravel. All window sample boreholes were terminated in the drift deposits.

The Kempton Park Gravel was encountered from depths of between 2.80m and 5.50mbgl to a maximum depth of 8.60mbgl. This stratum comprised various layers of silty gravelly SAND, silty SAND and GRAVEL and silty sandy GRAVEL.

The solid geology of the London Clay Formation was encountered underlying the Kempton Park Gravel and was proven to a maximum depth of 24.20mbgl, although the full thickness was not proven in the majority or boreholes. The London Clay Formation comprised firm to very stiff, medium to very hight strength CLAY, locally silty and with occasional fine sand partings.

Below the London Clay Formation the Lambeth Group was encountered within BH103, BH110, BH116, BH118, BH123 and BH124. From depths of between 8.80m and 24.20mbgl to a maximum depth of 24.40mbgl. The Lambeth Group comprised various layer of dense silty fine and medium SAND and silty sandy CLAY. Occasional shell fragments were encountered locally.

5.2 Groundwater

Reference should be made to the exploratory hole records for full details of groundwater conditions encountered during drilling. The groundwater strikes encountered within the cable percussion boreholes have been summarised below, however equilibrium groundwater levels are rarely obtained while drilling. A detailed gas and groundwater monitoring scheme has been completed by Entec UK Limited and will provide more accurate information on the groundwater conditions.

Hole ID	Depth to groundwater strike (mbgl)	Standing groundwater level after 20 minutes (mbgl)	Flow Remarks
BH101	3.900	3.200	Slow
BH102	4.400	3.900	Slow
BH103	3.500	2.500	Medium
BH104	3.900	3.300	Slow
BH105	4.300	3.200	Slow
BH106	5.600	Not Recorded	Seepage
BH107	3.000	2.700	Slow
BH108	3.000	2.900	Seepage
BH109	2.800	2.400	Slow
BH110	3.400	Not Recorded	Slow
BH113	4.300	2.600	Medium
BH114	1.200	1.200	Seepage
BH115	1.400	1.950	Seepage
BH115	2.600	2.400	Seepage
BH115	3.500	1.900	Medium
BH116	3.600	3.100	Slow
BH117	4.300	4.100	Slow
BH118	4.400	3.400	Slow
BH118	14.500	11.800	Medium
BH119	2.000	1.900	Slow
BH119	4.700	4.000	Medium
BH120	4.100	4.000	Medium
BH121	4.300	4.100	Slow
BH122	5.400	5.300	Medium
BH123	10.600	9.800	Medium
BH124	4.000	3.900	Slow
BH124	10.500	9.500	Medium

6 REFERENCES

1. British Geological Survey England and Wales, 1:50,000, Sheet 256, (Solid & Drift Edition).

2. BS EN 1997-2 (2007): Eurocode 7 Geotechnical Design – Part 2: Ground Investigation and testing.

3. BS EN ISO 14688-1: (2002): Geotechnical Investigation and Testing – Identification and Classification of Soil – Part 1: Identification and Description.

4. BS EN ISO 14688-2: (2004): Geotechnical Investigation and Testing – Identification and Classification of Soil – Part 2: Principles for a classification.

5. BS EN ISO 14688-3: (2005): Geotechnical Investigation and Testing – Field Testing – Part 3: Standard Penetration Test.

6. Specification for ground Investigation, Site Investigation Steering Group (1993).

7. BS5930: (1999) Site Investigation – Code of Practice, British Standards Institution.

APPENDIX A

EXPLORATORY HOLE RECORDS AND FIELD DATA

MAY GURNEY

Key to Site Investigation Records

Project: LondonWaste EcoPark, Edmonton

Project I.D.: SI1688

Client: Entec UK Limited

In Situ Testing & Observations

PID	Photo Ionisation Detection test, reported in ppm.
S or C	Standard Penetration Test as per BS1377:1190 ‘Methods of test for soils for civil engineering purposes’. Uncorrected test result shown on the log at the relevant depth. S – split spoon or C – solid cone.
HV	Hand vane test, shear strength reported in kPa.
PP	Pocket penetrometer test, shear strength reported in kPa.
▽	Groundwater strike
▼	Level to which groundwater has risen after the specified time. (Nominal 20 minutes).

Sampling

D	Small disturbed sample, around 1kg.
B	Bulk disturbed sample, around 5kg.
C	Core undisturbed sample.
W	Water sample.
ES	Environmental soil sample, in more than one container if appropriate.
U 100	Undisturbed driven thinwall tube sample. Nominal 100mm diameter and 450mm length in CP boreholes. The number of blows taken to drive the sample tube the full length is reported on the log sheet at the appropriate depth along with the percentage recovery. The U100 thinwall has an edge taper angle of 5 degrees, area ratio of 14.97 and an internal diameter of 104mm, which complies with BS EN ISO 22475-1 (2006), for a thin wall open drive sampler. The samples obtained within cohesive soil using a U100T are deemed Class one in accordance with BS EN ISO 22475-1 (2006).

General Comments

1. Soil samples have been described in accordance with BS EN ISO 14688-2(2002), BS EN ISO 14688-2(2004) and BS5930:2007 ‘Code of practice for site investigation’ – Section 6.

2. Electronic data provided in relation to this project has been produced using the Association of Geotechnical & Geoenvironmental Specialists (AGS) data transfer format, with specific reference to their publication ‘Electronic Transfer of Geotechnical and Geoenvironmental Data Edition 3.1, 2004 including addendum May 2005’. All legend and backfill codes are as per this document.

Summary of exploratory holes:

Exploratory hole ID	Type of Exploratory Hole*	Final depth mbgl	Easting	Northing	Elevation m aOD	Final depth m aOD
BH101	CP	15.00	535623.08	192943.02	11.658	-3.34
BH102	CP	8.45	535597.55	192844.90	12.512	4.06
BH103	CP	18.70	535625.32	192774.31	11.169	-7.53
BH104	CP	15.00	535733.78	192845.15	12.217	-2.78
BH105	CP	8.70	535800.00	192879.05	12.117	3.42
BH106	CP	17.00	535816.83	192811.33	13.603	-3.40
BH107	CP	10.00	535910.55	192849.06	11.294	1.29
BH108	CP	15.45	535715.72	192707.50	11.123	-4.33
BH109	CP	15.00	535825.82	192597.48	10.830	-4.17
BH110	CP	11.40	535701.94	192490.25	10.751	-0.65
BH113	CP	6.50	535638.19	192730.94	11.173	4.67
BH114	CP	7.00	535744.97	192768.64	10.785	3.79
BH115	CP	7.10	535867.51	192633.10	11.636	4.54
BH116	CP	24.40	535891.55	192705.40	11.747	-12.65
BH117	CP	6.00	535813.75	192713.45	11.709	5.71
BH118	CP	19.95	535815.68	192489.67	10.975	-8.98
BH119	CP	10.00	535727.16	192461.74	11.188	1.19
BH120	CP	9.45	535703.06	192386.51	11.060	1.61
BH121	CP	10.00	535784.87	192394.71	11.342	1.34
BH122	CP	10.25	535750.19	192370.34	12.637	2.39
BH123	CP	20.00	535717.97	192303.66	10.955	-9.05
BH124	CP	11.00	535768.62	192331.88	11.021	0.02
WS101	WS	5.00	535682.84	192927.00	12.227	7.23
WS102	WS	4.00	535600.48	192854.37	12.545	8.55
WS103	WS	3.00	535625.24	192765.76	11.293	8.29
WS104	WS	5.00	535733.51	192844.13	12.220	7.22
WS105	WS	3.00	535671.47	192790.96	10.884	7.88
WS106	WS	6.00	535811.82	192806.35	13.925	7.93
WS107	WS	4.70	535877.59	192779.10	14.373	9.67
WS108	WS	4.80	535875.26	192765.56	14.408	9.61
WS109	WS	2.00	535784.92	192757.33	10.928	8.93
WS110	WS	3.00	535879.17	192706.01	11.631	8.63
WS111	WS	3.00	535849.04	192630.59	11.664	8.66
WS112	WS	3.00	535817.36	192707.55	11.495	8.50
WS113	WS	3.00	535829.30	192671.03	11.285	8.29
WS115	WS	2.00	535745.22	192767.91	10.772	8.77
WS116	WS	2.00	535655.88	192701.48	10.415	8.42
WS117	WS	2.00	535664.23	192688.51	10.369	8.37
WS118	WS	2.00	535715.30	192708.95	10.984	8.98
WS119	WS	2.00	535766.40	192717.01	10.788	8.79
WS120	WS	3.00	535708.80	192546.54	10.741	7.74
WS121	WS	6.00	535803.55	192588.84	10.703	4.70
WS122	WS	5.00	535747.13	192518.46	10.744	5.74
WS123	WS	3.00	535702.36	192448.15	11.168	8.17
WS124	WS	3.00	535739.14	192436.79	11.207	8.21

Exploratory hole ID	Type of Exploratory Hole*	Final depth mbgl	Easting	Northing	Elevation m aOD	Final depth m aOD
WS125	WS	3.00	535789.27	192499.21	10.594	7.59
WS126	WS	2.00	535819.25	192506.31	10.886	8.89
WS127	WS	3.00	535790.50	192441.88	11.243	8.24
WS128	WS	2.00	535775.98	192395.75	12.055	10.06
WS129	WS	4.00	535710.48	192379.49	11.526	7.53
WS130	WS	4.00	535706.30	192342.70	12.820	8.82
WS131	WS	3.00	535751.04	192358.39	12.384	9.38
WS132	WS	2.00	535715.05	192304.25	10.968	8.97
WS133	WS	1.90	535756.32	192325.77	11.154	9.25
WS134	WS	3.00	535839.21	192883.53	12.035	9.04

*CP=Cable Percussion Borehole, RC=Rotary Core Borehole, DP=Dynamic Probe, WS=Window Sampler Borehole, TP=Trial Pit, CBR = In-Situ California Bearing Ratio Test

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Borehole Record

Sheet 1 of 2

BH101

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

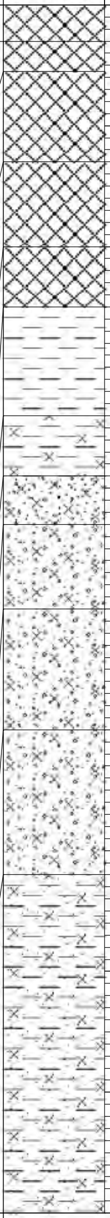
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.658mAOD
Coordinates: 535623.08E
192943.02N

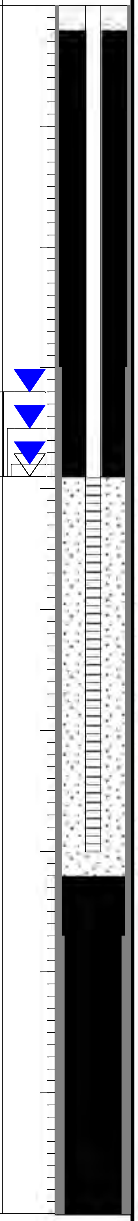
Description	Depth (m)	O.D. Level (m)
MADE GROUND: Tarmac.	0.30	11.36
MADE GROUND: Type 1 red-grey silty fine to coarse SAND and angular to subangular fine and medium limestone and granite GRAVEL.	0.55	11.11
MADE GROUND: Mixed stiff grey slightly (approximately 10%) gravelly CLAY and brown clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.	1.30	10.36
MADE GROUND: Medium dense mixed yellow-brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint and firm to stiff brownish grey slightly gravelly (approximately 5%) CLAY. Gravel is angular to subangular fine to coarse flint and brick.	2.00	9.66
MADE GROUND: Mixed dark brown silty CLAY and loose yellowish grey clayey very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint with rare brick. Possible slight hydrocarbon odour.	2.50	9.16
Soft to firm low strength blue-green CLAY with some black organic mottling. (ALLUVIUM).	3.40	8.26
Firm dark brown organic rich silty CLAY. (ALLUVIUM).	3.90	7.76
Medium dense grey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine and medium flint. (KEMPTON PARK GRAVEL).	4.30	7.36
Medium dense grey slightly silty fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	5.00	6.66
Medium slightly silty very sandy GRAVEL with some thin grey clay bands. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).	6.00	5.66
Grey slightly silty very sandy fine to coarse angular to subrounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	7.20	4.46
Stiff grey high strength slightly silty CLAY, locally slightly sandy. (LONDON CLAY FORMATION). ...At 8.00mbgl very stiff locally thinly laminated.		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
ES1	0.30-0.50					
B1	0.35-0.50					
D1	0.35-0.50					
B2	0.50-1.20					
D2	0.50-0.60					
ES2	0.50-0.70					
S	1.20-1.65			N=19 (1,1/3,4,3,9)		
B3	1.20-2.00					
D3	1.20-1.65					
ES3	1.50-1.70					
S	2.00-2.45	2.00		N=7 (5,1/2,1,2,2)		
B4	2.00-2.45					
D4	2.00-2.45					
ES4	2.20-2.40					
B5	2.50-3.00					
ES5	2.70-2.90					
U1	3.00			21 blows		
D5	3.50-3.60					
S	4.00-4.45	3.00	(3.20)	N=10 (1,1/1,3,3,3)		
B6	4.00-5.00					
D6	4.00-4.45					
ES6	4.30-4.50					
S	5.00-5.45	5.00	(3.10)	N=11 (1,3/3,3,3,2)		
B7	5.00-6.00					
D7	5.00-5.45					
ES7	5.80-6.00					
S	6.00-6.45	6.00	(2.80)	N=13 (2,2/3,2,4,4)		
B8	6.00-7.00					
D8	6.00-6.45					
S	7.00-7.45	7.00	(5.10)	N=9 (5,4/3,2,2,2)		
B9	7.00-7.70					
D9	7.00-7.45					
D10	7.20-7.30					
ES8	7.40-7.60					
U2	8.00			HV=150.0kPa 51 blows	100%	
D11	8.40-8.50					
S	9.00-9.45	8.30		N=16 (6,4/3,4,4,5)		
B10	9.00-10.00					
D12	9.00-9.45					

Installations



Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.00	3.00
200	7.70	7.70
150	15.00	15.00

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	3.90	5	3.80	3.00	8.30
15/03/11	3.90	10	3.50	3.00	8.30
15/03/11	3.90	15	3.20	3.00	8.30
15/03/11	3.90	20	3.20	3.00	8.30

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011-16/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 7.20mbgl. Plain pipe from GL to 3.90mbgl and a slotted pipe from 3.90m to 7.20mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 3.90mbgl, gravel from 3.90m to 7.20mbgl and bentonite from 7.20m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 3.00mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite / cement grout seal added at 7.70mbgl at reduction from 200mm diameter casing to 150mm diameter drilling tools. Bentonite / cement grout left overnight to set.

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Borehole Record

BH101

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.658mAOD
Coordinates: 535623.08E
192943.02N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
Stiff grey high strength slightly silty CLAY, locally slightly sandy. (LONDON CLAY FORMATION).				U3	10.00			64 blows	100%		
				D13	10.40-10.50						
				S B11 D14	11.50-11.95 11.50-13.00 11.50-11.95	8.30		N=21 (3,4/3,5,6,7)			
...From 13.00mbgl becoming high strength slightly sandy.				U4	13.00			49 blows	100%		
				D15	13.40-13.50						
				ES9	14.00-14.20						
				S D16	14.50-14.95 14.50-14.95	8.30		N=29 (5,5/6,7,8,8)			
Borehole Complete at 15.00 m		15.00	-3.34								

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	3.00	3.00			
200	7.70	7.70			
150	15.00	15.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	3.90	5	3.80	3.00	8.30
15/03/11	3.90	10	3.50	3.00	8.30
15/03/11	3.90	15	3.20	3.00	8.30
15/03/11	3.90	20	3.20	3.00	8.30

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011-16/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:

1. Hand pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 7.20mbgl. Plain pipe from GL to 3.90mbgl and a slotted pipe from 3.90m to 7.20mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 3.90mbgl, gravel from 3.90m to 7.20mbgl and bentonite from 7.20m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 3.00mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite / cement grout seal added at 7.70mbgl at reduction from 200mm diameter casing to 150mm diameter drilling tools. Bentonite / cement grout left overnight to set.

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Borehole Record

BH102

Sheet 1 of 1

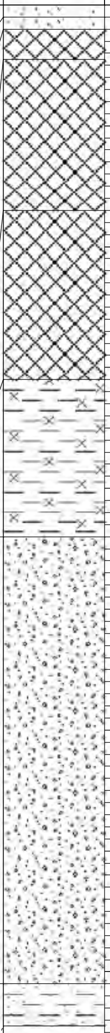
Project: London Waste Ecopark, Edmonton

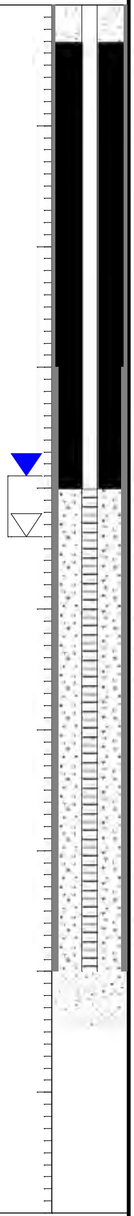
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.512mAOD
Coordinates: 535597.55E
192844.90N





Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: CONCRETE		0.10	12.41							
MADE GROUND: Weak CONCRETE		0.20	12.31	B1 D1	0.20-0.40 0.20-0.30					
MADE GROUND: Dark grey silty, gravelly fine to coarse ashy SAND. Gravel is angular to subangular fine and medium ash and flint with a little metal. ...At 0.45mbgl Geotextile mat.		0.45	12.06	ES1 B2 D2 ES2	0.30-0.40 0.40-0.60 0.40-0.50 0.50-0.70					
				S B3 D3	1.20-1.65 1.20-2.00 1.20-1.65			N=14 (2,2/2,4,4,4)		
MADE GROUND: Medium dense dark grey clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint, brick and pottery, (approximately 10% brick cobbles). Occasional ash. Locally a sandy CLAY with fragments of wood and metal.		1.70	10.81	ES3	1.70-1.90					
				S B4 D4	2.00-2.45 2.00-3.00 2.00-2.45			N=7 (3,3/1,1,2,3)		
MADE GROUND: Stiff brown-grey slightly silty slightly gravelly (approximately 10%) sandy CLAY. Gravel is angular to subangular fine to coarse brick concrete, glass and flint.		3.10	9.41	S B5 D5 ES4	3.00-3.45 3.00-4.00 3.00-3.45 3.30-3.40	3.00		N=5 (1,1/1,1,2,1)		
Stiff blue-grey slightly silty CLAY with occasional fine brown decayed plant debris. (ALLUVIUM).		4.40	8.11	U1 W1	4.10 4.10			19 blows 80%		
Medium dense grey slightly slity fine to coarse SAND and angular to subangular fine to coarse flint GRAVEL. Locally a sandy GRAVEL and a gravelly SAND. (KEMPTON PARK GRAVEL)		8.10	4.41	B6 D6	4.10-5.00 4.50-4.60					
				S ES5 B7 D7	5.00-5.45 5.00-5.20 5.00-6.00 5.00-5.45	5.00	(4.00)	N=13 (2,2/2,4,3,4)		
				S B8 D8	6.00-6.45 6.00-7.00 6.00-6.45	5.90	(3.10)	N=13 (5,4/3,3,4,3)		
...From 7.00mbgl Some thin clay bands.				S ES6 B9 D9	7.00-7.45 7.00-7.20 7.00-8.00 7.00-7.45	7.00	(5.60)	N=0 (1,0/-,-,-,-)		
				S D10	8.00-8.45 8.00-8.45	8.00	(5.00)	N=12 (2,2/3,3,2,4)		
Stiff grey slightly sandy CLAY with occasional angular to subangular fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).		8.45	4.06							
Borehole Complete at 8.45 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200 150	4.10 8.45	3.00 8.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/03/11	4.40	20	3.90	4.10	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	07/03/2011-08/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Water level standing at 5.00mbgl on completion.
3. Installation Details: 50mm HDPE Standpipe installed from GL to 8.00mbgl. Plain pipe from GL to 4.00mbgl and a slotted pipe from 4.00m to 8.00mbgl. Hole backfilled with concrete from GL to 0.30mbgl, bentonite from 0.30m to 4.00mbgl, gravel from 4.00m to 8.00mbgl and concrete to cement in flush cover and gas tap from 8.00m to 8.45mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellets seal added at 4.10mbgl at reduction from 200mm to 150mm diameter casing. bentonite seal left to set overnight.

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Borehole Record

BH103

Sheet 1 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

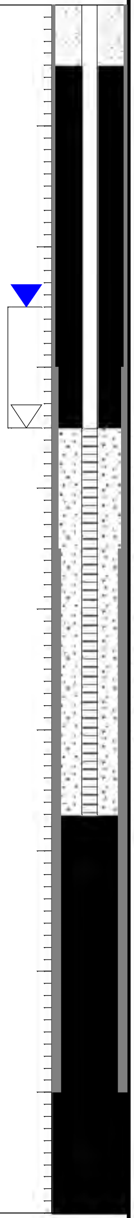
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.169mAOD
Coordinates: 535625.32E
192774.31N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Brown-grey silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse granite, glass and flint.	0.05	11.12	B1	0.00-0.10				
			ES1	0.10-0.30				
	0.40	10.77	B2	0.10-0.40				
MADE GROUND: Red-grey silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, concrete and flint.			ES2	0.40-0.60				
			B3	0.40-1.20				
MADE GROUND: Yellow-brown slightly silty fine to coarse SAND and rounded to subangular fine to coarse flint GRAVEL. Occasional brick.	1.20	9.97	S	1.20-1.50			33 (3,17/14,19)	
			D1	1.20-1.58				
			B4	1.20-2.00				
			ES3	1.50-1.70				
MADE GROUND: Brown-grey clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint, concrete and brick. Occasional cobble.	2.00	9.17	S	2.00-2.45	2.00		N=4 (1,0/1,1,1,1)	
			D2	2.00-2.45				
			B5	2.00-2.50			PP=15.0kPa	
			ES4	2.30-2.50				
Soft to firm mottled green-grey and yellow-grey CLAY with occasional decayed plant debris. (ALLUVIUM). ...From 3.30mbgl dark brown silty organic rich silty clay.			U1	3.00			10 blows (100%)	
	3.50	7.67	D3	3.45-3.55				
Medium dense grey slightly silty very sandy angular to rounded fine to coarse coarse flint GRAVEL. (KEMPTON PARK GRAVEL). ...From 4.00mbgl becoming fine to coarse sand and fine to coarse flint gravel.			B6	3.50-4.00				
			S	4.00-4.45	4.00	(2.80)	N=12 (1,2/2,3,3,4)	
			D4	4.00-4.45				
			ES5	4.00-4.20				
			B7	4.00-4.50				
			S	5.00-5.45	5.00	(3.00)	N=11 (1,1/3,3,2,3)	
			D5	5.00-5.45				
			B8	5.00-6.00				
Loose grey sandy GRAVEL. Occasional thin clay. (KEMPTON PARK GRAVEL).	5.50	5.67						
			S	6.00-6.45	6.00	(3.20)	N=8 (1,1/2,2,2,2)	
			D6	6.00-6.45				
			ES6	6.00-6.20				
			B9	6.00-6.45				
Stiff grey CLAY with occasional angular to subangular fine and medium flint gravel. Locally slightly sandy with mica flakes. (REWORKED LONDON CLAY FORMATION).	6.70	4.47	B10	6.70-7.00				
			D7	6.70				
			U2	7.00			28 blows (100%)	
			D8	7.45-7.55				
			ES7	8.00-8.20				
			B11	8.20-8.70				
			U3	8.70			47 blows (88%)	
Very stiff and brown-grey CLAY. (LONDON CLAY FORMATION)	9.00	2.17						
			D9	9.15-9.25				

Installations



Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	3.00	3.00			
200	4.50	4.50			
150	18.70	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/03/11	3.50	20	2.50	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	07/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	P.Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 9.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.70mbgl. Plain pipe from GL to 3.50mbgl and a slotted pipe from 3.50m to 6.70mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.50mbgl, gravel from 3.50m to 6.70mbgl and bentonite from 6.70m to 18.70mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 3.50mbgl at reduction of 250mm to 200mm diameter casing. bentonite allowed to set for 2hrs.
5. Two meter bentonite/cement seal added at 8.20mbgl at reduction of 200mm diameter casing. Bentonite allowed to set overnight.

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Borehole Record

BH103

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.169mAOD
Coordinates: 535625.32E
192774.31N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
Very stiff and brown-grey CLAY. (LONDON CLAY FORMATION)			S D10 B12 ES8	10.00-10.45 10.00-10.45 10.00-10.45 10.00-10.20	9.00		N=23 (3,4/4,6,6,7) PP=250.0kPa		
			U4	11.50			62 blows	100%	
...From 12.00mbgl bands of silty fine sand and sandy clay.			D11 ES9	11.95-12.05 12.00-12.20			PP=250.0kPa		
Very stiff brown-grey, locally closely fissured and thinly laminated CLAY. (LONDON CLAY FORMATION).	12.40	-1.23							
			S D12 B13	13.00-13.45 13.00-13.45 13.00-13.45	9.00		N=24 (3,4/4,7,6,7)		
			ES10	14.00-14.20			PP=200.0kPa		
			U5	14.50			80 blows		
			D13	14.95-15.05					
			S ES11 B14 D14	16.00-16.45 16.00-16.20 16.00-16.45 16.00-16.45	9.00		N=34 (4,5/6,9,9,10) PP=240.0kPa		
			S D15 B15	17.50-17.95 17.50-17.95 17.70-18.45	9.00		N=47 (5,7/9,12,13,13)		
Very stiff green-grey sandy CLAY with occasional subrounded fine and medium flint gravel. Occasional bands of silty fine sand. (LAMBETH GROUP - UNDIFFERENTIATED).	17.80	-6.63	ES12	18.00-18.20					
Borehole Complete at 18.70 m	18.70	-7.53							

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	3.00	3.00			
200	4.50	4.50			
150	18.70	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/03/11	3.50	20	2.50	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	07/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	P.Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 9.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.70mbgl. Plain pipe from GL to 3.50mbgl and a slotted pipe from 3.50m to 6.70mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.50mbgl, gravel from 3.50m to 6.70mbgl and bentonite from 6.70m to 18.70mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 3.50mbgl at reduction of 250mm to 200mm diameter casing. bentonite allowed to set for 2hrs.
5. Two meter bentonite/cement seal added at 8.20mbgl at reduction of 200mm diameter casing. Bentonite allowed to set overnight.

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Borehole Record

Sheet 1 of 2

BH104

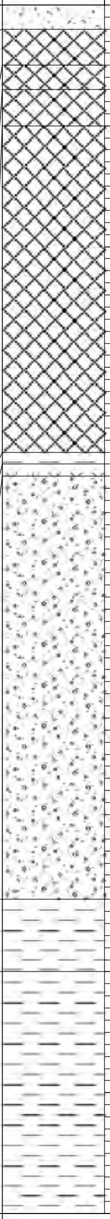
Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

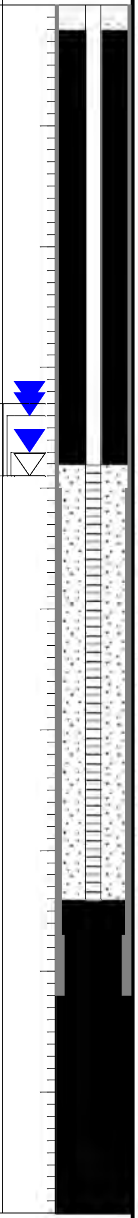
Ground Level: 12.217mAOD
Coordinates: 535733.78E
192845.15N



Description	Depth (m)	O.D. Level (m)
MADE GROUND: REINFORCED CONCRETE	0.20	12.02
MADE GROUND: Dark grey silty fine to coarse SAND and angular to subangular fine and medium ash concrete brick and glass GRAVEL. ...At 0.40mbgl Geotextile mesh.	0.50	11.72
MADE GROUND: Grey-brown clayey fine to coarse SAND and angular to subrounded fine to coarse brick, concrete and pottery (approximately 10%). Occasional concrete cobbles and plastic fragments. Occasional ash.	0.70	11.52
MADE GROUND: Firm to stiff brown-grey and grey brown slightly gravelly CLAY. Gravel is angular fine to coarse brick flint and concrete with some dark brown sandy pockets and large fragments of wood. ...At 0.90mbgl wooden sleeper.	1.00	11.22
MADE GROUND: Stiff medium strength brown-grey CLAY, locally slightly sandy with occasional brick and flint gravel. Occasional plastic fragments.	3.70	8.52
Firm to stiff brown silty CLAY. (ALLUVIUM).	3.80	8.42
Dark brown peaty SILT with some fine roots. (ALLUVIUM).	3.90	8.32
Medium dense grey very sandy angular to subangular, fine to coarse flint GRAVEL. Sand is fine to coarse. (KEMPTON PARK GRAVEL). ...From 5.00m to 7.00mbgl loose.	7.40	4.82
Firm to stiff grey CLAY. (LONDON CLAY FORMATION).	8.00	4.22
Very stiff medium strength locally closely fissured CLAY. (LONDON CLAY FORMATION).		

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
B1	0.20-0.50					
D1	0.20-0.30					
ES1	0.20-0.40					
B2	0.50-0.60					
D2	0.50-0.60					
ES2	0.50-0.70					
B3	0.70-1.20					
D3	0.70-0.80			21 blows	100%	
ES3	0.70-0.90					
U1	1.20					
B4	1.20-2.00					
ES4	1.20-1.40					
D4	1.70-1.80					
S	2.00-2.45			N=8 (1,1/1,2,2,3)		
B5	2.00-3.00					
D5	2.00-2.45					
ES5	2.30-2.50					
U2	3.00			20 blows	100%	
B6	3.00-3.70					
ES6	3.30-3.50					
D6	3.50-3.60					
B7	3.70-3.80					
ES7	3.70-3.90					
W1	3.90	3.90	(3.80)	N=15 (2,2/3,3,5,4)		
S	4.00-4.45					
D7	4.00-4.45					
B8	4.00-5.00					
ES8	4.00-4.20					
S	5.00-5.45	5.00	(3.60)	N=8 (3,2/2,2,2,2)		
D8	5.00-5.45					
B9	5.00-6.00					
S	6.00-6.45	6.00	(3.10)	N=8 (3,2/2,2,2,2)		
B10	6.00-7.00					
D9	6.00-6.45					
S	7.00-7.45	7.00	(3.40)	N=13 (5,4/4,3,3,3)		
D10	7.00-7.45					
B11	7.50-8.00					
D11	7.60-7.70					
U3	8.00			51 blows	100%	
D12	8.40-8.50			HV=160.0kPa		
ES9	8.80-9.00					
S	9.00-9.45	8.20		N=18 (1,4/3,4,5,6)		
B12	9.00-10.00			HV=140.0kPa		
D13	9.00-9.45					

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	4.00	4.00			
200	7.70	7.70			
150	15.00	8.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/03/11	3.90	5	3.70	3.90	8.20
10/03/11	3.90	10	3.40	3.90	8.20
10/03/11	3.90	15	3.30	3.90	8.20
10/03/11	3.90	20	3.30	3.90	8.20

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	10/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 7.40mbgl. Plain pipe from GL to 3.80mbgl and a slotted pipe from 3.80m to 7.40mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 3.80mbgl, gravel from 3.80m to 7.40mbgl and bentonite from 7.40m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 4.00mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite / cement grout seal added at 7.70mbgl at reduction from 200mm to 150mm diameter casing. Bentonite / cement grout left for two hours to set.
3.

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Borehole Record

BH104

Sheet 2 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.217mAOD
Coordinates: 535733.78E
192845.15N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
Very stiff medium strength locally closely fissured CLAY. (LONDON CLAY FORMATION).				U4	10.00			HV=200.0kPa 57 blows	100%		
				D14	10.40-10.50						
Very stiff grey slightly brown-grey slightly sandy CLAY. (LONDON CLAY FORMATION).		11.50	0.72	S	11.50-11.95	8.20		N=22 (2,3/4,6,6,6)			
				B13	11.50-13.00			HV=210.0kPa			
				D15	11.50-11.95						
				D16	13.00-13.50			HV=160.0kPa			
				U5	13.00			51 blows	100%		
				ES10	14.30-14.50						
				S	14.50-14.95	8.20		N=20 (3,3/4,5,5,6)			
				D17	14.50-14.95			HV=180.0kPa			
Borehole Complete at 15.00 m		15.00	-2.78								

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	4.00	4.00			
200	7.70	7.70			
150	15.00	8.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/03/11	3.90	5	3.70	3.90	8.20
10/03/11	3.90	10	3.40	3.90	8.20
10/03/11	3.90	15	3.30	3.90	8.20
10/03/11	3.90	20	3.30	3.90	8.20

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	10/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 7.40mbgl. Plain pipe from GL to 3.80mbgl and a slotted pipe from 3.80m to 7.40mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 3.80mbgl, gravel from 3.80m to 7.40mbgl and bentonite from 7.40m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 4.00mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite / cement grout seal added at 7.70mbgl at reduction from 200mm to 150mm diameter casing. Bentonite / cement grout left for two hours to set.
3.

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Borehole Record

BH105

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.117mAOD
Coordinates: 535800.00E
192879.05N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
MADE GROUND: CONCRETE.	0.15	11.97	B1	0.15-0.30					
MADE GROUND: Silty fine to coarse SAND and brick and concrete fine to coarse GRAVEL.	0.30	11.82	D1	0.15-0.30					
	0.50	11.62	ES1	0.30-0.50					
	0.60	11.52	B2	0.30-0.50					
MADE GROUND: Dark brown silty fine to coarse ash SAND and angular fine and medium ash GRAVEL.			D2	0.30-0.40					
			ES2	0.60-0.80					
			B3	0.60-1.20					
MADE GROUND: Brick rubble. ...At 0.50mbgl geotextile mesh.			D3	0.60-1.20					
	1.30	10.82	S	1.20-1.65			N=4 (1,0/1,1,1,1)		
			B4	1.20-2.00					
			D4	1.20-1.65					
MADE GROUND: Stiff mottled brown-grey and grey-brown slightly gravelly (approximately 15%) CLAY. Gravel is angular to subangular fine to coarse flint, brick and pottery.			ES3	1.80-2.00					
			U1	2.00			31 blows	100%	
MADE GROUND: Stiff brown-grey slightly gravelly (approximately 5%) CLAY. Gravel is rounded to angular fine to coarse flint with occasional brick.	2.45	9.67	D5	2.50-2.60					
			ES4	2.70-2.90					
			S	3.00-3.45	2.80		N=8 (8,2/1,2,2,3)		
MADE GROUND: Loose yellow-brown slightly silty fine to coarse SAND and subangular to rounded fine to coarse flint GRAVEL.	3.25	8.87	D6	3.25-3.45					
			ES5	3.30-3.50					
Firm mottled grey and brown-grey CLAY. (ALLUVIUM).			B5	3.80-4.30					
			U2	4.00			31 blows	100%	
Medium dense grey slightly silty very sandy subangular to rounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	4.30	7.82	W1	4.30					
			B6	4.30-5.00					
			D7	4.50-4.60					
			ES6	4.60-4.80					
			S	5.00-5.45	5.00	(4.10)	N=12 (2,2/2,2,4,4)		
			B7	5.00-6.00					
			D8	5.00-5.45					
			S	6.00-6.45	6.00	(3.40)	N=10 (2,2/2,3,2,3)		
			B8	6.00-7.00					
			D9	6.00-6.45					
			ES7	6.50-6.70					
			S	7.00-7.45	7.00	(3.50)	N=11 (2,2/3,3,2,3)		
			D10	7.00-7.45					
			B9	7.00-8.00					
			S	8.00-8.45	8.00	(3.70)	N=13 (7,6/4,4,3,2)		
			D11	8.00-8.45					
Stiff grey CLAY with occasional angular fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).	8.50	3.62	D12	8.50-8.70					
	8.70	3.42	ES8	8.50-8.70					
Borehole Complete at 8.70 m									

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	3.00	3.00			
150	8.70	8.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/03/11	4.30	20	3.20	4.00	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	09/03/2011-10/03/2011
Plant:	Dando 2000
Drilled By:	E. McNamara
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Water level standing at 4.70mbgl on completion.
3. Hole cased at 8.50mbgl utilising 150mm diameter casing.
4. Installation details: 50mm HDPE Standpipe installed from GL to 8.50mbgl. Plain pipe from GL to 4.30mbgl and a slotted pipe from 4.30m to 8.50mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentoniet from 0.20m to 4.30mbgl, gravel from 4.30m to 8.50mbgl and bentonite from 8.50m to 8.70mbgl. Hole finished with a flush cover and gas tap.
5. Bentonite pellet seal at 3.80mbgl at reduction from 200mm diameter casing to 150mm casing. bentonite seal allowed to set overnight.
6. Intially bentonite seal was placed at 2.60mbgl, however Made Ground below.

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Borehole Record

BH106

Sheet 1 of 2

Project: London Waste Ecopark, Edmonton

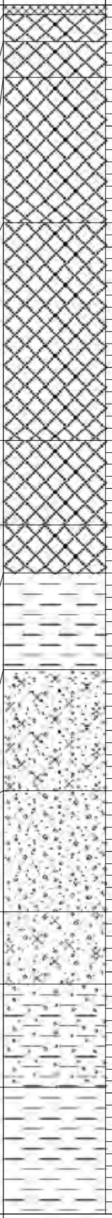
Project ID: SI1688

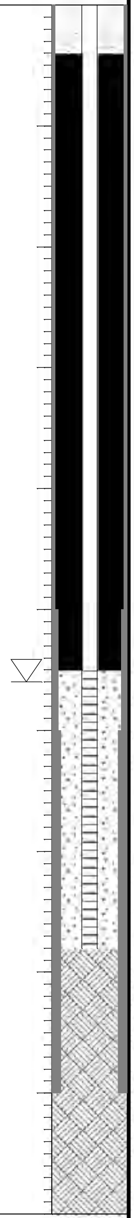
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 13.603mAOD

Coordinates: 535816.83E
192811.33N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Brick weave.	0.08	13.52	D1	0.10				
	0.30	13.30	D2	0.30-1.95				
MADE GROUND: Dark grey sandy angular fine to coarse tarmac GRAVEL.	0.60	13.00	B1	0.60-1.00				
			D3	0.60				
MADE GROUND: Red-grey slightly silty fine to coarse SAND and angular to subangular fine to coarse granite GRAVEL (TYPE 1).			ES1	0.70-0.90				
			B2	1.00-1.50				
			ES2	1.30-1.50				
MADE GROUND: Loose yellow-brown slightly silty fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL.			S	1.50-1.95	1.50		N=3 (2,1/0,1,1,1)	
			D4	1.50-1.95				
	1.80	11.80	B3	1.80-2.50				
			ES3	2.00-2.20				
MADE GROUND: Stiff brown-grey slightly gravelly CLAY. Gravel is angular fine to coarse brick and flint. (Anticipated to be fill LONDON CLAY FORMATION).			S	2.50-2.95	2.50		N=5 (1,0/1,1,1,2)	
			B4	2.50-3.00				
			D5	2.50-2.95				
			S	3.50-3.95	3.50		N=45 (3,5/8,9,13,15)	
	3.60	10.00	D6	3.50-3.95				
MADE GROUND: Dense orange-brown slightly clayey fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL.			ES4	3.60-3.80				
			B5	3.60-4.00				
	4.30	9.30	D7	4.30				
MADE GROUND: Grey-brown and yellow-brown silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint and brick. Occasional ash.			S	4.50-4.95	4.50		N=4 (1,0/1,1,1,0)	
	4.70	8.90	D8	4.50-4.95				
			ES5	4.70-4.90				
			B6	4.70-5.10				
			U1	5.10			7 blows 100%	
Firm mottled brown and grey CLAY with rare organic debris. ...At 4.90mbgl dark brown compact amorphous peat.	5.50	8.10	B7	5.50-6.00				
			D9	5.55				
			ES6	6.00-6.20				
Medium dense yellow-grey silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint. (KEMPTON PARK GRAVEL).	6.50	7.10	S	6.50-6.95	6.50		N=14 (1,2/3,4,4,3)	
			D10	6.50-6.95				
Medium dense grey slightly silty fine to coarse SAND and angular to subangular fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).			B8	6.50-7.00				
	7.50	6.10	S	7.50-7.95	7.50	(5.10)	N=17 (2,3/3,3,5,6)	
Medium dense grey slightly silty very sandy angular to subrounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).			D11	7.50-7.95				
			B9	7.50-8.00				
			D12	7.80				
	8.10	5.50	B10	8.10-8.50				
Stiff brown-grey CLAY with occasional angular to subrounded fine to coarse flint gravel. (REWORKED LONDON CLAY FORMATION)			D13	8.10				
			ES7	8.20-8.40				
			U2	8.50			41 blows 100%	
	8.95	4.65	D14	8.95				
Stiff to very stiff brown-grey closely fissured CLAY. (LONDON CLAY FORMATION).			S	9.50-9.95	9.00		N=16 (1,2/3,4,4,5)	
			B11	9.50-10.00				
			D15	9.50-9.95				

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	5.00	5.00			
200	6.00	6.00			
150	17.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/03/11	5.60	-	-	5.60	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	21/03/2011-22/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 7.80mbgl. Plain pipe from GL to 5.50mbgl and a slotted pipe from 5.50m to 7.80mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 5.50mbgl, gravel from 5.50m to 7.80mbgl and bentonite from 7.80m to 17.00mbgl. Hole finished with a flush cover, gas tap and top cap.
3. Bentonite pellet seal added at 5.00m at reduction of 250mm to 200mm diameter casing. Bentonite left to set for 2hr.
4. Bentonite pellet seal added at 9.00m at reduction of 200mm to 150mm diameter casing. Bentonite left to set for 2hrs.

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Borehole Record

BH106

Sheet 2 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 13.603mAOD
Coordinates: 535816.83E
192811.33N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
Stiff to very stiff brown-grey closely fissured CLAY. (LONDON CLAY FORMATION).				U3	11.00			40 blows	100%		
				D16	11.45						
Stiff brown-grey very silty slightly sandy CLAY with occasional mica flakes. (LONDON CLAY FORMATION).		11.95	1.65								
				S B12 D17	12.50-12.95 12.50-13.00 12.50-12.95	9.00		N=19 (2,3/4,4,5,6)			
				U4	14.00			47 blows	100%		
				D18	14.45						
				S B13 D19 ES8	15.50-15.95 15.50-16.50 15.50-15.95 15.50-15.70	9.00		N=26 (3,4/5,6,7,8)			
				U5	16.50			48 blows	100%		
Borehole Complete at 17.00 m		17.00	-3.40	D20	17.00						

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	5.00	5.00			
200	6.00	6.00			
150	17.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/03/11	5.60	-	-	5.60	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	21/03/2011-22/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 7.80mbgl. Plain pipe from GL to 5.50mbgl and a slotted pipe from 5.50m to 7.80mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 5.50mbgl, gravel from 5.50m to 7.80mbgl and bentonite from 7.80m to 17.00mbgl. Hole finished with a flush cover, gas tap and top cap.
3. Bentonite pellet seal added at 5.00m at reduction of 250mm to 200mm diameter casing. Bentonite left to set for 2hr.
4. Bentonite pellet seal added at 9.00m at reduction of 200mm to 150mm diameter casing. Bentonite left to set for 2hrs.

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Borehole Record

BH107

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

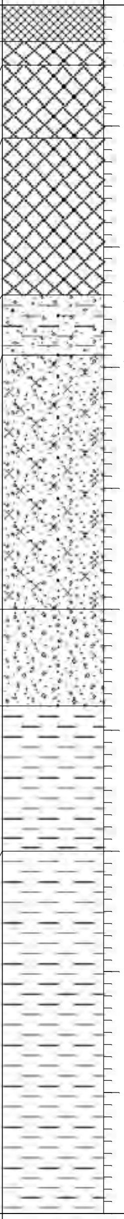
Project ID: SI1688

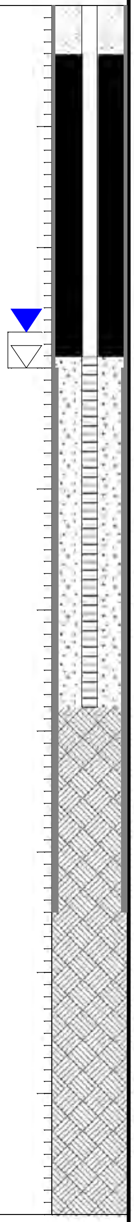
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.294mAOD
Coordinates: 535910.55E
192849.06N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
MADE GROUND: TARMAC.	0.30	10.99	B1	0.00-0.40					
			D1	0.20					
MADE GROUND: Red-brown silty very sandy angular to subangular fine to coarse granite GRAVEL.	0.50	10.79	B2	0.40-1.00					
MADE GROUND: Yellow-brown slightly silty fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL.	1.10	10.19	ES1	0.60-0.80					
MADE GROUND: Stiff grey CLAY with rare angular to subrounded fine to coarse flint gravel and occasional brick fragments. (Anticipated to br fill derived from LONDON CLAY FORMATION). ...From 1.50mbgl mixed with dark brown sandy clay.	2.40	8.89	D2	1.10					
			B3	1.10-1.40					
			ES2	1.20-1.40					
			D3	1.40					
			S	1.50-1.95	1.50		N=50 (6,6/9,22,11,8)		
			B4	1.50-2.00					
			D4	1.50-1.95					
			ES3	1.80-2.00					
			D5	2.00					
Firm grey slightly sandy CLAY with rare flint gravel and occasional plant debris (POSSIBLE MADE GROUND).	2.90	8.39	ES4	2.40-2.60	2.50		N=11 (1,0/1,0,4,6)		
			D6	2.40					
			S	2.50-2.95					
			B5	2.50-2.90					
			D7	2.50-2.95					
Medium dense grey slightly silty very gravelly fine to coarse SAND. Gravel is subrounded to angular fine to coarse flint. (KEMPTON PARK GRAVEL).	5.00	6.29	ES5	3.40-3.60					
			S	3.50-3.95	3.50	(2.80)	N=13 (1,2/2,4,4,3)		
			B6	3.50-4.00					
			D8	3.50-3.95					
			S	4.50-4.95	4.50	(0.30)	N=18 (1,3/3,4,5,6)		
			B7	4.50-5.00					
			D9	4.50-4.95					
Medium dense grey fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL)	5.80	5.49	S	5.50-5.95	5.50	(4.30)	N=15 (2,3/3,4,5,3)		
			D10	5.50-5.95					
			B8	5.50-5.80					
Stiff brown-grey CLAY. (LONDON CLAY FORMATION). ...At 6.95mbgl weak concretionary limestone.	7.00	4.29	D11	5.80					
			ES6	6.00-6.20					
			U1	6.50			47 blows	90%	
			D12	6.95					
Very stiff brown-grey closely fissured, locally thinly laminated CLAY. (LONDON CLAY FORMATION)			S	7.50-7.95	7.50		N=13 (1,2/2,3,4,4)		
			D13	7.50-7.95					
			B9	7.50-8.00					
			U2	8.50			38 blows	100%	
			D14	8.95					
			ES7	9.00-9.20					
			S	9.50-9.95	7.50		N=16 (2,2/2,4,4,6)		
			B10	9.50-10.00					
			D15	9.50-10.00					





Borehole Complete at 10.00 m

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
200	3.00	3.00 7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
17/03/11	3.00	20	2.70	2.50	7.00

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	17/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 5.80mbgl. Plain pipe from GL to 2.90mbgl and a slotted pipe from 2.90m to 5.80mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 2.90mbgl, gravel from 2.90m to 5.80mbgl and gravel from 5.80m to 10.00mbgl. Hole finished with a flush cover, gas tap and top cap.

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Borehole Record

BH108

Sheet 1 of 2

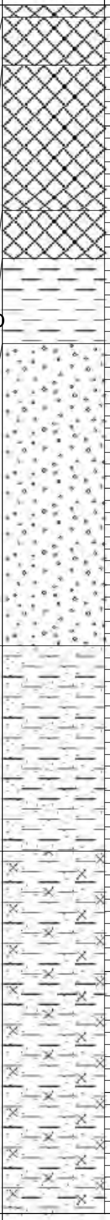
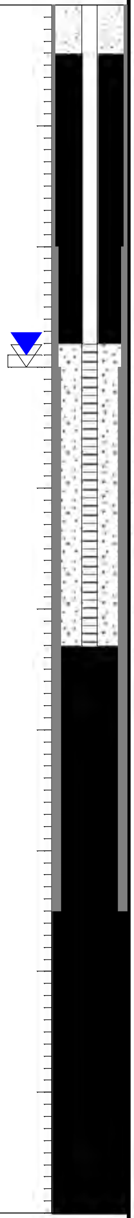
Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.123mAOD
Coordinates: 535715.72E
192707.50N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Brown-grey silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.		0.10	11.02	B1	0.00-0.30					
				D1	0.10					
				ES1	0.30-0.50					
MADE GROUND: Brown grey clayey very gravelly SAND. Gravel is angfular to rounded fine to coarse flint and brick with some sandy clay pockets. ...From 2.30mbgl Dark brown organic SILT.		0.50	10.62	B2	0.30-1.00	1.50		N=3 (1,0/1,0,1,1)		
				D2	0.30					
				S	0.51-0.96					
				ES2	0.70-0.90					
				B3	1.00-1.50					
				D3	1.00					
				B4	1.50-1.80					
				D4	1.50-1.95					
MADE GROUND: Firm brownish grey and yellowish grey sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to rounded fine to coarse flint with rare brick and concrete. ...From 13.50mbgl Locally silty slightly sandy.		1.70	9.42	ES3	1.70-1.90					
				D5	1.80					
MADE GROUND: Mixed grey clayey fine and medium SAND and sandy CLAY.		2.10	9.02	ES4	2.10-2.30					
				B5	2.10-2.40					
				D6	2.10					
				D7	2.30					
Firm very low strength mottled grey and yellowish grey CLAY. (ALLUVIUM).		2.80	8.32	B6	2.80-3.20					
				D8	2.95					
				ES5	3.00-3.20					
				D9	3.00					
Medium dense brown-grey slightly silty very sandy angular to rounded fine to coarse flint GRAVEL. Sand is fine to coarse. (KEMPTON PARK GRAVEL).				S	3.50-3.95	3.50	(3.20)	N=17 (1,1/4,4,4,5)		
				D10	3.50-3.95					
				B7	3.50-4.00					
				S	4.50-4.95	4.70	(2.80)	N=21 (3,4/5,5,5,6)		
				D11	4.50-4.95					
				B8	4.50-5.00					
Stiff grey CLAY with occasional angular to subangular fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).		5.30	5.82	D12	5.30					
				B9	5.30-6.00	3.20	(5.50)	N=8 (2,3/2,2,2,2)		
				S	5.50-5.95					
				D13	5.50-5.95			HV=11.0kPa		
				ES6	5.60-5.80					
				U1	6.50			35 blows 100%		
Very stiff high strength slightly silty slightly sandy CLAY. (LONDON CLAY FORMATION).		7.00	4.12	D14	6.95			HV=206.0kPa		
				S	7.50-7.95	7.00		N=14 (2,2/2,3,4,5)		
				B10	7.50-8.00					
				D15	7.50-7.95					
				U2	8.50			24 blows 100%		
				D16	8.95					
				S	9.50-9.95	7.00		N=22 (2,2/4,5,6,7)		
				B11	9.50-10.00			HV=150.0kPa		
				D17	9.50-9.95					

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.00	2.00			
200	6.30	3.00			
150	15.00	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/03/11	3.00	20	2.90	3.00	7.00

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	14/03/2011-15/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 5.80mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 5.80mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 2.80mbgl, gravel from 2.80m to 5.30mbgl and bentonite from 5.30m to 15.45mbgl. Hole finished with a flush cover, gas tap and top cap.
3. Bentonite pellet seal added at 2.30mbgl at reduction from 250mm to 200mm diameter casing. Bentonite seal left for two hours to set.
4. Bentonite pellet seal added at 6.30mbgl at reduction from 250mm to 150mm diameter casing. Bentonite seal left two hours to set.

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Borehole Record

BH108

Sheet 2 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.123mAOD
Coordinates: 535715.72E
192707.50N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
Very stiff high strength slightly silty slightly sandy CLAY. (LONDON CLAY FORMATION).		10.50	0.62	U3	10.50			40 blows	100%		
Very stiff brown-grey slightly silty CLAY. (LONDON CLAY FORMATION).				D18	10.95						
...From 12.00mbgl Locally thinly laminated and closely fissured.				S B12 D19	12.00-12.45 12.00-12.50 12.00-12.45	7.50		N=22 (2,3/4,5,6,7)			
				U4	13.50			41 blows	100%		
				D20	13.95						
				ES7	14.20-14.40						
				B13	14.50-15.00						
				S D21	15.00-15.45 15.00	7.50		N=23 (3,3/5,5,6,7)			
Borehole Complete at 15.45 m		15.45	-4.33								

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.00	2.00			
200	6.30	3.00			
150	15.00	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/03/11	3.00	20	2.90	3.00	7.00

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	14/03/2011-15/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 5.80mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 5.80mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 2.80mbgl, gravel from 2.80m to 5.30mbgl and bentonite from 5.30m to 15.45mbgl. Hole finished with a flush cover, gas tap and top cap.
3. Bentonite pellet seal added at 2.30mbgl at reduction from 250mm to 200mm diameter casing. Bentonite seal left for two hours to set.
4. Bentonite pellet seal added at 6.30mbgl at reduction from 250mm to 150mm diameter casing. Bentonite seal left two hours to set.

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Borehole Record

BH109

Sheet 1 of 2

Project: London Waste Ecopark, Edmonton

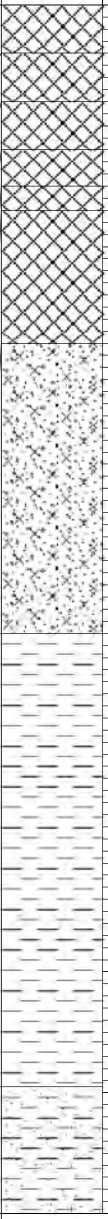
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.830mAOD

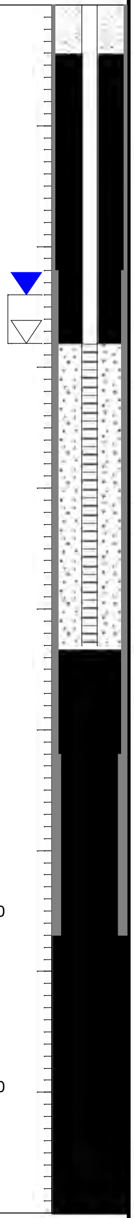
Coordinates: 535825.82E
192597.48N



Description	Depth (m)	O.D. Level (m)
MADE GROUND: Dark grey-brown silty gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse brick and flint.	0.40	10.43
MADE GROUND: Grey-brown clayey gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse flint brick and concrete.	0.80	10.03
MADE GROUND: Grey-brown silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint and brick with occasional brick cobbles.	1.20	9.63
MADE GROUND: Loose dark grey and brown-grey clayey very gravelly fine to coarse SAND. Gravel is angular fine to coarse brick and flint. Locally mixed with sandy clay. Slight hydrocarbon odour.	1.50	9.33
MADE GROUND: Firm brown-grey sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse brick and flint with rare organic debis and slight hydrocarbon odour.	1.70	9.13
MADE GROUND: Firm to stiff grey slightly gravelly CLAY. gravel is angular to subangular fine to coarse brick concrete and flint with a little black organic debris.	2.80	8.03
Medium dense grey silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).	5.20	5.63
Stiff to very stiff brown-grey CLAY, locally thinly bedded and closely fissured. (LOWER COAL FORMATION). ...At 6.80mbgl Very weak concretionary limestone.	8.95	1.88
Stiff to very stiff brown-grey and locally slightly green-grey and slightly sandy CLAY. (LONDON CLAY FORMATION).		

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
B1	0.00-0.40					
D1	0.10					
ES1	0.10-0.30					
B2	0.40-0.80					
D2	0.40					
ES2	0.40-0.60					
B3	0.80-1.00					
ES3	0.80-1.00					
D3	1.00					
B4	1.00-1.20					
D4	1.20					
ES4	1.20-1.40					
B5	1.20-1.50					
S	1.50-1.95	1.50		N=4 (1,1/1,0,2,1)		
D5	1.50-1.95					
ES5	1.50-1.70					
B6	1.50-1.70					
D6	1.70					
B7	1.70-2.00					
ES6	2.00-2.20					
S	2.50-2.95	2.50		N=8 (1,0/1,0,2,5)		
D7	2.50-2.95					
W1	2.80					
B8	2.80-3.50					
ES7	3.20-3.40					
S	3.50-3.95	3.50	(3.20)	N=14 (2,2/2,4,4,4)		
D8	3.50-3.95					
B9	3.50-4.00					
S	4.50-4.95	4.50	(2.40)	N=18 (1,2/2,4,5,7)		
B10	4.50-5.00					
D9	4.50-4.95					
S	5.20-5.65	5.20	(2.80)	N=8 (1,2/1,2,2,3)		
D10	5.20-5.65					
B11	5.20-6.00					
ES8	5.80-6.00					
U1	6.50			40 blows	100%	
D11	6.95					
S	7.50-7.95	7.50		N=14 (1,2/2,3,4,5)		200.00
B12	7.50-8.00					
D12	7.50-7.95					
U2	8.50			36 blows	100%	
D13	8.95					210.00
S	9.50-9.95	7.70		N=18 (2,2/3,4,5,6)		
B13	9.50-10.00					
D14	9.50-9.95					

Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	2.80	20	2.40	2.00	7.50

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	2.20	2.20			
200	6.20	6.20			
150	15.00	7.70			

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 5.30mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 5.30mbgl. Hole backfilled with concrete form GL to 0.40mbgl, bentonite form 0.20m to 2.80mbgl, gravel from 2.80m to 5.30mbgl and bentonite from 5.30m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 2.20mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite pellet seal added at 6.20mbgl at reduction from 200mm to 150mm diameter casing. Bentonite / cement grout left to set for two hours.

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Borehole Record

Sheet 2 of 2

BH109

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.830mAOD
Coordinates: 535825.82E
192597.48N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
Stiff to very stiff brown-grey and locally slightly green-grey and slightly sandy CLAY. (LONDON CLAY FORMATION).				U3	10.50			39 blows	100%		
				D15	10.95						
				S	12.00-12.45	7.70		N=22 (2,3/4,6,6,6)			
				B14	12.00-12.50						
				D16	12.00-12.45						
				U4	13.50			36 blows	100%	250.00	
				ES9	13.80-14.00						
				D17	13.95						
				S	14.50-14.95	7.70		N=24 (2,5/5,5,6,8)			
				B15	14.50-15.00						
				D18	14.50-15.00						
		15.00	-4.17								
Borehole Complete at 15.00 m											

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.20	2.20			
200	6.20	6.20			
150	15.00	7.70			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	2.80	20	2.40	2.00	7.50

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation Details: 50mm Standpipe installed from GL to 5.30mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 5.30mbgl. Hole backfilled with concrete form GL to 0.40mbgl, bentonite form 0.20m to 2.80mbgl, gravel from 2.80m to 5.30mbgl and bentonite from 5.30m to 15.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 2.20mbgl at reduction from 250mm to 200mm diameter casing.
4. Two meter bentonite pellet seal added at 6.20mbgl at reduction from 200mm to 150mm diameter casing. Bentonite / cement grout left to set for two hours.

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Borehole Record

BH110

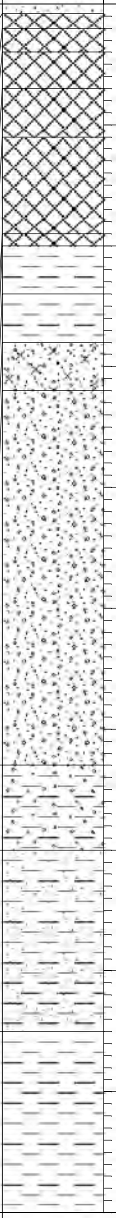
Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

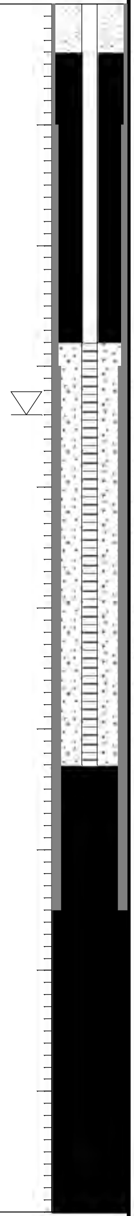
Ground Level: 10.751mAOD
Coordinates: 535701.94E
192490.25N



Description	Depth (m)	O.D. Level (m)
MADE GROUND: CONCRETE.	0.08	10.67
MADE GROUND: Dark brown silty very gravelly fine to coarse SAND. Gravel is angular fine to coarse flint and concrete. ...From 0.10mbgl becoming clayey.	0.20	10.55
MADE GROUND: Brick rubble in sandy matrix.	0.40	10.35
MADE GROUND: Mixed firm dark brown silty gravelly CLAY. Gravel is angular fine and medium brick and flint and brown gravelly clayey fine to coarse SAND with approximately 15% brick cobbles.	0.70	10.05
MADE GROUND: Grey silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.	1.10	9.65
MADE GROUND: Grey and dark grey sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint rare brick and concrete.	1.90	8.85
MADE GROUND: Firm dark brown and grey slightly gravelly CLAY. Gravel is subangular to angular fine to coarse flint and brick.	2.00	8.75
Firm mottled grey and yellow-grey CLAY. (ALLUVIUM)	2.40	8.35
Firm dark brown organic rich CLAY withrare decayed plant debris (fragments of wood). (ALLUVIUM)	2.80	7.95
Medium dense grey silty very gravelly fine to coarse coarse SAND. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL).	3.20	7.55
Grey slightly silty medium and coarse SAND and angular to rounded fine to coarse flint GRAVEL.	6.30	4.45
Stiff brown-grey closely fissured CLAY with occasional angular to subangular fine to coarse flint gravel. (REWORKED LONDON CLAY FORMATION).	7.00	3.75
Very stiff brown-grey slightly sandy CLAY. (LONDON CLAY FORMATION) ...From 7.50m to 8.20mbgl silty fine sand bands.	8.50	2.25
Very stiff brown-grey closely fissured CLAY. (LONDON CLAY FORMATION).		

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
B1	0.10-0.40				
D1	0.10				
ES1	0.10-0.20				
B2	0.40-1.00				
D2	0.40				
ES2	0.50-0.70				
ES3	0.80-1.00				
B3	1.00-1.20				
D3	1.00				
B4	1.20-1.50				
ES4	1.30-1.50	1.50		N=4 (2,2/1,1,1,1)	
S	1.50-1.95				
D4	1.50-1.95				
B5	1.50-2.00				
D5	1.90				
B6	2.00-2.20				
ES5	2.20-2.40				
D6	2.20			28 blows	
D7	2.40				
U1	2.50				
D8	2.80				
ES6	3.00-3.20				
B7	3.30-3.50				
S	3.50-3.95	3.50		N=18 (3,3/4,4,5,5)	
B8	3.50-4.00				
D9	3.50-3.95				
W1	3.60				
S	4.50-4.95	4.50	(3.60)	N=17 (1,3/4,4,4,5)	
B10	4.50-5.00				
D10	4.50-4.95				
B11	5.30-6.00				
ES7	5.40-5.60				
S	5.50-5.95	5.50	(3.50)	N=21 (2,3/4,5,6,6)	
D11	5.50-5.95				
S	6.30-6.75	6.30	(3.70)	N=11 (3,1/3,3,2,3)	
B12	6.30-7.00				
D12	6.30-6.75				
ES8	6.80-7.00				
U2	7.50			30 blows	
D13	7.95				
S	8.50-8.95	7.50		N=16 (1,3/3,4,4,5)	
B13	8.50-9.00				
D14	8.50-8.95				
U3	9.50			43 blows	
D15	9.95				

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	3.00	1.00			
250	7.00	3.00			
150	11.40	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/03/11	3.40	-	-	3.40	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	23/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 6.30mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 6.30mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 2.80mbgl, gravel from 2.80m to 6.30mbgl and bentonite from 6.30m to 11.40mbgl. Hole finished with a flush cover, gas tap and top cap.

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Borehole Record

BH110

Sheet 2 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.751mAOD
Coordinates: 535701.94E
192490.25N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Remaining Detail : 9.90m - 9.90m : ...From 9.90mbgl becoming slightly sandy.				S B14 D16	10.50-10.95 10.50-11.00 10.50-10.95	7.50		N=22 (3,3/4,5,6,7)		
Stiff to very stiff slightly green-grey sandy to very sandy CLAY with some degraded shell and silty fine sand bands. (LAMBETH GROUP - UPPER SHELLY BEDS).		11.20 11.40	-0.45 -0.65	B15 ES9	11.20-11.40 11.20-11.40					
Borehole Complete at 11.40 m										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	3.00	1.00
250	7.00	3.00
150	11.40	7.50

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/03/11	3.40	-	-	3.40	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	23/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 6.30mbgl. Plain pipe from GL to 2.80mbgl and a slotted pipe from 2.80m to 6.30mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 2.80mbgl, gravel from 2.80m to 6.30mbgl and bentonite from 6.30m to 11.40mbgl. Hole finished with a flush cover, gas tap and top cap.

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Borehole Record

BH113

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.173mAOD

Coordinates: 535638.19E
192730.94N

Description

MADE GROUND: Dark brown silty, fine to coarse SAND and angular to rounded fine to coarse flint GRAVEL.

MADE GROUND: Dark brown silty, very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick and flint with some rare clay pockets.

MADE GROUND: Brown-grey clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint, brick and ash.

MADE GROUND: Stiff grey slightly sandy, slightly gravelly (approximately 10%) CLAY, Gravel is angular to subangular fine to coarse brick and flint.

MADE GROUND: Firm to stiff grey slightly silty CLAY with occasional angular to subangular fine to coarse flint gravel.

Soft to firm mottled grey and green-grey CLAY with occasional decayed plant debris and gravel. (ALLUVIUM).

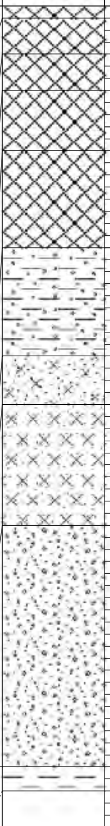
Grey silty shelly fine to coarse SAND. (ALLUVIUM).

Soft dark brown slightly sandu organic rich SILT with occasional angular fine to coarse flint gravel. (ALLUVIUM).

Medium dense grey silty fine to coarse SAND and angular to rounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).

Stiff grey CLAY. (POSSIBLE LONDON CLAY FORMATION).

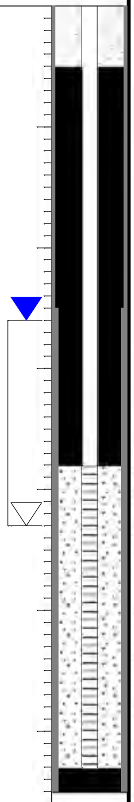
Borehole Complete at 6.50 m



Depth (m)	O.D. Level (m)
0.10	11.07
0.40	10.77
0.70	10.47
1.20	9.97
2.00	9.17
2.90	8.27
3.30	7.87
4.30	6.87
6.30	4.87
6.50	4.67

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
B1	0.00-0.10					
B2	0.10-0.40					
ES1	0.20-0.40					
B3	0.40-0.70					
ES2	0.50-0.70					
ES3	0.70-0.90					
B4	0.70-1.20					
S	1.20-1.65			N=5 (1,0/1,1,1,2)		
D1	1.20-1.65					
ES4	1.20-1.40					
B5	1.20-1.65					
U1	2.00			9 blows	100%	
D2	2.45-2.85					
ES5	2.70-2.90					
S	3.00-3.45	3.00		N=2 (1,0/0,1,0,1)		
D3	3.00-3.45					
B6	3.10-3.50					
ES6	3.70-3.90					
U2	4.00					
D4	4.45-4.55					
B7	4.50-5.50					
S	5.00-5.45	5.00	(3.00)	N=11 (4,3/3,3,2,3)		
D5	5.00-5.45					
ES7	5.00-5.20					
S	6.00-6.45	6.00	(3.00)	N=15 (1,0/1,2,5,7)		
D6	6.00-6.45					
B8	6.00-6.30					
ES8	6.00-6.20					
B9	6.30-6.50					
ES9	6.30-6.50					

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200 150	2.50 6.50	2.50 6.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/03/11	4.30	20	2.60	3.00	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	08/03/2011-09/03/2011
Plant:	Dando 2000
Drilled By:	T.York
Logged By:	J. Tomalin
Checked By:	P.Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Water level standing at 3.10mbgl on completion.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.30mbgl. Plain pipe from GL to 3.80mbgl and a slotted pipe from GL to 6.30mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.80mbgl, gravel from 3.80m to 6.30mbgl and bentonite from 6.30m to 6.50mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 2.50mbgl at reduction of 200mm to 150mm diameter casing. Bentonite seal allowed two hours to set.

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Borehole Record

BH114

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

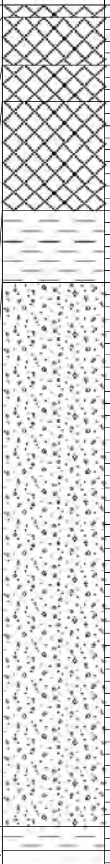
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.785mAOD
Coordinates: 535744.97E
192768.64N

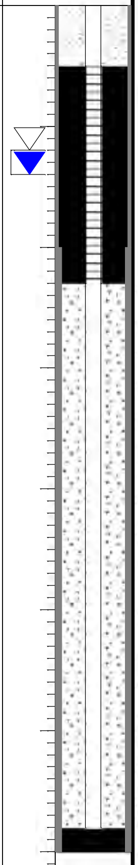
Description	Depth (m)	O.D. Level (m)
MADE GROUND: Concrete rubble	0.10	10.69
MADE GROUND: Brown silty vey gravelly fine and medium SAND. Gravel is angular to subangular to subangular fine to coarse brick, concrete and flint.	0.50	10.29
MADE GROUND: Firm to stiff brown-grey slightly gravelly CLAY. Gravel is angular to subangular fine to coarse brick, concrete and flint.	0.80	9.99
MADE GROUND: Loose dark brown clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick flint and concrete (approximately 10%) concrete cobbles with some sandy clay pockets. ...From 1.30mbgl becoming sandy CLAY with sandy pockets.	1.70	9.09
Firm mottled yellow-grey and yellow-brown CLAY. (ALLUVIUM). ...From 1.90mbgl Mottled grey and dark grey.	2.30	8.49
Medium dense grey silty fine to coarse SAND and angular to subrounded fine and medium flint GRAVEL. (RIVER TERRACE DEPOSITS).	6.80	3.99
Grey firn to soft grey CLAY. (POSSIBLE LONDON CLAY FORMATION).	7.00	3.79
Borehole Complete at 7.00 m		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
B1	0.10-0.60				
ES1	0.10-0.30				
B2	0.60-1.20				
ES2	0.60-0.80				
ES3	0.80-1.00				
S	1.20-1.65			N=8 (1,1/0,2,2,4)	
D1	1.20-1.65				
B3	1.20-1.65				
B4	1.70-2.00				
ES4	1.70-1.90				
S	2.00-2.45			N=13 (1,2/2,3,5,3)	
D2	2.00-2.45				
B5	2.30-3.00				
ES5	2.50-2.70				
S	3.00-3.45	3.00	(2.70)	N=44 (4,5/10,11,14,9)	
D3	3.00-3.45				
B6	3.00-3.45				
S	4.00-4.45	4.00	(3.00)	N=13 (1,2/3,4,3,3)	
D4	4.00-4.45				
B7	4.00-4.45				
ES6	4.50-4.70				
S	5.00-5.45	5.00	(3.00)	N=11 (1,1/2,3,3,3)	
D5	5.00-5.45				
B8	5.00-5.45				
S	6.00-6.45	6.00	(3.10)	N=12 (1,2/2,3,4,3)	
D6	6.00-6.45				
B9	6.00-6.45				

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	2.00	2.00			
150	7.00	7.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/03/11	1.20	20	1.40	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	10/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Handpit dug form GL to 1.20mbgl.
2. Hole cased at 7.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.80mbgl. Plain pipe from GL to 0.50mbgl, slotted pipe form 0.50m to 2.30mbgl and a plain pipe from 2.30m to 7.00mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 2.30mbgl, gravel from 2.30m to 6.80mbgl and bentonite from 6.80m to 7.00mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 2.00mbgl at reduction of 200mm to 150mm diameter casing. Bentonite seal left two hours to allow to set.

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Borehole Record

BH115

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

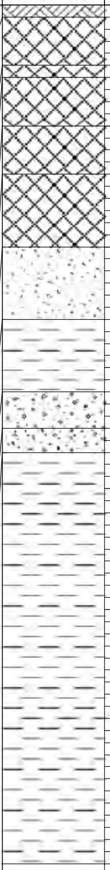
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.636mAOD
Coordinates: 535867.51E
192633.10N

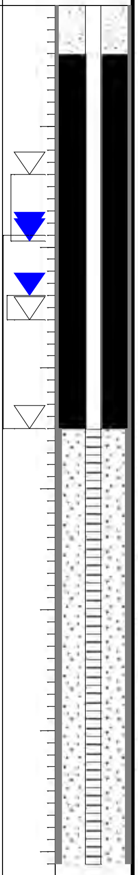
Description	Depth (m)	O.D. Level (m)
Grass over dark brown sandy SILT (Topsoil) with roots and some flint gravel.	0.10	11.54
MADE GROUND: Brown gravelly slihtly gravelly SAND. Gravel is angular to rounded fine to coarse brick,flint and occasional ash wth occasional brick cobble.	0.50	11.14
MADE GROUND: Light brown clayey silty SAND with some fine to coarse wood, brick, concrete and flint gravel.	0.60	11.04
MADE GROUND: Soft brown gravelly sandy CLAY with much wood, brick and some roots.	1.00	10.64
MADE GROUND: Firm to stiff brown CLAY with some flint, brick and root fragments.	1.40	10.24
MADE GROUND: Firm to stiff CLAY with some flint, brick and root fragments.	2.00	9.64
MADE GROUND: Concrete Obstruction	2.60	9.04
Loose grey soft CLAY with occasional roots. (ALLUVIUM).	3.20	8.44
Loose grey slightly sandy fine to coarse angular to subangular GRAVEL of flint. (KEMPTON PARK GRAVEL).	3.50	8.14
Loose grey gravelly (approximately 20%) fine to coarse SAND. Gravel is angular rounded fine to coarse flint. (KEMPTON PARK GRAVEL).	3.70	7.94
Firm grey CLAY. (LONDON CLAY FORMATION).	7.10	4.54
Borehole Complete at 7.10 m		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
B1	0.10-0.40				
D1	0.10				
ES1	0.20-0.30				
D2	0.50				
B2	0.60-0.90				
D3	0.60				
ES2	0.70-0.90				
B3	1.00-1.40				
D4	1.00				
D5	1.40				
S	1.50-1.95			N=10 (1,1/2,2,3,3)	
ES3	1.50-1.70				
B4	1.50-2.00				
W1	1.90				
S	2.50-2.95	2.50	(2.40)	N=5 (1,0/1,1,1,2)	
B5	2.50-3.00				
D6	2.50-2.95				
B6	3.00-3.50				
D7	3.00				
D8	3.20				
S	3.50-3.95	3.50	(3.30)	N=9 (3,2/2,2,2,3)	
ES4	3.50-3.70				
B7	3.50-4.00				
S	4.50-4.95	4.50	(1.90)	N=9 (1,1/2,2,2,3)	
B8	4.50-5.00				
D9	4.50-4.95				
C	5.50-5.95	5.50	(2.70)	N=5 (1,0/1,1,1,2)	
ES5	5.50-5.70				
B9	5.50-6.00				
S	6.50-6.95	6.50	(2.40)	N=13 (1,2/3,3,3,4)	
B10	6.50-7.00				
D10	6.50-7.00				
D11	7.10				

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	3.50	3.50			
150	7.10	7.10			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/03/11	1.40	20	1.95	-	
08/03/11	2.60	20	2.40	-	
08/03/11	3.50	20	1.90	-	

Client: Entec UK Ltd
Engineer: N / A
Contractor: May Gurney Professional Services
Dates: 08/03/2011
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: J. Tomalin
Checked By: D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Unable to carry out U100 sample at 2.50m to 3.50mbgl due to concrete obstruction.
3. Groundwater level standing at 2.10mbgl on completion.
4. Installation details: 50mm HDPE Standpipe installed from GL to 7.10mbgl. Plain pipe from GL to 3.50mbgl and a slotted pipe from 3.50m to 7.10mbgl. Hole backfilled with concrete from GL to 0.40mbgl, bentonite from 0.40m to 3.50mbgl and gravel from 3.50m to 7.10mbgl. Hole finished with a flush cover and gas tap.
5. Bentonite seal added at 3.50mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for two hours.

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Borehole Record

BH116

Sheet 1 of 3

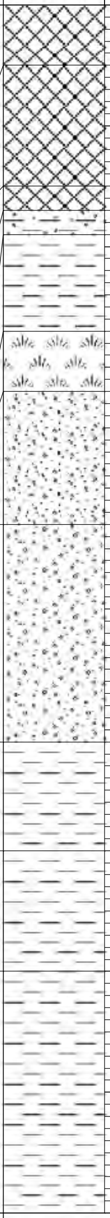
Project: London Waste Ecopark, Edmonton

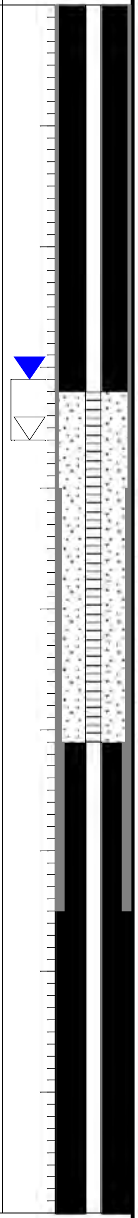
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.747mAOD
Coordinates: 535891.55E
192705.40N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Grass over slightly gravelly silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint and rare clay pipe fragments.	0.50	11.25	ES1	0.10-0.30				
MADE GROUND: Clayey gravelly fine to coarse SAND. Gravel is fine to coarse with occasional cobble flint, brick, wood, plastic, metal, glass and possible asbestos fragments.	1.50	10.25	ES2 ES3	0.60-0.80 0.70				
			W1	1.00				
MADE GROUND: Firm brown CLAY with occasional gravel of flint.	1.70	10.05						
Soft to firm brown-grey sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint. (ALLUVIUM).	1.90	9.85						
Soft to firm grey CLAY with occasional brown mottling and rare plant matter. (ALLUVIUM).	2.70	9.05	U1 ES4	2.50 2.50-2.70			22 blows	
Soft brown PEAT. (recovered from U100). (ALLUVIUM).	3.20	8.55						
Medium dense grey-brown gravelly fine to coarse SAND. Gravel is angular to rounded fine and medium flint. (KEMPTON PARK GRAVEL).	4.30	7.45	S B6 D8 ES5	3.40-3.85 3.40-4.00 3.40-3.85 3.50-3.70	3.20	(0.00)	N=22 (6,8/2,6,7,7)	
Medium dense grey-brown sandy fine to coarse GRAVEL of flint. (KEMPTON PARK GRAVEL).	6.10	5.65	S B7 D9	4.50-4.95 4.50-5.00 4.50-4.95	4.50	(3.10)	N=16 (1,2/3,3,5,5)	
			S D10 B8	5.50-5.95 5.50-5.95 5.50-6.00	5.50	(3.30)	N=28 (2,2/5,6,8,9)	
Firm to stiff grey CLAY. (LONDON CLAY FORMATION).	7.00	4.75	S D11 D12 B9 ES6	6.10-6.55 6.10 6.10-6.50 6.10-6.50 6.30-6.50	6.10	(3.30)	N=18 (2,3/4,3,5,6)	
Firm to stiff CLAY. (LONDON CLAY FORMATION).	8.00	3.75	ES7	7.00-7.20				
			U2	7.50			26 blows	
			D13	7.95				
Very stiff grey CLAY. (LONDON CLAY FORMATION).			S B10 D14	8.50-8.95 8.50-9.00 8.50-8.95	7.50		N=16 (1,2/3,3,5,5)	
			U3	9.50			30 blows	
			D15	9.95				

Hole Diameter Detail: Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details: From (m)	To (m)	Time (hours)
250	4.00	4.00			
200	6.10	6.10			
150	24.40	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/03/11	3.60	20	3.10	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	08/03/2011-10/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	K. Boswell
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 4.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.10mbgl. Plain pipe from GL to 3.20mbgl and a slotted pipe from 3.20m to 6.10mbgl. Hole backfilled with bentonite from GL to 3.20mbgl, gravel from 3.20m to 6.10mbgl and bentonite from 6.10m to 24.40mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 3.40mbgl at reduction from 250mm to 200mm diameter casing. Bentonite allowed two hours to set.
5. Bentonite / cement seal added at 7.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed eighteen hours to set.

MAY GURNEY

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Borehole Record

BH116

Sheet 2 of 3

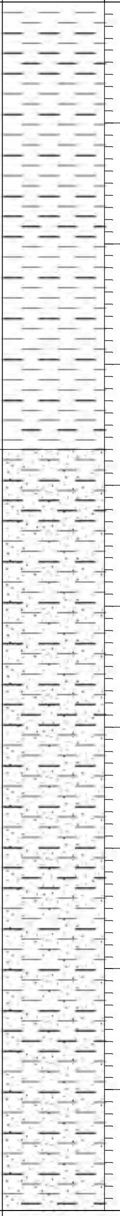
Project: London Waste Ecopark, Edmonton

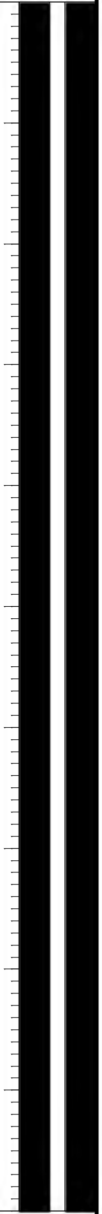
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.747mAOD
Coordinates: 535891.55E
192705.40N





Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff grey CLAY. (LONDON CLAY FORMATION).				S B11 D16	10.50-10.95 10.50-11.00 10.50-10.95	7.50		N=19 (1,2/3,4,6,6)		
				U4	12.00			37 blows		
				D17	12.45					
				S B12 D18	13.50-13.95 13.50-14.00 13.50-13.95	7.50		N=17 (2,3/3,4,4,6)		
Stiff slightly sandy grey CLAY with occasional fine to medium shell fragments and granite gravel. (LONDON CLAY FORMATION).		13.70	-1.95							
				D19	14.00					
				U5	15.00			30 blows		
				D20	15.45					
				S B13 D21	16.50-16.95 16.50-17.00 16.50-16.95	7.50		N=22 (2,3/5,5,5,7)		
				U6	18.00			47 blows		
				D22	18.45					
				S B14 D23	19.50-19.95 19.50-20.00 19.50-19.95	7.50		N=17 (2,3/3,4,4,6)		

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/03/11	3.60	20	3.10	-	

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	4.00	4.00			
200	6.10	6.10			
150	24.40	7.50			

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	08/03/2011-10/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	K. Boswell
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 4.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.10mbgl. Plain pipe from GL to 3.20mbgl and a slotted pipe from 3.20m to 6.10mbgl. Hole backfilled with bentonite from GL to 3.20mbgl, gravel from 3.20m to 6.10mbgl and bentonite from 6.10m to 24.40mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 3.40mbgl at reduction from 250mm to 200mm diameter casing. Bentonite allowed two hours to set.
5. Bentonite / cement seal added at 7.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed eighteen hours to set.

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Borehole Record

BH116

Sheet 3 of 3

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.747mAOD
Coordinates: 535891.55E
192705.40N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff slightly sandy grey CLAY with occasional fine to medium shell fragments and granite gravel. (LONDON CLAY FORMATION).										
				U7	21.00			48 blows		
				D24 B15	21.45-24.00 21.50-22.00					
				S B16 D25	22.50-22.95 22.50-23.00 22.50-22.95	7.50		N=31 (2,5/6,7,8,10)		
Stiff grey-green sandy CLAY with occasional shells. (LAMBETH GROUP - UPPER SHELLY BEDS).		24.20	-12.45	D26	24.20					
Borehole Complete at 24.40 m		24.40	-12.65							

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	4.00	4.00
200	6.10	6.10
150	24.40	7.50

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/03/11	3.60	20	3.10	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	08/03/2011-10/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	K. Boswell
Checked By:	D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 4.00mbgl utilising 150mm diameter casing.
3. Installation details: 50mm HDPE Standpipe installed from GL to 6.10mbgl. Plain pipe from GL to 3.20mbgl and a slotted pipe from 3.20m to 6.10mbgl. Hole backfilled with bentonite from GL to 3.20mbgl, gravel from 3.20m to 6.10mbgl and bentonite from 6.10m to 24.40mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite pellet seal added at 3.40mbgl at reduction from 250mm to 200mm diameter casing. Bentonite allowed two hours to set.
5. Bentonite / cement seal added at 7.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed eighteen hours to set.

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Borehole Record

Sheet 1 of 1

BH117

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.709mAOD
Coordinates: 535813.75E
192713.45N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Grass over brown gravelly SILT (Topsoil). Gravel is angular to subangular, fine and medium brick and flint with occasional brick cobble.	0.40	11.31
MADE GROUND: Very soft brown very gravelly CLAY. Gravel is angular to subrounded, fine and medium brick and some flint.	0.80	10.91
MADE GROUND: Brown soft slightly gravelly CLAY. Gravel is angular to subrounded, fine to coarse brick, wood and flint.	1.00	10.71
MADE GROUND: Soft to firm grey-brown gravelly CLAY. Gravel is angular to subrounded fine brick and ash. Some black staining and possible hydrocarbon odour.	1.50	10.21
MADE GROUND: Soft to firm grey-brown slightly gravelly CLAY with occasional brick cobble and approximate 20mm tyre fragment.	2.10	9.61
Soft low strength grey CLAY with occasional organic plant matter and black staining. Possible mild hydrocarbon odour. (ALLUVIUM).	3.90	7.81
Medium dense grey slightly silty sandy angular to subangular, fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL). ...From 5.50mbgl loose.	6.00	5.71
Borehole Complete at 6.00 m		

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
D1	0.10				
B1	0.20-0.40				
ES1	0.20-0.40				
B2	0.40-0.80				
ES2	0.40-0.70				
D2	0.50				
B3	0.80-1.00				
D3	0.80				
ES3	0.80-1.00				
B4	1.00-1.20				
D4	1.00				
ES4	1.00-1.20				
S	1.50-1.85	1.50		50 (1,0/1,16,33 for 45mm)	
B5	1.50-2.00				
D5	2.10				
ES5	2.20-2.40				
U1	2.50			5 blows	
W1	2.90				
D6	2.95				
S	3.50-3.95	3.50		N=20 (1,0/3,5,5,7)	
B6	3.50-3.90				
D7	3.50-3.95				
B7	3.90-4.50				
ES6	4.00-4.20				
S	4.50-4.95	4.50	(4.10)	N=22 (3,5/5,5,6,6)	
B8	4.50-5.00				
D8	4.50-4.95				
S	5.50-5.95	5.50	(3.60)	N=7 (2,3/2,1,2,2)	
B9	5.50-6.00				
D9	5.50-5.95				
D10	6.00				
ES7	6.00-6.20				

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	3.00	3.00
150	6.00	5.50

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/03/11	4.30	20	4.10	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	10/03/2011-11/03/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	K. Boswell
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 6.00mbgl. Plain pipe from GL to 3.90mbgl and a slotted pipe from 3.90m to 6.00mbgl. Hole backfilled with bentonite from GL to 3.90mbgl and gravel from 3.90m to 6.00mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 3.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed two hours to set.

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Borehole Record

BH118

Sheet 1 of 2

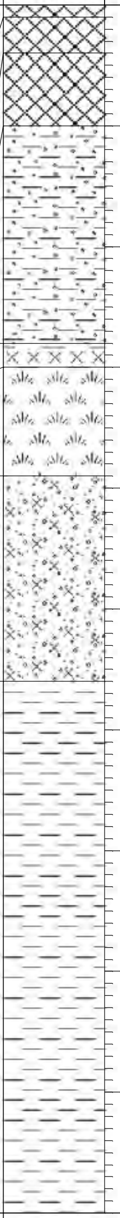
Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

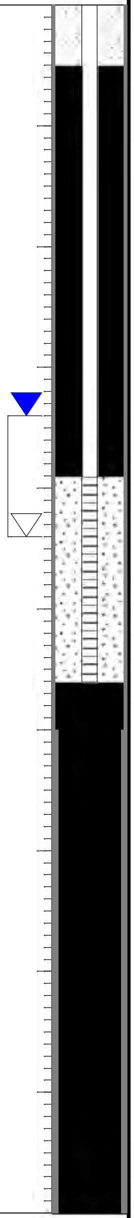
Engineer : N / A

Ground Level: 10.975mAOD
Coordinates: 535815.68E
192489.67N



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Grass over sandy slightly gravelly SILT (topsoil) with roots.	0.10	10.88	B1 D1 ES1	0.10-0.40 0.10-0.20 0.10-0.30				
MADE GROUND: Brown silty gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium brick, flint and concrete.	0.40	10.58	B2 D2	0.40-1.00 0.40-0.50				
MADE GROUND: Yellow-brown sandy rounded to subangular fine to coarse GRAVEL of flint and wood.	1.00	9.98	B3	1.00-1.20				
			D3	1.20				
Soft to firm medium strength mottled gravelly CLAY with rare shell fragments. (ALLUVIUM).			U1	1.50			11 blows	
			D4 S B4 D5	1.95-2.00 2.00-2.45 2.00-2.80 2.00-2.45			N=4 (1,0/1,1,1,1)	
Black clayey SILT with organic flint. (ALLUVIUM).	2.80	8.18						
Soft brown PEAT. (ALLUVIUM).	3.00	7.98	U2 B5	3.00 3.00-3.50			9 blows	
			W1 D6	3.40 3.45-3.50				
Grey slightly silty sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).	3.90	7.08	S B6 D7	4.00-4.45 4.00-4.50 4.00-4.45	3.00		N=16 (1,3/4,4,4,4)	
			S B7 D8	5.00-5.45 5.00-5.60 5.00-5.45	5.00	(3.80)	N=12 (1,3/3,3,3,3)	
Firm to stiff high strength grey CLAY. (LONDON CLAY FORMATION).	5.60	5.38	B8	5.60-6.00				
			U3	6.50			35 blows	
			D9 S D10 B9	6.95-7.00 7.00-7.45 7.00-7.45 7.00-8.00	6.50		N=15 (1,2/3,3,4,5)	
...From 8.00mbgl very high strength			U4	8.00			52 blows	
			D11	8.45-8.50				
			S B10 D12	9.00-9.45 9.00-10.00 9.00-9.45	7.00		N=15 (1,2/3,3,4,5)	

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	6.00	6.00			
150	19.95	16.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
18/03/11	4.40	20	3.40	-	
21/03/11	14.50	20	11.80	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	18/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	T. Kidd
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 5.60mbgl. Plain pipe from GL to 3.90mbgl and a slotted pipe from 3.90m to 19.95mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.90mbgl, gravel from 3.90m to 5.60mbgl and bentonite from 5.60m to 19.95mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite seal added at 6.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for fourty six hours.

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Borehole Record

Sheet 2 of 2

BH118

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.975mAOD
Coordinates: 535815.68E
192489.67N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Firm to stiff high strength grey CLAY. (LONDON CLAY FORMATION).			U5	10.00			47 blows	
			D13	10.45-10.50				
			S B11 D14 W2	11.50-11.95 11.50-12.00 11.50-11.95 11.80	7.00		N=19 (1,2/4,4,5,6)	
			U6	13.00			66 blows	
Dense grey clayey silty fine and medium SAND with occasional shell fragments. (LAMBETH GROUP - UNDIFFERENTIATED). ...From 13.50mbgl shell fragments.	13.50	-2.53	D15	13.45-13.50				
			S B12 D16	14.50-14.88 14.50-16.00 14.50-14.95	7.00		50 (3,6/9,10,22,9 for 5mm)	
...From 16.00m to 19.00mbgl medium dense.			S B13 D17	16.00-16.45 16.00-17.50 16.00-16.45	16.00	(8.20)	N=32 (3,4/5,7,8,12)	
			D18 U7	17.45-17.50 17.50			132 blows	
			B14 D19	18.50-19.50 18.50				
			S D20	19.50-19.95 19.50-19.95	17.50		N=50 (3,5/7,8,16,19)	
	19.95	-8.98						

Borehole Complete at 19.95 m

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
200 150	6.00 19.95	6.00 16.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
18/03/11	4.40	20	3.40	-	
21/03/11	14.50	20	11.80	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	18/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	T. Kidd
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 5.60mbgl. Plain pipe from GL to 3.90mbgl and a slotted pipe from 3.90m to 19.95mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.90mbgl, gravel from 3.90m to 5.60mbgl and bentonite from 5.60m to 19.95mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite seal added at 6.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for fourty six hours.

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Borehole Record

BH119

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

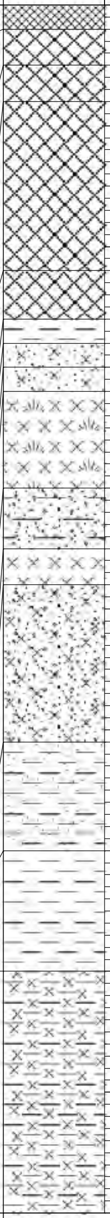
Engineer : N / A

Ground Level: 11.188mAOD

Coordinates: 535727.16E
192461.74N

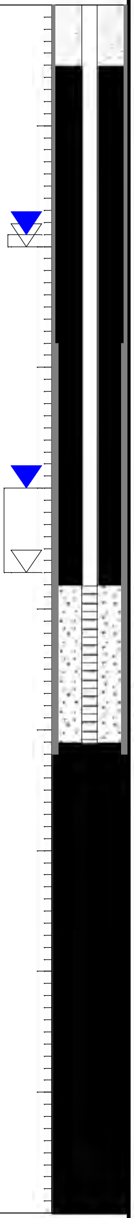
Description	Depth (m)	O.D. Level (m)
MADE GROUND: TARMAC.	0.20	10.99
MADE GROUND: Grey-brown silty gravelly fine to coarse SAND. Gravel is angular to subangular fine and medium flint and concrete.	0.50	10.69
MADE GROUND: Brown silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick and flint. approximately 15% brick cobbles.	0.80	10.39
MADE GROUND: Medium dense dark grey silty fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL. ...From 1.40mbgl becoming grey.	2.20	8.99
MADE GROUND: Firm dark grey slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint and brick with locally rare fresh water shell debris.	2.60	8.59
Firm mottled grey and yellow-grey CLAY. (ALLUVIUM).	2.80	8.39
Brown silty shell SAND (fresh water shell debris). (ALLUVIUM).	3.00	8.19
Grey silty fine and medium SAND. (ALLUVIUM).	3.20	7.99
Firm dark brown peaty SILT with some light grey silt mottling and rare fresh water shell debris. (ALLUVIUM).	4.00	7.19
Grey clayey slightly gravelly fine and medium SAND. Gravel is angular to subangular fine and medium flint. (ALLUVIUM).	4.50	6.69
Firm brown organic rich SILT. (ALLUVIUM).	4.80	6.39
Grey slightly silty medium and coarse SAND and angular to rounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	6.10	5.09
Stiff brown-grey locally slightly sandy CLAY. (LONDON CLAY FORMATION).	7.00	4.19
Very stiff closely fissured slightly sandy and locally thinly laminated CLAY. (LONDON CLAY FORMATION).	8.00	3.19
Very stiff closely fissured slightly silty CLAY. (LONDON CLAY FORMATION).		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
B1	0.30-0.50					
ES1	0.50-0.70					
B2	0.50-0.80					
ES2	0.80-1.00					
B3	0.80-1.20					
S	1.20-1.65			N=36 (3,6/8,9,7,12)		
D1	1.20-1.65					
B4	1.20-1.40					
S	2.00-2.45	2.00		N=7 (3,2/2,2,1,2)		
D2	2.00-2.45					
B5	2.10-2.50					
ES3	2.20-2.40					
B6	2.50-2.80					
ES4	2.60-2.80					
S	3.00-3.45	3.00	(2.80)	N=4 (1,1/0,1,1,2)		
D3	3.00-3.45					
B7	3.20-4.00					
U1	4.00			8 blows	100%	
D4	4.00-4.20					
ES5	4.50-4.70					
B8	4.50					
S	5.00-5.45	5.00	(4.00)	N=21 (1,3/5,5,6,5)		
D5	5.00-5.45					
ES6	5.00-5.20					
B9	5.00-5.45					
S	6.00-6.45	6.00	(5.80)	N=9 (2,1/2,2,2,3)		
D6	6.00-6.45					
B10	6.10-6.50					
ES7	6.40-6.60					
U2	7.00			15 blows	100%	
D7	7.45-7.55					
S	8.00-8.45	6.20	(7.90)	N=18 (2,3/3,5,4,6)		
B11	8.00-8.45					
D8	8.00-8.45					
ES8	8.80-9.00					
U3	9.00			17 blows	77%	
D9	9.45-9.55					

Installations



Borehole Complete at 10.00 m

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	2.80	2.80			
150	10.00	6.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/03/11	2.00	20	1.90	2.00	6.20
22/03/11	4.70	20	4.00	4.70	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	22/03/2011-23/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 6.10mbgl. Plain pipe from GL to 4.80mbgl and a slotted pipe from 4.80m to 6.10mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 4.80mbgl, gravel from 4.80m to 6.10mbgl and bentonite from 6.10m to 10.00mbgl. Hole finished with flush cover and gas tap.
3. Bentonite pellet seal added at 2.80mbgl at reduction of 200mm to 150mm diameter casing. Bentonite allowed to set for 2hrs.

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Borehole Record

BH120

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

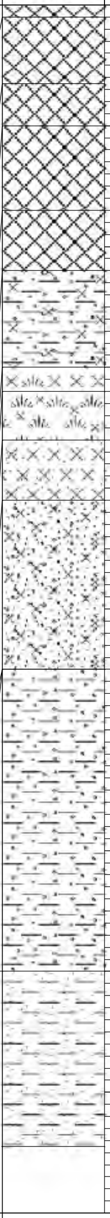
Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.060mAOD
Coordinates: 535703.06E
192386.51N

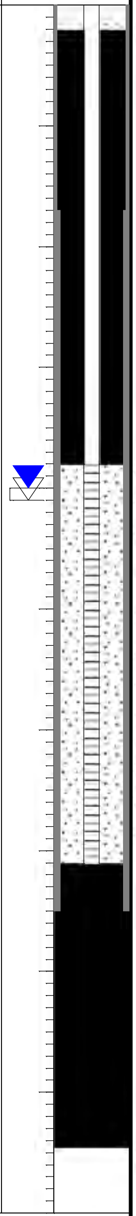
Description	Depth (m)	O.D. Level (m)
MADE GROUND: Brown silty gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse flint.	0.10	10.96
MADE GROUND: Grey-brown slightly clayey gravelly fine and medium SAND. Gravel is angular to subrounded fine to coarse flint, brick and concrete.	0.65	10.41
MADE GROUND: Yellow-brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint with approximately 10% brick rubble.	1.00	10.06
MADE GROUND: Medium dense dark grey silty very gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint.	1.70	9.36
MADE GROUND: Firm grey slightly sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to subrounded fine to coarse flint and occasional brick fragment.	2.20	8.86
Firm dark grey and brown silty CLAY, organic rich with occasional angular to subangular fine and medium flint gravel with occasional plant debris.	3.00	8.06
Brown very shelly (fresh water) peaty SILT.	3.20	7.86
Firm dark brown ammorphous silty PEAT.	3.60	7.46
Firm brown sandy SILT.	4.10	6.96
Medium dense grey silty fine to coarse SAND and angular to subrounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	5.50	5.56
Medium dense grey medium and coarse SAND and angular to rounded fine to coarse flint GRAVEL.	8.00	3.06
Stiff brown-grey CLAY with occasional angular to subangular fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).		
Stiff brown-grey slightly sandy CLAY.	9.45	1.61
Borehole Complete at 9.45 m		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)
D1	0.05-0.10					
B1	0.10-0.65					
D2	0.10-0.30					
ES1	0.40-0.60					
B2	0.65-1.00					
D3	0.70-0.80					
ES2	0.80-1.00					
B3	1.00-1.20					
ES3	1.00-1.20			N=12 (3,4/4,4,2,2)		
D4	1.00-1.10					
S	1.20-1.65					
B4	1.20-1.70					
D5	1.20-1.65					
B5	1.70-2.00					
D6	1.70-1.80	1.70		N=5 (1,1/1,1,1,2)		
ES4	1.80-2.00					
S	2.00-2.45					
B6	2.00-2.20					
D7	2.00-2.20					
ES5	2.20-2.40					
B7	2.20-3.00					
D8	2.20-2.30	2.50		N=4 (1,0/1,1,1,1)		
S	3.00-3.45					
B8	3.00-4.00					
D9	3.00-3.45					
ES6	3.40-3.80					
S	4.00-4.45	3.00		N=21 (1,3/6,5,6,4)		
W1	4.00					
D10	4.10-4.45					
B9	4.10-5.00					
ES7	4.30-4.50					
S	5.00-5.45	5.00	(4.20)	N=15 (2,3/3,3,4,5)		
B10	5.00-6.00					
D11	5.00-5.45					
S	6.00-6.45	6.00	(4.20)	N=12 (4,2/3,2,3,4)		
B11	6.00-7.00					
D12	6.00-6.45					
S	7.00-7.45	7.00	(4.20)	N=11 (2,4/4,3,2,2)		
B12	7.00-7.40					
D13	7.00-7.45					
B13	7.40-8.00					
D14	7.50-7.60					
ES8	7.60-7.80					
U1	8.00			34 blows	100%	
D15	8.45-8.50					
ES9	8.80-9.00					
S	9.00-9.45	7.50		N=19 (2,3/4,4,5,6)		
D16	9.00-9.45					

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	2.30	1.70			
150	9.45	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/03/11	4.10	20	4.00	3.00	

Client: Entec UK Ltd
Engineer: N / A
Contractor: May Gurney Professional Services
Dates: 21/03/2011-23/03/2011
Plant: Dando 2000
Drilled By: J. Elliott
Logged By: J. Tomalin
Checked By: D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 7.10mbgl. Plain pipe from GL to 3.80mbgl and a slotted pipe from 3.80m to 7.10mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 3.80mbgl, gravel from 3.80m to 7.10mbgl and bentonite from 7.10m to 9.45mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 2.30mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for 2hrs.

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Borehole Record

BH121

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

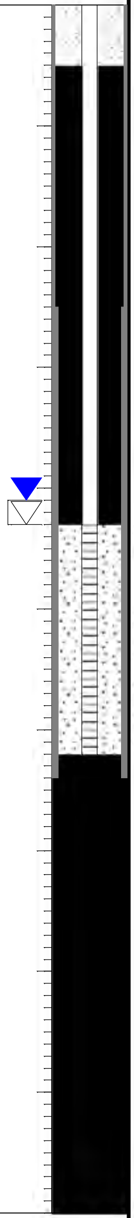
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.342mAOD
Coordinates: 535784.87E
192394.71N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Grass over slightly gravelly sandy SILT (topsoil). Gravel is angular to subrounded fine to medium flint.		0.30	11.04	B1	0.00-0.30					
				ES1	0.10-0.30					
				B2	0.30-0.90					
				ES2	0.40-0.60					
MADE GROUND: Brown gravelly SAND. Gravel is angular to subrounded fine to coarse brick, flint and concrete.		1.00	10.34							
MADE GROUND: Soft to firm grey CLAY with rare fine fragments of red and yellow brick.		2.30	9.04	B3	1.00-1.20					
				S	1.20-1.65			N=7 (1,1/1,2,2,2)		
				D1	1.20-1.65					
				ES3	1.20-1.40					
				B4	1.20-1.65					
				U1	2.00			15 blows		
Soft to firm CLAY with occasional black organic staining. (ALLUVIUM)		3.40	7.94	D2	2.45-2.55					
				ES4	2.50-2.70					
				B5	2.55-3.00					
				S	3.00-3.38	3.00		N=4 (1/1,1,1,1)		
				D3	3.00-3.45					
Soft dark brown SILT with occasional fine organic matter. (ALLUVIUM).		4.30	7.04	B6	3.40-4.00					
				ES5	3.60-3.80					
				S	4.00-4.45	3.00		N=14 (1,0/2,3,4,5)		
				D4	4.00-4.45					
Medium dense grey very gravelly medium to coarse SAND. Gravel is angular to subrounded fine to coarse flint with occasional flint cobbles. (KEMPTON PARK GRAVEL).		6.20	5.14	B7	4.30-5.00					
				ES6	4.50-4.70					
				S	5.00-5.45	5.00	(4.80)	N=18 (3,4/4,4,4,6)		
				D5	5.00-5.45					
				B8	5.00-5.45					
				S	6.00-6.45	6.00	(4.80)	N=10 (1,1/1,2,3,4)		
				D6	6.00-6.45					
Soft to firm grey CLAY. (LONDON CLAY FORMATION).				B9	6.20-7.00					
				ES7	6.40-6.60					
				U2	7.00			24 blows		
				D7	7.45-7.55					
				S	8.00-8.45	6.40		N=18 (2,3/4,4,5,5)		
				B10	8.00-8.45					
				D8	8.00-8.45					
				U3	9.00			32 blows		
				D9	9.45-9.55					



Borehole Complete at 10.00 m

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200 150	2.50 10.00	2.50 6.40			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	4.30	20	4.10	4.00	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011-16/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 6.20mbgl. Plain pipe from GL to 4.30mbgl and a slotted pipe from 4.30m to 6.20mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 4.30mbgl, gravel from 4.30m to 6.20mbgl and bentonite from 6.20m to 10.00mbgl. Hole finished with a flush cover, gas tap and top cap.
3. Bentonite pellet seal added at 2.50mbgl at reduction from 200mm to 150mm diameter casing. Bentonite seal allowed to set for 2hrs.

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Borehole Record

Sheet 1 of 2

BH122

Project: London Waste Ecopark, Edmonton

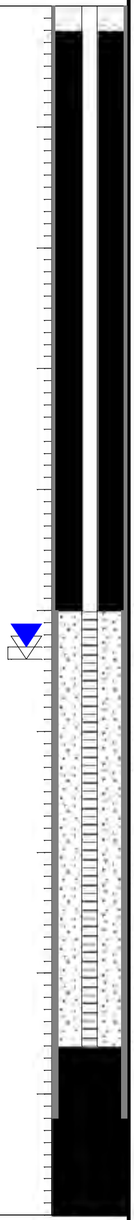
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.637mAOD
Coordinates: 535750.19E
192370.34N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Brown silty gravelly fine and medium SAND. Gravel is angular to subrounded fine to coarse flint, brick and concrete.				B1	0.10-0.60					
				ES1	0.10-0.30					
MADE GROUND: Firm brown-grey sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to subangular flint, brick and concrete.		0.60	12.04	B2	0.60-1.20					
				ES2	0.60-0.80					
				S	1.20-1.65			N=3 (1,0/1,0,1,1)		
...From 1.30mbgl soft with approximately 10% brick rubble.				D1	1.20-1.65					
				B3	1.20-2.00					
				ES3	1.30-1.50					
stiff mottled brown and brown-grey slightly sandy slightly gravelly (approximately 6%) CLAY. Gravel is angular fine to coarse flint.		1.80	10.84	ES4	1.80-2.00					
				S	2.00-2.45			N=6 (1,1/1,1,2,2)		
				D2	2.00-2.45					
				B4	2.00-3.00					
MADE GROUND: Stiff brown-grey CLAY (Anticipated to be fill derived from LONDON CLAY FORMATION).		2.90	9.74	U1	3.00			10 blows 100%		
				B5	3.00-3.40					
				B6	3.40-3.80					
MADE GROUND: Firm to stiff grey sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to subrounded fine to coarse flint with fragments of concrete and brick.		3.45	9.19	D3	3.45-3.50					
				ES5	3.50-3.70					
				S	4.00-4.45	4.00		N=29 (1,1/1,3,23,2)		
				D4	4.00-4.45					
				B7	4.00-4.60					
...From 4.40m to 4.60mbgl pockets of gravelly sand.				ES6	4.40-4.60					
		4.60	8.04	B8	4.60-5.00					
Dark brown slightly sandy SILT with some fine fresh water shell debris. (ALLUVIUM).				D5	5.00-5.45					
Medium dense grey slightly silty very gravelly medium and coarse SAND. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).		5.20	7.44	B9	5.20-6.00					
				W1	5.30					
				ES7	5.50-5.70					
				S	6.00-6.45	6.00		N=16 (3,4/4,4,4,4)		
				B10	6.00-7.00					
				D6	6.00-6.45					
				S	7.00-7.45	7.00	(5.70)	N=11 (1,2/3,2,3,3)		
				B11	7.00-8.00					
				D7	7.00-7.45					
...From 8.00mbgl becoming loose sand and gravel.				S	8.00-8.45	8.00	(5.70)	N=9 (1,2/2,2,3,2)		
				D8	8.00-8.45					
Stiff brown-grey slightly sandy CLAY with occasional angular to subrounded fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).		8.60	4.04	B12	8.60-9.20					
				D9	8.60-8.70					
				ES8	8.80-9.00					
				U2	9.20			40 blows 100%		
				D10	9.65-9.80					
				S	9.80-10.25	9.20		N=19 (2,3/4,4,5,6)		
				D11	9.80-10.25					



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	5.00	5.00			
200	10.25	9.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
24/03/11	5.40	20	5.30	5.40	8.60

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	23/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	J. Elliott
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 8.60mbgl. Plain pipe from GL to 5.00mbgl and a slotted pipe from 5.00m to 8.60mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 5.00mbgl, gravel from 5.00m to 8.60mbgl and bentonite from 8.60m to 10.25mbgl. Hole finished with a flush cover and gas tap.
3. Initial bentonite seal added at 3.80m. Made Ground found below seal. Borehole redrilled in 250mm diameter.
4. Bentonite pellet seal added at 5.00mbgl at reduction of 200mm to 250mm diameter casing. Bentonite allowed to set for 2hrs.

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Borehole Record

Sheet 2 of 2

BH122

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.637mAOD
Coordinates: 535750.19E
192370.34N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff brown-grey slightly sandy CLAY with occasional angular to subrounded fine and medium flint gravel. (REWORKED LONDON CLAY FORMATION).		10.25	2.39							
Borehole Complete at 10.25 m										

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
24/03/11	5.40	20	5.30	5.40	8.60

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	5.00	5.00
200	10.25	9.20

Chiseling Details

From (m)	To (m)	Time (hours)

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	23/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	J. Elliott
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 8.60mbgl. Plain pipe from GL to 5.00mbgl and a slotted pipe from 5.00m to 8.60mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 5.00mbgl, gravel from 5.00m to 8.60mbgl and bentonite from 8.60m to 10.25mbgl. Hole finished with a flush cover and gas tap.
3. Initial bentonite seal added at 3.80m. Made Ground found below seal. Borehole redrilled in 250mm diameter.
4. Bentonite pellet seal added at 5.00mbgl at reduction of 200mm to 250mm diameter casing. Bentonite allowed to set for 2hrs.

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Borehole Record

Sheet 1 of 2

BH123

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

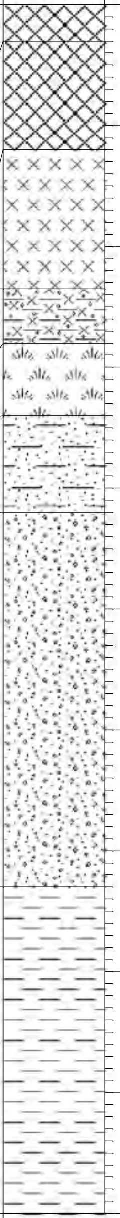
Client : Entec UK Ltd

Engineer : N / A

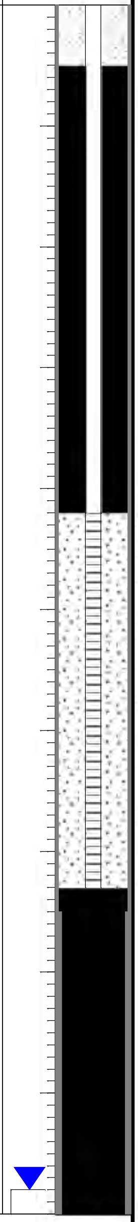
Ground Level: 10.955mAOD

Coordinates: 535717.97E
192303.66N

Legend



Installations



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Dark grey slightly silty gravelly SAND of angular to subangular fine to medium flint, glass, brick, metal fragments and ceramics.	0.30	10.66	B1 ES1 B2 ES2	0.00-0.30 0.00-0.30 0.30-0.80 0.30-0.80				
MADE GROUND: Brown clayey sandy GRAVEL with low cobble content of angular to subangular brick. Gravel is angular to subrounded fine to coarse brick, ceramics, concrete, clinker, flint and rare wood fragments.	1.20	9.76	S D1 B3 ES3 B4 ES4	1.20-1.65 1.20-1.65 1.20-1.65 1.20-1.60 1.65-2.00 1.70-2.00			N=3 (1,1/1,1,1,0)	
Very soft (spongy) black pseudo fibrous (peaty) SILT with organic odour. (ALLUVIUM).	2.35	8.61	S D2	2.00-2.45 2.00-2.45			N=3 (1,0/1,0,1,1)	
Soft to very soft grey-green mottled dark brown slightly gravelly clayey SILT. Gravel is subrounded to rounded medium to coarse flint. (ALLUVIUM).	2.80	8.16	B5	2.80-3.00				
Dark brown soft PEAT with occasional organic matter. (ALLUVIUM).	3.40	7.56	S D3	3.00-3.45 3.00-3.45	3.00		N=8 (1,0/1,0,3,4)	
Loose dark brown clayey fine to coarse SAND. (ALLUVIUM).	4.20	6.76	B6	3.40-4.00				
			S D4	4.00-4.45 4.00-4.45	4.00		N=16 (3,4/4,4,4,4)	
Medium dense grey-brown silty SAND and GRAVEL. Gravel is angular to subrounded fine to medium flint. (KEMPTON PARK GRAVEL).	7.30	3.66	B7	4.20-5.00				
...From 5.00mbgl becoming silty very sandy GRAVEL			S D5 B8	5.00-5.45 5.00-5.45 5.00-5.45	5.00	(4.30)	N=9 (1,2/2,2,2,3)	
			S D6 B9	6.00-6.45 6.00-6.45 6.00-6.45	6.00	(4.50)	N=10 (1,1/2,2,3,3)	
			S B10 D7	7.20-7.65 7.20-8.00 7.20-7.45	7.20	(7.00)	N=13 (3,2/3,3,3,4)	
Firm to stiff grey CLAY. (LONDON CLAY FORMATION).								
...From 8.50mbgl high strength			U1	8.50			31 blows	
			D8	8.95-9.05				

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200	7.50	7.50			
150	20.00	16.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/03/11	10.60	20	9.80	-	13.00

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	21/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	T. Kidd
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Water level standing at 4.10mbgl on completion.
3. Installation details: 50mm HDPE Standpipe installed from GL to 7.30mbgl. Plain pipe from GL to 4.20mbgl and a slotted pipe from 4.20m to 7.30mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 4.20mbgl, gravel from 4.20m to 7.30mbgl and bentonite from 7.30m to 20.00mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite / cement seal added at 8.00mbgl during reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for fourty eight hours.

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Borehole Record

BH123

Sheet 2 of 2

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 10.955mAOD
Coordinates: 535717.97E
192303.66N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Firm to stiff grey CLAY. (LONDON CLAY FORMATION).			S B11 D9	10.00-10.45 10.00-10.45 10.00-10.45	8.50		N=22 (3,3/4,6,6,6)	
	10.60	0.36	D10	10.60				
Stiff green sandy SILT. (LAMBETH GROUP).	11.00	-0.05	D11	11.00-11.20				
Grey very silty fine to medium SAND. LAMBETH GROUP).			S B12 D12 ES5	11.50-11.50 11.50-12.00 11.50-11.82 11.50-12.00	11.50	(7.50)	()	
	12.10	-1.15	D13	12.10-12.20				
Stiff green-grey sandy CLAY with occasional black flint angular to rounded gravels. (LAMBETH GROUP).	12.40	-1.45	D14	12.40-12.60				
Stiff green-grey slightly sandy silty CLAY. (LAMBETH GROUP).			S B13 D15	13.00-13.45 13.00-13.45 13.00-13.45	13.00	(7.50)	N=32 (5,5/6,8,8,10)	
			U2	14.50			83 blows	
	14.80	-3.85	D16	14.95-15.05				
Stiff grey mottled orange and brown very sandy SILT. (LAMBETH GROUP).	15.20	-4.25	B14	15.20-16.00				
Very dense light grey clayey silty fine to medium SAND with rare fine and medium gravel (LAMBETH GROUP).			S B15 D17 ES6	16.00-16.38 16.00-17.00 16.00-16.38 16.00-17.00	16.00		50 (6,9/12,18,20)	
			S B16 D18	17.50-17.50 17.50-18.00 17.50-17.80	16.50	(5.50)	()	
			S B17 D19	19.00-19.00 19.00-20.00 19.00-19.30	16.50	(6.00)	()	

Borehole Complete at 20.00 m

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
200 150	7.50 20.00	7.50 16.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/03/11	10.60	20	9.80	-	13.00

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	21/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	T. Kidd
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Water level standing at 4.10mbgl on completion.
3. Installation details: 50mm HDPE Standpipe installed from GL to 7.30mbgl. Plain pipe from GL to 4.20mbgl and a slotted pipe from 4.20m to 7.30mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 4.20mbgl, gravel from 4.20m to 7.30mbgl and bentonite from 7.30m to 20.00mbgl. Hole finished with a flush cover and gas tap.
4. Bentonite / cement seal added at 8.00mbgl during reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for fourty eight hours.

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Borehole Record

Sheet 1 of 2

BH124

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

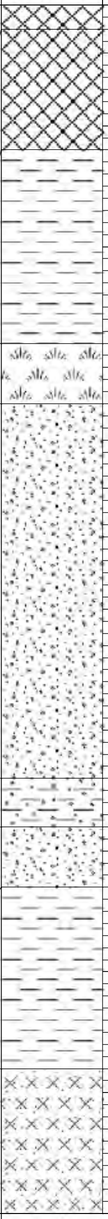
Client : Entec UK Ltd

Engineer : N / A

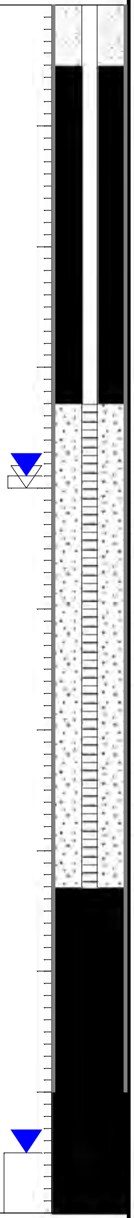
Ground Level: 11.021mAOD
Coordinates: 535768.62E
192331.88N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Light brown gravelly sandy SILT (topsoil). Gravel is angular to subrounded fine to medium brick and flint.	0.20	10.82	B1 ES1 B2 ES2	0.00-0.10 0.00-0.20 0.20-0.60 0.40-0.60				
MADE GROUND: Light brown slightly silty gravelly SAND. Gravel is angular to subrounded fine to coarse brick, ash and flint. ...At 0.80mbgl many cobbles of brick and concrete.	1.20	9.82	B3	0.90-1.20				
Soft grey CLAY. (ALLUVIUM)			S D1 ES3 B4	1.20-1.65 1.20-1.65 1.20-1.40 1.20-1.65			N=10 (1,1/2,2,3,3)	
	2.80	8.22	S D2 B5	2.00-2.45 2.00-2.45 2.00-2.45	2.00		N=3 (1,0/1,0,1,1)	
Soft dark brown fibrous PEAT. (ALLUVIUM)	3.30	7.72	B6 U1 ES4	2.80-3.30 3.00 3.00-3.20			31 blows	
Loose grey gravelly medium to coarse SAND. Gravel is angular to subrounded fine to medium flint. (KEMPTON PARK GRAVEL).			ES5 B7	3.30-3.50 3.30-4.00				
			S D3 B8	4.00-4.45 4.00-4.45 4.00-4.45	4.00		N=5 (1,2/1,2,1,1)	
			S D4 B9	5.00-5.45 5.00-5.45 5.00-5.45	5.00	(4.00)	N=8 (1,1/2,2,2,2)	
...from 6.00m becoming medium dense.	6.40	4.62	S D5	6.00-6.45 6.00-6.45	6.00	(4.50)	N=10 (1,1/2,2,3,3)	
Soft to firm grey CLAY with occasional flint gravel. (KEMPTON PARK GRAVEL).	6.80	4.22	B10	6.40-6.80				
Grey very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).	7.30	3.72	B11 S D6	6.80-7.30 7.00-7.45 7.00-7.45	7.00	(4.50)	N=9 (1,1/1,2,2,4)	
Firm to stiff grey CLAY. (LONDON CLAY FORMATION).	8.80	2.22	U2	8.50			41 blows	
Dark grey-green sandy SILT. Sand is fine. (LONDON CLAY FORMATION)			D7	8.95-9.05				

Legend



Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	11.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/03/11	4.00	20	3.90	4.00	
16/03/11	10.50	20	9.50	9.00	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	14/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 7.30mbgl. Plain pipe from GL to 3.30mbgl and a slotted pipe from 3.30m to 7.30mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.30mbgl and gravel from 3.30m to 7.30mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 1.60mbgl at reduction from 250mm to 200mm diameter borehole. Bentonite allowed to set for 2hrs.
4. Two meter bentonite/cement grout seal added at 8.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for 36hrs.

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Borehole Record

Sheet 2 of 2

BH124

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 11.021mAOD
Coordinates: 535768.62E
192331.88N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Dark grey-green sandy SILT. Sand is fine. (LONDON CLAY FORMATION)		10.40	0.62	S B12 ES6 D8 ES7 D9	10.00-10.45 10.00-10.40 10.00-10.20 10.00-10.45 10.40-10.60 10.40-10.60	9.00		N=46 (4,5/7,10,14,15)		
Dark green silty fine SAND with some shell fragments. (LAMBETH GROUP - UPPER SHELLY BEDS)		10.60	0.42							
Grey-green fine SAND. (LAMBETH GROUP - POSSIBLE UPPER MOTTLED BED CHANNELS).		11.00	0.02							
Borehole Complete at 11.00 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	11.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/03/11	4.00	20	3.90	4.00	
16/03/11	10.50	20	9.50	9.00	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	14/03/2011-24/03/2011
Plant:	Dando 2000
Drilled By:	T. York
Logged By:	J. Tomalin
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Installation details: 50mm HDPE Standpipe installed from GL to 7.30mbgl. Plain pipe from GL to 3.30mbgl and a slotted pipe from 3.30m to 7.30mbgl. Hole backfilled with concrete from GL to 0.50mbgl, bentonite from 0.50m to 3.30mbgl and gravel from 3.30m to 7.30mbgl. Hole finished with a flush cover and gas tap.
3. Bentonite pellet seal added at 1.60mbgl at reduction from 250mm to 200mm diameter borehole. Bentonite allowed to set for 2hrs.
4. Two meter bentonite/cement grout seal added at 8.00mbgl at reduction from 200mm to 150mm diameter casing. Bentonite allowed to set for 36hrs.

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Borehole Record

WS101

Sheet 1 of 1

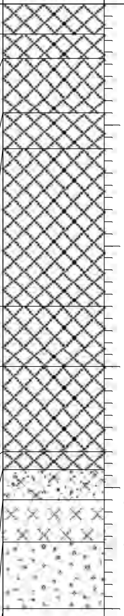
Project: London Waste Ecopark, Edmonton

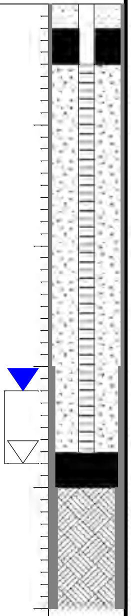
Project ID: SI1688

Client : Entec UK Ltd

Engineer : N / A

Ground Level: 12.227mAOD
Coordinates: 535682.84E
192927.00N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Tarmac	0.25	11.98	ES1	0.30-0.50				
MADE GROUND: Red-grey silty fine to coarse SAND and angular fine and medium granite GRAVEL. (Type 1).	0.45	11.78	B1	0.50-0.90				
MADE GROUND: Yellow-brown slightly silty fine to coarse SAND and subangular to rounded fine to coarse flint gravel.	0.90	11.33	B2 ES2	0.90-1.20 1.00-1.20				
MADE GROUND: Stiff grey CLAY with a little amgular to subrounded fine to coarse flint and concrete gravel.	1.20	11.03	B3	1.20-2.00				
MADE GROUND: Very Stiff CLAY.	2.50	9.73	ES3 B4	1.80-1.90 2.00-3.00				
MADE GROUND: Orange-brown very gravelly SAND. Gravel is angular fine to coarse flint.	3.00	9.23	ES4	2.60-2.70				
MADE GROUND: Stiff and very stiff black and brown slightly sandy slightly gravelly CLAY with brick cobbles. Gravel is angular to subangular fine to coarse brick, clinker and flint.	3.70	8.53	B5 ES5	3.00-4.00 3.60-3.70				
MADE GROUND: Soft white and grey (chalky) SILT with rare shelly fragments.	3.85	8.38						
Light grey silty gravelly SAND. Gravel is subrounded to rounded fine and medium chert and many shelly fragments with decayed organic matter below 4.00mbgl. (ALLUVIUM).	4.10	8.13						
Very soft grey SILT with decayed organic matter. (ALLUVIUM).	4.45	7.78						
Grey sandy angular to rounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	5.00	7.23						
Borehole Complete at 5.00 m								

Hole Diameter Detail / Chiseling Details

Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
102	3.00	3.00			
86	4.00	4.00			
76	5.00	5.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	3.80	20	3.20	-	

Client:	Entec UK Ltd
Engineer:	N / A
Contractor:	May Gurney Professional Services
Dates:	15/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Groundwater standing at 3.20mbgl on completion.
3. Installation Details: 40mm Standpipe installed from GL to 3.70mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 3.70mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 3.70mbgl and bentonite from 3.70m to 4.00mbgl.
4. Hole collpsed 4.00m to 5.00mbgl.
5. Hole cased at 3.00mbgl utilising 128mm diameter casing.
6. Standing groundwater level only recorded after 20 minutes.

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Window Sample Record

WS101

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Contractors ID:

Client: Entec UK Ltd

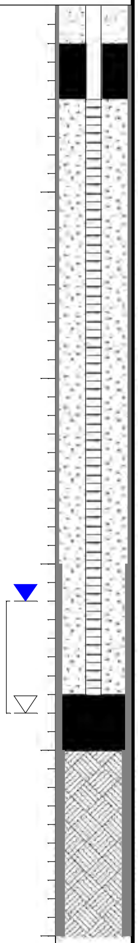
Engineer: N / A

Ground Level: 12.227mAOD

Coordinates: 535682.84E
192927.00N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Tarmac	0.25	11.98				
MADE GROUND: Red-grey silty fine to coarse SAND and angular fine and medium granite GRAVEL. (Type 1).	0.45	11.78	ES1	0.30-0.50		
MADE GROUND: Yellow-brown slightly silty fine to coarse SAND and subangular to rounded fine to coarse flint gravel.	0.90	11.33	B1	0.50-0.90		
MADE GROUND: Stiff grey CLAY with a little amgular to subrounded fine to coarse flint and concrete gravel.	1.20	11.03	B2 ES2	0.90-1.20 1.00-1.20		
MADE GROUND: Very Stiff CLAY.	2.50	9.73	B3 ES3 B4	1.20-2.00 1.80-1.90 2.00-3.00		
MADE GROUND: Orange-brown very gravelly SAND. Gravel is angular fine to coarse flint.	3.00	9.23	ES4	2.60-2.70		
MADE GROUND: Stiff and very stiff black and brown slightly sandy slightly gravelly CLAY with brick cobbles. Gravel is angular to subangular fine to coarse brick, clinker and flint.	3.70	8.53	B5 ES5	3.00-4.00 3.60-3.70		
MADE GROUND: Soft white and grey (chalky) SILT with rare shelly fragments.	3.85	8.38				
Light grey silty gravelly SAND. Gravel is subrounded to rounded fine and medium chert and many shelly fragments with decayed organic matter below 4.00mbgl. (ALLUVIUM).	4.10	8.13				
Very soft grey SILT with decayed organic matter. (ALLUVIUM).	4.45	7.78				
Grey sandy angular to rounded fine to coarse flint GRAVEL. (KEMPTON PARK GRAVEL).	5.00	7.23				
Window Sample Complete at 5.00 m						

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102 86 76	3.00 4.00 5.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	3.80	20	3.20	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Groundwater standing at 3.20mbgl on completion.
3. Installation Details: 40mm Standpipe installed from GL to 3.70mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 3.70mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 3.70mbgl and bentonite from 3.70m to 4.00mbgl.
4. Hole collpsed 4.00m to 5.00mbgl.
5. Hole cased at 3.00mbgl utilising 128mm diameter casing.
6. Standing groundwater level only recorded after 20 minutes.

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Window Sample Record

WS102
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

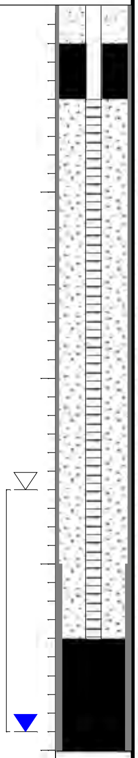
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 12.545mAOD
Coordinates: 535600.48E
192854.37N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
CONCRETE.		0.20	12.35	B1 ES1	0.20-0.40 0.20-0.40		
MADE GROUND: Dark grey silty very gravelly fine to coarse ashy SAND. Gravel is angular to subangular fine and medium ash, brick and flint.		0.40	12.15	B2	0.40-0.90		
MADE GROUND: Mixed dark grey gravelly fine to coarse SAND and firm to stiff brown-grey slightly gravelly (approximately 10%) CLAY. Gravel is angular to subangular fine to coarse brick, flint and concrete.		0.90	11.65	ES2 B3	0.70-0.90 0.90-1.20		
MADE GROUND: Firm to stiff brown-grey slightly gravelly (approximately 5%) CLAY. Gravel is angular to subangular fine to coarse brick and flint with rare cobble, sand, brick and concrete fragments. ...Below 1.30mbgl Stiff ...Between 1.55m and 1.56mbgl Pocket of black pseudo fibrous peat.		2.10	10.45	C1 ES3 C2	1.20-2.00 1.40-1.50 2.00-3.00		
MADE GROUND: Brown slightly silty gravelly SAND with rare cobble sized brick fragments. Gravel is angular to subangular fine to coarse brick and flint.		2.40	10.15				
MADE GROUND: Very soft to soft grey-brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium flint and rare decayed organic matter.		3.00	9.55	ES4 C3	2.80-2.90 3.00-4.00		
MADE GROUND: Stiff dark brown pseudo fibrous (very organic) slightly gravelly CLAY. Gravel is angular fine and medium flint and brick.		3.40	9.15	ES5	3.20-3.30		
Firm to stiff grey CLAY. (ALLUVIUM).		4.00	8.55				
Window Sample Complete at 4.00 m							

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102 86	3.00 4.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	2.60	20	3.90	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011-16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1.Hand pit dug from GL to 1.20mbgl.
2.Groundwater standing at 3.90mbgl on completion.
3. Installation Details: 40mm Standpipe installed from GL to 3.40mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 3.40mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 3.40mbgl and bentonite from 3.40m to 4.00mbgl.
4. Hole cased at 2.00mbgl utilising 128mm diameter casing.
5. Standing groundwater only recorded after 20 minutes.

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Window Sample Record

WS103
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

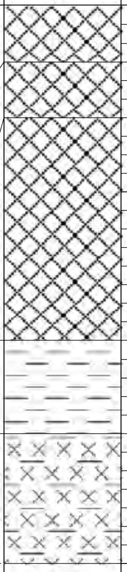
Project ID: SI1688

Contractors ID:

Client: Entec UK Ltd

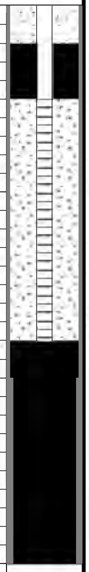
Engineer: N / A

Ground Level: 11.293mAOD
Coordinates: 535625.24E
192765.76N



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Red-grey silty very gravelly fine to coarse SAND and angular to subrounded fine to coarse flint, brick and concrete GRAVEL.	0.30	10.99	ES1	0.10-0.30		
MADE GROUND: Yellow brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.	0.60	10.69	ES2	0.40-0.60		
MADE GROUND: Firm to stiff brown-grey CLAY with a little angular fine to coarse brick and flint gravel. (ALLUVIUM). ...From 1.00mbgl Black and very organic.	1.80	9.49	ES3 C1 ES4	0.80-1.00 1.10-2.00 1.40-1.50		
Firm grey-brown silty CLAY. (ALLUVIUM).	2.30	8.99	C2	2.00-3.00		
Very soft to soft grey mottled brown clayey SILT. (ALLUVIUM).	3.00	8.29				
Window Sample Complete at 3.00 m						

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	18/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation Details: 40mm Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.80mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.80mbgl and bentonite from 1.80m to 3.00mbgl.
3. Hole cased to 2.00mbgl utilising 128mm diameter casing.

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Window Sample Record

WS104
Sheet 1 of 1

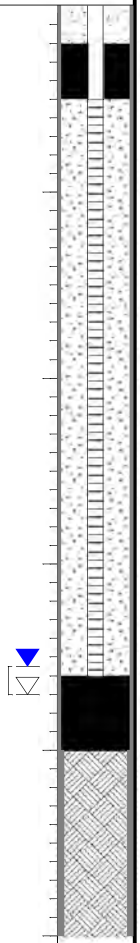
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 12.220mAOD
Coordinates: 535733.51E
192844.13N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
CONCRETE (Reinforced)		0.20	12.02					
MADE GROUND: dark grey silty very sandy angular to subangular fine and medium ash concrete brick and glass GRAVEL.		0.30	11.92	B1 ES1	0.30-0.60 0.30-0.50			
MADE GROUND: Soft mixed dark grey and grey slightly sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular fine to coarse concrete and flint with a little wood debris.		0.60	11.62					
				B2 ES2	0.80-1.20 0.80-1.00			
MADE GROUND: Stiff brown-grey slightly gravelly CLAY. Gravel is angular fine to coarse concrete flint and brick with occasional cobbles.		1.25	10.97	C1 ES3	1.20-2.00 1.25-1.33			
MADE GROUND: Stiff dark brown sandy (ashy) slightly gravelly CLAY. Gravel is angular to rounded fine and medium flint and brick.		1.33	10.89					
MADE GROUND: Very stiff brown-grey CLAY. Rare coarse angular flint gravel below 1.75mbgl.		2.00	10.22	C2 ES4	2.00-3.00 2.10-2.20			
MADE GROUND: Stiff to very stiff brown mottled grey CLAY with rare pockets of gravel comprising angular to subangular fine to coarse brick, flint, concrete, sandstone and slag. Pockets of ashy / sandy material with clinker gravel.				C3	3.00-4.00			
				ES5	3.30-3.50			
		3.60	8.62					
Stiff dark brown-black pseudo fibrous very organic peaty CLAY. (ALLUVIUM).		3.75	8.47					
Soft to very soft grey mottled brown SILT with rare decayed vegetation. (ALLUVIUM).		3.95	8.27	C4	4.00-5.00			
Grey sandy GRAVEL of angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL).		5.00	7.22					
Window Sample Complete at 5.00 m								



Drive Records

Diameter (mm)	To (m)	Recovery (%)
86	3.00	
86	4.00	
66	5.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	3.70	20	3.55	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased to 2.00mbgl utilising 128mm diameter casing.
3. Installation Details: 40mm Standpipe installed from GL to 3.60mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 3.60mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 3.60mbgl and bentonite from 3.60m to 4.00mbgl.
4. Hole collapsed between 4.00m and 5.00mbgl.
5. Standing groundwater level only recorded after 20 minutes.

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Window Sample Record

WS105
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

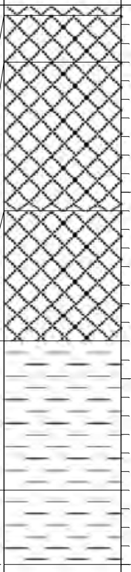
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.884mAOD
Coordinates: 535671.47E
192790.96N

Description
MADE GROUND: Grey slightly gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse concrete.
MADE GROUND: Red-brown silty very sandy angular fine to coarse concrete gravel.
MADE GROUND: Yellow-brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint with occasional brick fragments. ...At 0.80mbgl Becomes greyish.
MADE GROUND: Brown slightly clayey sandy GRAVEL of angular to subrounded fine to coarse brick, flint and concrete.
Stiff grey mottled brown CLAY. (ALLUVIUM). ...From 2.10mbgl Becoming firm. ...From 2.30mbgl Becoming soft.
Firm to stiff dark brown silty CLAY with shelly fragments. (ALLUVIUM).
Window Sample Complete at 3.00 m

Legend

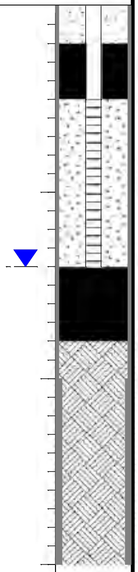


Depth (m)	O.D. Level (m)
0.05	10.83
0.30	10.58
1.10	9.78
1.80	9.08
2.60	8.28
3.00	7.88

Sample Test	
Type	Depth (m)
ES1	0.10-0.20
ES2	0.30-0.50
ES3	0.80-1.00
C1	1.20-2.00
ES4	1.50-1.60
C2	2.00-3.00

Remarks and Test Results PID (ppm)

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102 86	2.00 3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	1.40	20	1.40	1.20	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011-16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Groundwater standing at 1.40mbgl at completion.
3. Installation Details: 40mm Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.40mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.40mbgl and bentonite from 1.40m to 1.80mbgl.
4. Hole cased at 1.20mbgl utilising 128mm diameter casing.
5. Hole collapsed between 1.80m and 3.00mbgl.
6. Standing groundwater only recorded after 20 minutes.

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Window Sample Record

WS106
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

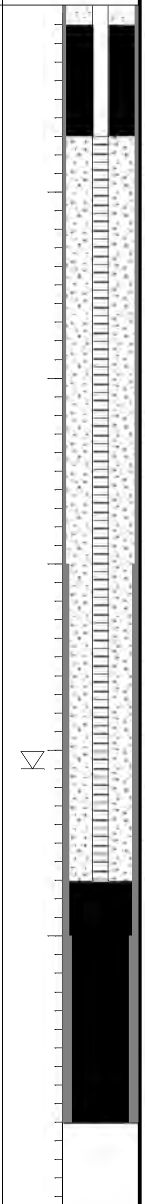
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 13.925mAOD
Coordinates: 535811.82E
192806.35N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Brickweave.	0.08	13.85				
Yellow brown SAND.	0.10	13.83				
MADE GROUND: Tarmac.	0.20	13.73	B1 ES1	0.30-0.50 0.30-0.50		
MADE GROUND: Yellow-brown silty very gravelly fine and coarse flint with occasional brick and tarmac fragments.			B2 ES2	0.80-1.00 0.80-1.00		
MADE GROUND: Firm to stiff grey CLAY. ...From 1.90mbgl Very stiff.	1.45	12.48	ES3	1.70-1.80		
MADE GROUND: Orange-brown sandy GRAVEL of angular fine and medium flint.	4.10	9.83	ES4	4.20-4.40		
MADE GROUND: Stiff to very stiff brown-black slightly sandy gravelly CLAY. Gravel is angular fine to coarse brick.	4.40	9.53	ES5	4.75-4.85		
Stiff brown mottled grey CLAY. (ALLUVIUM).	4.85	9.08				
Black pseudo fibrous PEAT. (ALLUVIUM).	5.40	8.53				
Soft to very soft grey mottled brown SILT. (ALLUVIUM).	5.50	8.43				
Window Sample Complete at 6.00 m	6.00	7.93				

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	
86	5.00	
76	6.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	4.10	-	-	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011-16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation Details: 40mm Standpipe installed from GL to 4.70mbgl. Plain pipe from GL to 0.70mbgl and a slotted pipe from 0.70m to 4.70mbgl. Hole backfilled with concrete form GL to 0.10mbgl, bentonite from 0.10m to 0.70mbgl, gravel from 0.70m to 5.00mbgl and bentonite from 5.00m to 6.00mbgl.
3. Hole cased to 2.80mbgl with 128mm diameter casing.
4. Standing groundwater only recorded after 20 minutes.

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Window Sample Record

WS107
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 14.373mAOD
Coordinates: 535877.59E
192779.10N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Dark brown slighly sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to round fine to coarse flint with a little brick with gravelly sand pockets.				B1	0.30-0.50			
				ES1	0.30-0.60			
		0.50	13.87	B2	0.50-0.80			
MADE GROUND: Yellow brown slightly silty fine to coarse SAND and angular to rounded fine to coarse flint.				ES2	0.80-1.00			
				C1	1.00-2.00			
		1.70	12.67					
MADE GROUND: Stiff to very stiff grey brown CLAY. ...From 1.80mbgl Very stiff				ES3	1.80-1.90			
				C2	2.00-3.00			
				C3	3.00-4.00			
...At 3.80mbgl One medium gravel sized brick fragment.				C4	4.00-4.70			
		4.55	9.82					
MADE GROUND: Orange-brown sandy GRAVEL of angular fine to coarse flint.		4.70	9.67					
Window Sample Complete at 4.70 m								

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	
86	4.00	
76	4.70	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	15/03/2011-16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation details: 40mm HDPE Standpipe installed from GL to 4.70mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 4.70mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl and gravel from 1.00m to 4.70mbgl.
3. Hole cased at 2.00mbgl utilising 128mm diameter casing.

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Window Sample Record

WS108
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

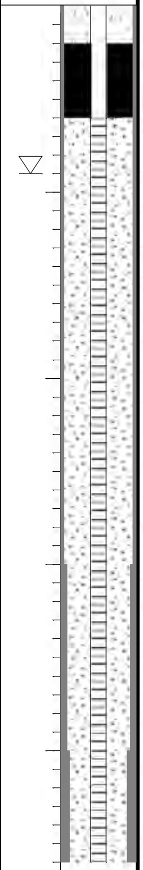
Contractors ID:

Client: Entec UK Ltd

Engineer: N / A

Ground Level: 14.408mAOD
Coordinates: 535875.26E
192765.56N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results PID (ppm)	Installations
MADE GROUND: Bricks.		0.08	14.33				
MADE GROUND: Sand.		0.12	14.29				
MADE GROUND: Tarmac.		0.28	14.13				
MADE GROUND: Red-brown silty fine to coarse SAND.		0.35	14.06				
MADE GROUND: Yellow-brown slightly silty fine to coarse SAND and angular to rounded fine to coarse flint gravel ...At 0.80mbgl Sandy gravel		1.00	13.41	B1 ES1 B2	0.50-0.70 0.50-0.70 0.80-1.00		
MADE GROUND: Firm to stiff brown-grey slightly silty CLAY. ...From 1.20m Grey ...From 1.30mbgl Very stiff.		4.45	9.96	B3 ES2	1.00-1.20 1.20-1.30		
MADE GROUND: Orange-brown sandy GRAVEL of angular fine to coarse flint and rare brick.		4.60	9.81	ES3	4.45-4.60		
Window Sample Complete at 4.60 m							



Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/03/11	0.90	-	-	-	

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	
86	4.00	
76	4.60	

Client: Entec UK Ltd
Engineer: N / A
Date: 15/03/2011-16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation Details: 40mm Standpipe installed from GL to 4.60mbgl. Plain pipe from GL to 0.60mbgl and a slotted pipe from 0.60m to 4.60mbgl. Hole backfilled with concrete form GL to 0.20mbgl, bentonite from 0.20m to 0.60mbgl, gravel from 0.60m to 4.60mbgl.
3. Hole cased at 2.00mbgl utilising 128mm diameter casing.
4. Standing groundwater only recorded after 20 minutes.

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Window Sample Record

WS109
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

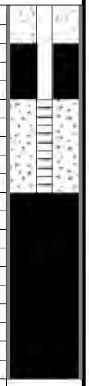
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.928mAOD
Coordinates: 535784.92E
192757.33N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results PID (ppm)	Installations
MADE GROUND: Black silty fine to coarse SAND and angular fine to coarse tarmac GRAVEL.		0.20	10.73	ES1	0.20-0.40		
MADE GROUND: Brown-grey silty very gravelly fine to coarse SAND. Gravel is angular fine to coarse brick, concrete with a little flint (10% brick cobbles).		0.60	10.33	ES2	0.60-0.80		
MADE GROUND: Firm lottled brown-grey slightly gravelly (approximately 8%) CLAY. Gravel is rounded to subangular fine to coarse flint and brick.		0.80	10.13	ES3	0.80-1.00		
MADE GROUND: Soft dark grey-black organic rich silty CLAY with a little brick and pottery, gravel and some plant debris (straw and wood).		1.20	9.73	C1	1.00-2.00		
Soft (spongy) dark brown-black pseudo fibrous peaty SILT. (ALLUVIUM).		1.40	9.53				
Soft (spongy) dark grey and brown pseudo fibrous peaty SILT. (ALLUVIUM).		1.55	9.38				
Firm and stiff grey mottled brown silty CLAY. (ALLUVIUM). ...From 1.70mbgl Shelly fragments.		2.00	8.93				

Window Sample Complete at 2.00 m



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 18/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.00mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.00mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.00mbgl and bentonite from 1.00m to 2.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

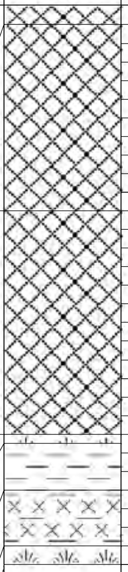
WS110
Sheet 1 of 1

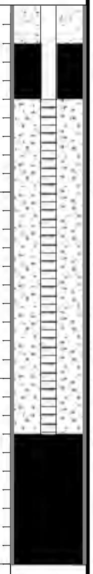
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.631mAOD
Coordinates: 535879.17E
192706.01N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Dark grey-brown slightly sandy CLAY.	0.10	11.53				
MADE GROUND: Brown-grey and brown slightly sandy slightly gravelly (10%) CLAY. Gravel is angular to subangular fine to coarse flint, brick and concrete. ...From 0.80mbgl grey.	1.10	10.53	ES1 ES2	0.30-0.50 0.80-1.00		
MADE GROUND: Very soft grey and brown slightly gravelly clayey SILT. Gravel is angular to subangular fine to coarse brick and flint. ...At 1.30mbgl brick cobble. ...From 1.40mbgl pockets of peaty material. ...From 2.00m to 2.30mbgl brick cobbles.	2.30	9.33	C1 ES3 C2	1.20-2.00 1.50-1.60 2.00-3.00		
Firm dark brown pseudo fibrous PEAT. (ALLUVIUM).	2.35	9.28				
Stiff grey CLAY with some shelly fragments. (ALLUVIUM).	2.60	9.03				
Soft to very soft dark grey clayey SILT. (ALLUVIUM).	2.90	8.73				
Firm dark brown pseudo fibrous clayey PEAT. (ALLUVIUM).	3.00	8.63				

Window Sample Complete at 3.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 18/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.30mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 2.30mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.30mbgl and bentonite from 2.30m to 3.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

WS111
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

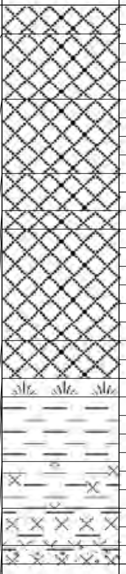
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.664mAOD
Coordinates: 535849.04E
192630.59N

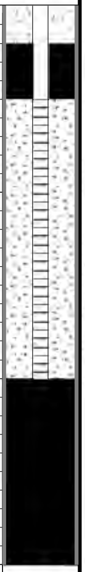
Description
MADE GROUND: Dark brown silty fine and medium SAND.
MADE GROUND: Dark brown silty gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse brick, concrete and flint with occasional concrete cobbles and plastic fragments.
MADE GROUND: Grey-brown silty gravelly fine to coarse SAND. Gravel is angular fine to coarse brick, concrete and flint with approximately 10% brick rubble.
MADE GROUND: Brown-grey slightly sandy slightly gravelly (15%) CLAY. Gravel is angular to subangular fine to coarse concrete, brick, flint and occasional cobble.
MADE GROUND: Firm grey and dark brown CLAY with occasional brick and flint gravel.
MADE GROUND: Soft grey and brown silty CLAY.
MADE GROUND: Soft brown and black slightly gravelly silty CLAY with many wood fragments. Gravel is angular to subrounded fine to medium brick and flint.
Very soft (spongy) black PEAT with organic odour. (ALLUVIUM).
Soft to firm brown and black pseudo fibrous (peaty) CLAY. (ALLUVIUM).
Soft to firm brown-grey silty CLAY. (ALLUVIUM).
Very soft brown-grey clayey SILT. (ALLUVIUM).
Soft brown slightly sandy slightly gravelly SILT. Gravel is subangular fine shelly fragments. (ALLUVIUM).

Window Sample Complete at 3.00 m



Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
0.15	11.51	ES1	0.20-0.40		
0.50	11.16				
		ES2	0.60-0.80		
		ES3	0.80-0.90		
0.90	10.76	ES4	0.90-1.10		
1.10	10.56				
1.20	10.46	C1	1.20-2.00		
		ES5	1.50-1.60		
1.80	9.86	ES6	1.80-2.00		
2.00	9.66	C2	2.00-3.00		
2.10	9.56				
2.45	9.21				
2.70	8.96				
2.90	8.76				
3.00	8.66				

Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	18/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.00mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 2.00mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.00mbgl and bentonite from 2.00m to 3.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

WS112

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

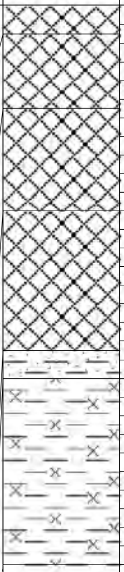
Contractors ID:

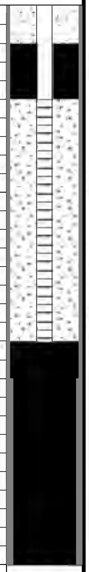
Client: Entec UK Ltd

Engineer: N / A

Ground Level: 11.495mAOD

Coordinates: 535817.36E 192707.55N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Grass over stiff brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint.	0.15	11.35				
MADE GROUND: Brown slightly clayey gravelly SAND with low cobble sized brick. Gravel is angular to subangular fine to coarse brick, clinker, flint and one fibrous pipe fragment (possible asbestos).	0.55	10.95	ES1 ES2	0.20-0.30 0.30-0.40		
MADE GROUND: Firm to stiff brown slightly sandy slightly gravelly CLAY with low cobble sized brick and concrete content. ...From 0.75m to 0.95mbgl concrete boulder with black staining. Abundant gravel and cobble size wood fragments and slight hydrocarbon odour below 1.00mbgl.	1.10	10.40	ES3 ES4	0.70-0.80 1.00-1.10		
MADE GROUND: Firm to stiff brown slightly gravelly CLAY. Gravel is angular to subangular medium to coarse wood fragments, concrete, brick and ceramics. Minor black staining around wood fragments. ...From 1.65m to 1.70mbgl black stained moist gravelly clay with moderate hydrocarbon odour.	1.85	9.65	C1 ES5	1.20-2.00 1.65-1.70		
Firm grey-brown slightly sandy CLAY with fine rootlets. (ALLUVIUM).	2.00	9.50				
Firm to stiff brown-grey speckled black silty CLAY with many shelly fragments. (ALLUVIUM).	3.00	8.50	C2	2.00-3.00		

Window Sample Complete at 3.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.80mbgl and bentonite from 1.80m to 3.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

WS113
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

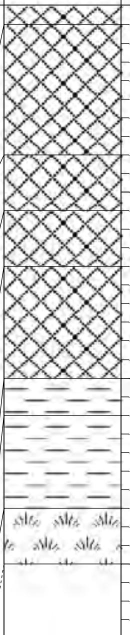
Project ID: SI1688

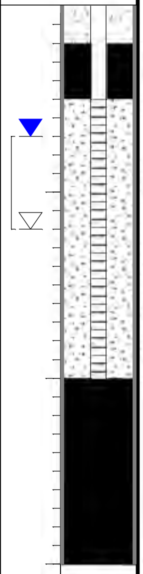
Contractors ID:

Client: Entec UK Ltd

Engineer: N / A

Ground Level: 11.285mAOD
Coordinates: 535829.30E
192671.03N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Brown silty slightly gravelly fine and medium SAND. Gravel is angular to subrounded fine to coarse flint and brick.	0.10	11.19	ES1	0.20-0.40			
MADE GROUND: Brown-grey silty gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, flint and concrete with 10% cobble.	0.80	10.49	ES2	0.80-1.00			
MADE GROUND: Firm grey and dark grey CLAY with silty sand pockets. Approximately 15% concrete cobbles. Slight possible hydrocarbon odour.	1.10	10.19	C1 ES3	1.20-2.00 1.30-1.40			
MADE GROUND: Very soft dark grey slightly sandy slightly gravelly SILT. Gravel is angular to subangular fine to coarse brick and flint.	1.40	9.89	ES4	1.50-1.60			
MADE GROUND: Very soft black slightly sandy gravelly SILT with low cobble content of concrete. Gravel is angular fine to coarse brick, concrete, flint, wood fragments and metal. Hydrocarbon staining and slight hydrocarbon odour.	2.00	9.29	C2	2.00-3.00			
Firm dark brown CLAY.	2.20	9.09					
Stiff brown-grey CLAY with some shelly fragments below 2.40mbgl. (ALLUVIUM).	2.70	8.59					
Soft (spongy) dark brown and black pseudo fibrous PEAT. (ALLUVIUM).	3.00	8.29					

Window Sample Complete at 3.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
18/03/11	1.20	20	0.70	-	

Client: Entec UK Ltd
Engineer: N / A
Date: 18/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.00mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 2.00mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.00mbgl and bentonite from 2.00m to 3.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

WS115
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

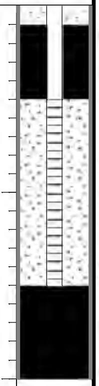
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.772mAOD
Coordinates: 535745.22E
192767.91N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results PID (ppm)	Installations
MADE GROUND: Comprising grey-brown slightly silty gravelly SAND. Gravel is angular to rounded limestone, brick and flint.		0.25	10.52	ES1 ES2	0.10-0.20 0.25-0.45		
MADE GROUND: Comprising dark brown and black slightly sandy slightly gravelly SILT. Gravel is angular to rounded fine to medium limestone, brick, flint and clinker.		0.45	10.32				
MADE GROUND: Comprising firm brown and black slightly gravelly CLAY. Gravel is angular to rounded fine to coarse brick, flint and clinker.		0.70	10.07	ES3 C1 ES4	0.70-1.00 1.00-2.00 1.00-1.20		
MADE GROUND: Comprising soft to firm brown sandy slightly gravelly CLAY. Gravel is angular fine to coarse brick, clinker, flint and rare wood fragments, slightly ashy.		1.40	9.37	ES5	1.40-1.50		
Possible made ground: Firm dark brown and black slightly sandy CLAY. (ALLUVIUM).		1.50	9.27				
Firm brown mottled grey CLAY. (ALLUVIUM).		1.90	8.87				
Soft dark grey clayey SILT with frequent fine rootlets. (ALLUVIUM).		2.00	8.77				

Window Sample Complete at 2.00 m



Drive Records

Diameter (mm)	To (m)	Recovery (%)
128	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	14/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.50mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.50mbgl. Hole backfilled with concrete from GL to 0.10mbgl, bentonite from 0.10m to 0.50mbgl, gravel from 0.50m to 1.50mbgl and bentonite from 1.50m to 2.00mbgl. Hole finished with a flush cover and gas tap.

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Window Sample Record

WS116
Sheet 1 of 1

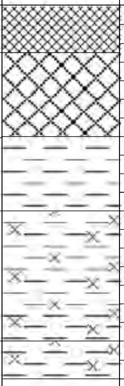
Project: London Waste Ecopark, Edmonton

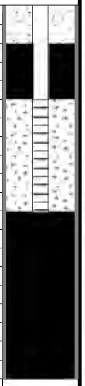
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.415mAOD
Coordinates: 535655.88E
192701.48N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: TARMAC.		0.25	10.17					
MADE GROUND: Brown-grey silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, concrete and flint with approximately 10% brick cobbles.		0.70	9.72	ES1	0.40-0.60			
POSSIBLE MADE GROUND: Firm to stiff grey CLAY.		1.10	9.32	ES2	0.80-1.00			
Firm to stiff grey silty CLAY becoming very soft and mottled brown below 1.40mbgl. (ALLUVIUM).		1.80	8.62	C1	1.20-2.00			
Very soft dark brown and black pseudo fibrous very organic peaty silty CLAY. (ALLUVIUM).		2.00	8.42					
Window Sample Complete at 2.00 m								





Water Level Observations

Drive Records		
Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 21/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Hand pit dug from GL to 1.10mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.00mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.10mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.10mbgl and bentonite from 1.10m to 2.00mbgl.

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Window Sample Record

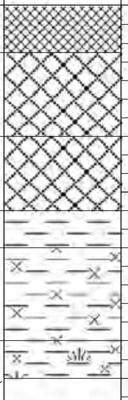
WS117
Sheet 1 of 1

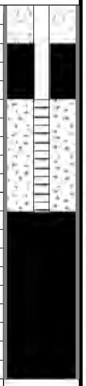
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.369mAOD
Coordinates: 535664.23E
192688.51N





Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: TARMAC.		0.25	10.12					
MADE GROUND: Yellow-grey silty very gravelly fine to coarse SAND. Gravel is angular fine to coarse concrete, brick and flint.		0.70	9.67	ES1	0.30-0.50			
POSSIBLE MADE GROUND: Firm to stiff brown CLAY.		1.10	9.27	ES2	0.80-1.00			
Firm to stiff grey CLAY. (ALLUVIUM).		1.30	9.07	C1	1.10-2.00			
Very soft to soft grey mottled brown silty CLAY. (ALLUVIUM).		1.80	8.57					
Very soft dark brown and black pseudo fibrous very organic peaty silty CLAY. (ALLUVIUM).		2.00	8.37					
Window Sample Complete at 2.00 m								

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 21/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Hand put dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.10mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.10mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.10mbgl and bentonite from 1.10m to 2.00mbgl.

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Window Sample Record

WS118
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.984mAOD
Coordinates: 535715.30E
192708.95N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Mixed black silty gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint with some brick and orange-brown silty gravelly (approximately 15%) CLAY. Gravel is angular to subrounded fine to coarse flint.		0.30	10.68	ES1	0.10-0.30			
MADE GROUND: Firm to stiff grey-brown slightly sandy slightly gravelly (approximately 10%) Gravel.is angular to subrounded fine to coarse flint with some brick.		0.80	10.18	ES2	0.40-0.60			
MADE GROUND: Yellow brown slightly silty very sandy angular to subangular fine to coarse flint gravel		1.20	9.78	ES3	1.00-1.20			
MADE GROUND: Firm dark CLAY.		1.40	9.58	C1	1.20-2.00			
MADE GROUND: Yello brown GRAVEL and subrounded to rounded fine to coarse flint		1.60	9.38					
MADE GROUND: Ceramic pipe filled with brown sandy silt.		1.90	9.08					
MADE GROUND: Brown silty gravelly SAND. Gravel is subangular fine to coarse flint and brick.		2.00	8.98					

Window Sample Complete at 2.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 18/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utlising 128mm diameter casing.
3. Hole terminated at 2.00mbgl and backfilled due to possible service strike (clay pipe). Possible service suspected to be redundant.
4. Hole backfilled with arisings from GL to 1.00mbgl and bentonite from 1.00m to 2.00mbgl.

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Window Sample Record

WS119
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

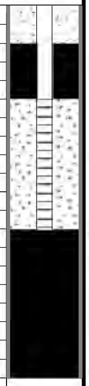
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.788mAOD
Coordinates: 535766.40E
192717.01N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: TARMAC.		0.10	10.69					
CONCRETE.		0.30	10.49	ES1 B1	0.30-0.50 0.35-0.50			
MADE GROUND: Yellow-brown silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint with occasional brick.		0.60	10.19	B2	0.60-0.80			
MADE GROUND: Brick and tarmac gravel and rubble and silty fine to coarse SAND matrix.		0.75	10.04	ES2 B3	0.80-1.00 1.00-1.20			
MADE GROUND: Black silty gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse brick and flint with approximately 15% brick cobbles. Some sandy clay pockets.		1.20	9.59	C1 ES3	1.20-2.00 1.40-1.50			
Stiff to very stiff grey speckled black CLAY. (ALLUVIUM).		1.50	9.29					
Stiff to very stiff grey-brown CLAY. (ALLUVIUM).		1.80	8.99					
Firm to stiff grey slightly sandy CLAY. (ALLUVIUM).		2.00	8.79					

Window Sample Complete at 2.00 m



Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Client: Entec UK Ltd
Engineer: N / A
Date: 15/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.20mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.20mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.20mbgl and bentonite from 1.20m to 2.00mbgl.

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Window Sample Record

WS120
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.741mAOD
Coordinates: 535708.80E
192546.54N

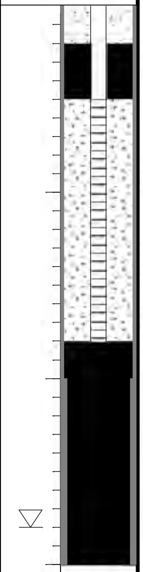
Description	Depth (m)	O.D. Level (m)
MADE GROUND: Reinforced Concrete	0.20	10.54
MADE GROUND: Sandy concrete and brick cobbles.	0.35	10.39
MADE GROUND: Yellow-brown silty very gravelly SAND. Gravel is angular fine to coarse flint and concrete.	0.70	10.04
MADE GROUND: Dark grey and green-grey sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse flint and concrete.	1.73	9.01
MADE GROUND: Dark grey-brown sandy GRAVEL of angular to subangular fine to coarse flint.	1.80	8.94
Firm dark grey mottled brown slightly gravelly CLAY. Gravel is subangular to rounded medium to coarse flint. (ALLUVIUM).	1.85	8.89
Firm grey mottled CLAY. (ALLUVIUM). ...From 2.00mbgl. Becoming soft.	2.30	8.44
Very soft grey mottled brown silty CLAY. (ALLUVIUM).	2.35	8.39
Very soft dark grey mottled brown SILT. (ALLUVIUM).	2.45	8.29
Very soft dark brown pseudo fibrous (peaty) SILT. (ALLUVIUM).	2.80	7.94
Firm dark brown pseudo fibrous PEAT. (ALLUVIUM).	2.95	7.79
Dark brown sandy GRAVEL of subrounded to rounded fine to coarse flint. (KEMPTON PARK GRAVEL).	3.00	7.74

Window Sample Complete at 3.00 m

Sample Test Type	Depth (m)
B1	0.35-0.60
ES1	0.40-0.60
ES2	0.70-0.90
B2	0.80-1.20
C1	1.20-2.00
ES3	1.75-1.80
ES4	1.80-1.85
C2	2.00-3.00

Remarks and Test Results PID (ppm)

Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
-	2.80	-	-	-	

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Client: Entec UK Ltd
Engineer: N / A
Date: 16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.80mbgl and bentonite from 1.80m to 3.00mbgl.

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Window Sample Record

WS121
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

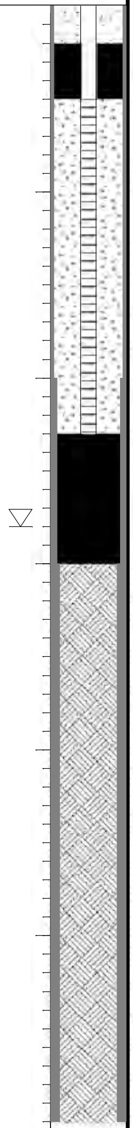
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.703mAOD
Coordinates: 535803.55E
192588.84N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results PID (ppm)
MADE GROUND: Tarmac.		0.01	10.70			
CONCRETE.		0.30	10.40	ES1	0.30-0.50	
MADE GROUND: Yellow-brown silty very gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint.						
MADE GROUND: Fine to stiff dark grey slightly sandy slightly gravelly (approximately 15%) CLAY. Gravel is angular to subangular fine to coarse flint, brick and concrete (approximately 10%) concrete and brick cobbles. ...From 1.10mbgl Becoming soft to firm with no cobbles. ...From 1.40mbgl Becoming stiff.		0.80	9.90			
				ES2	0.90-1.10	
				C1	1.20-2.00	
				ES3	1.50-1.60	
				C2	2.00-3.00	
MADE GROUND: Brown-black silty sandy GRAVEL of angular fine to coarse flint.		2.40	8.30	ES4	2.40-2.80	
MADE GROUND: Soft to firm grey-brown silty slightly gravelly CLAY. Gravel is subangular to subrounded medium to coarse flint and rare brick.		2.65	8.05			
				C3	3.00-4.00	
Poor recovery (casing to 2.00mbgl flow back) Possible natural. ... Between 4.00m and 4.30mbgl Brick cobbles.		4.00	6.70	C4	4.00-5.00	
				C5	5.00-6.00	
		5.90	4.80			
Stiff brown slightly gravelly CLAY. Gravel is subrounded to rounded medium flint. (ALLUVIUM).		6.00	4.70			
Window Sample Complete at 6.00 m						

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	
76	6.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
-	2.80	-	-	-	

Client: Entec UK Ltd
Engineer: N / A
Date: 15/03/2011-16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.30mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 2.30mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.30mbgl and bentonite from 2.30m to 3.00mbgl.
4. Hole collapsed between 3.00m and 6.00mbgl.

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Window Sample Record

WS122
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

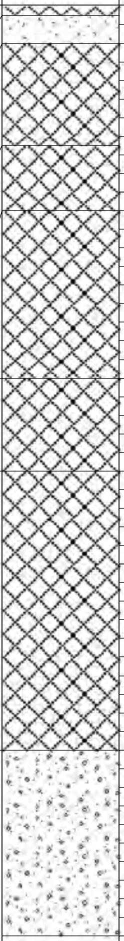
Contractors ID:

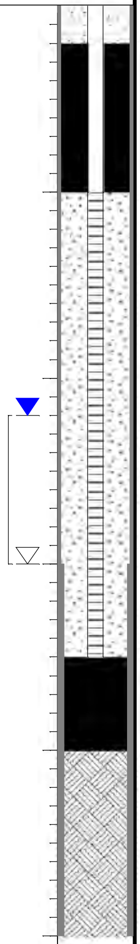
Client: Entec UK Ltd

Engineer: N / A

Ground Level: 10.744mAOD
Coordinates: 535747.13E
192518.46N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results PID (ppm)	Installations
MADE GROUND: Tarmac.		0.05	10.69				
CONCRETE.		0.20	10.54				
MADE GROUND: Yellow brown slightly silty very gravelly fine to coarse SAND. Gravel is subrounded to angular fine to coarse flint. ...At 0.60mbgl much brick rubble		0.75	9.99	ES1	0.30-0.50		
MADE GROUND:Brown-grey silty gravelly fine to coarse SAND. Gravel is angular fine to coarse brick, concrete and flint.		1.10	9.64	ES2	0.80-1.00		
MADE GROUND: Firm to stiff brown-grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse brick and flint. ...From 1.60mbgl becoming grey-brown		2.00	8.74	C1 ES3	1.20-2.00 1.40-1.50		
MADE GROUND: Soft brown-grey slightly gravelly silty CLAY. Gravel is angular fine to coarse flint.		2.50	8.24	C2	2.00-3.00		
MADE GROUND: Very soft sandy gravelly SILT. Gravel is angular to subangular fine to coarse flint and brick and rare wood fragments. Cobble of clinker with hydrocarbon staining and slight odour at 3.95mbgl.		4.00	6.74	ES4 C3	2.60-2.70 3.00-4.00		
Brown sandy GRAVEL at angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL).		5.00	5.74	C4	4.00-5.00		
Window Sample Complete at 5.00 m							





Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	
86	5.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
16/03/11	3.00	20	2.20	-	

Client: Entec UK Ltd
Engineer: N / A
Date: 16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 3.50mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 3.50mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl, gravel from 1.00m to 3.50mbgl and bentonite from 3.50m to 4.00mbgl.
4. Hole collapsed between 4.00m and 5.00mbgl.

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Window Sample Record

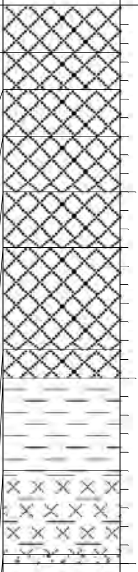
WS123
Sheet 1 of 1

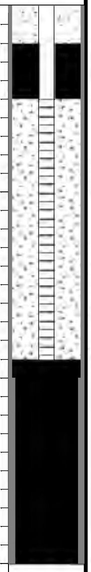
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.168mAOD
Coordinates: 535702.36E
192448.15N





Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Tarmac.		0.25	10.92	ES1	0.20-0.40			
MADE GROUND: Dense brown-gry silty gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse brick, concrete and flint.		0.45	10.72	ES2	0.50-0.70			
MADE GROUND: Stiff brown-grey gravelly CLAY. Gravel is angular to rounded fine to coarse. Rounded to angular flint, brick and tarmac.		0.70	10.47	ES3	0.80-1.00			
MADE GROUND: Brown-grey clayey very gravelly fine to coarse SAND. Gravel is angular fine to coarse brick and flint. (approximately 20% brick cobbles).		1.00	10.17					
MADE GROUND: Grey slightly silty very sandy rounded to angular flint, concrete and brick GRAVEL.		1.30	9.87	C1 ES4 ES5	1.20-2.00 1.20-1.30 1.30-1.40			
MADE GROUND: Stiff green-grey slightly gravelly CLAY. Gravel is subangular medium to coarse flint, brick and concrete. Black hydrocarbon staining and slight odour between 1.30m and 1.50mbgl.		1.85	9.32					
MADE GROUND: Stiff green-grey mottled black slightly gravelly CLAY. Gravel is subangular fine to medium flint. ...At 1.95mbgl Peaty band.		2.00	9.17	C2	2.00-3.00			
Stiff green-grey speckled black CLAY. (ALLUVIUM).		2.50	8.67					
Soft grey clayey SILT. (ALLUVIUM).		2.95	8.22					
Grey gravelly SAND. Gravel is subangular to rounded fine to coarse flint and shelly fragments. (ALLUVIUM).		3.00	8.17					
Window Sample Complete at 3.00 m								

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.90mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 1.90mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.90mbgl and bentonite from 1.90m to 3.00mbgl.

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Window Sample Record

WS124
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

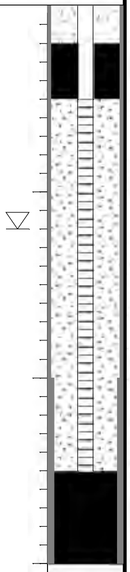
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.207mAOD
Coordinates: 535739.14E
192436.79N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Tarmac.		0.20	11.01	ES1	0.20-0.40			
MADE GROUND: Dense grey silty very fine to coarse SAND. Gravel is angular fine to coarse brick, concrete and flint.		0.55	10.66					
MADE GROUND: Firm brown CLAY with occasional angular to subangular fine to coarse flint gravel.		1.15	10.06	ES2	0.80-1.00			
MADE GROUND: Green-brown very gravelly SAND. Gravel is angular to subrounded fine to coarse flint. ...At 1.35mbgl Asbestos pipe fragment.		1.40	9.81	C1 ES3 ES4 ES5	1.20-2.00 1.30-1.40 1.35 1.40-1.50			
MADE GROUND: Black-brown slightly sandy GRAVEL of angular to rounded fine to coarse flint. Black hydrocarbon staining and slight odour.		1.55	9.66					
MADE GROUND: Stiff dark brown slightly gravelly CLAY. Gravel is angular fine to coarse brick, ceramics and flint.		2.50	8.71	ES6 C2	1.90-2.00 2.00-3.00			
Stiff dark brown-grey CLAY with some pseudo fibrous peaty material. (ALLUVIUM).		2.65	8.56					
Soft green-grey mottled brown clayey SILT. (ALLUVIUM).		3.00	8.21					

Window Sample Complete at 3.00 m



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102 86	2.00 3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
16/03/11	1.20	-	-	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.50mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 2.50mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.50mbgl and bentonite from 2.50m to 3.00mbgl.

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Window Sample Record

WS125
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

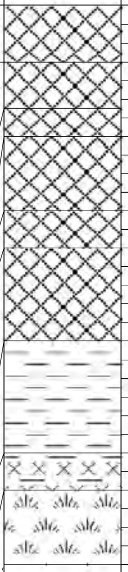
Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.594mAOD
Coordinates: 535789.27E
192499.21N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Tarmac	0.30	10.29
MADE GROUND: Yello-brown slightly slity very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint with a little brick.	0.55	10.04
MADE GROUND: Sandy angular brick gravel and cobbles.	0.70	9.89
MADE GROUND: Stiff grey CLAY.	1.10	9.49
MADE GROUND: Very soft brown-grey clayey SILT.	1.30	9.29
MADE GROUND: Stiff dark grey slightly gravelly silty CLAY. Gravel is angular to subangular fine to medium flint and brick. ...At 1.70mbgl Coarse gravel sized brick fragments.	1.80	8.79
Firm brown-grey CLAY. (ALLUVIUM). ...From 2.20mbgl Becoming soft and grey-brown.	2.40	8.19
Very soft dark grey-black clayey SILT. (ALLUVIUM).	2.60	7.99
Firm dark grey-brown and grey pseudo fibrous PEAT. (ALLUVIUM).	3.00	7.59

Window Sample Complete at 3.00 m

Legend

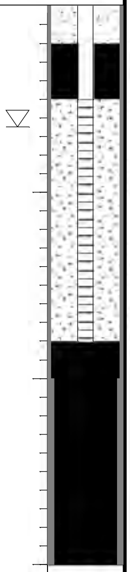


Sample Test

Type	Depth (m)
ES1	0.30-0.50
ES2	0.80-1.00
C1	1.20-2.00
ES3	1.20-1.30
ES4	1.50-1.60
C2	2.00-3.00

Remarks and Test Results PID (ppm)

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
-	0.65	-	-	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to .50mbgl and a slotted pipe from 0.50m to 1.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.80mbgl and bentonite from 1.80m to 3.00mbgl.

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Window Sample Record

WS126
Sheet 1 of 1

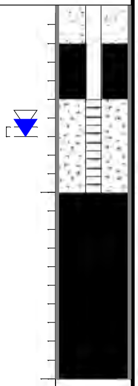
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.886mAOD
Coordinates: 535819.25E
192506.31N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
TOPSOIL: Dark brown sandy CLAY.		0.10	10.79					
MADE GROUND: Brown-grey clayey gravelly fine to coarse SAND. Gravel is angular fine to coarse flint brick and concrete. ...From 0.65mbgl Concrete and brick rubble		0.90	9.99	ES1 ES2	0.30-0.50 0.90-1.10			
Firm to Stiff grey CLAY. (ALLUVIUM). ...From 1.20mbgl Grey mottled brown.		2.00	8.89	C1 ES3	1.20-2.00 1.70-1.80			
Window Sample Complete at 2.00 m								



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
16/03/11	0.65	20	0.70	-	

Client:	Entec UK Ltd
Engineer:	N / A
Date:	16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.00mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.00mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.00mbgl and bentonite from 1.00m to 2.00mbgl.

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Window Sample Record

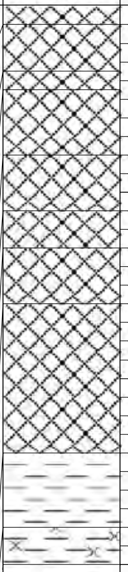
WS127
Sheet 1 of 1

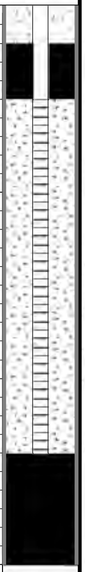
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.243mAOD
Coordinates: 535790.50E
192441.88N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Dark brown silty fine and medium SAND.	0.10	11.14	ES1	0.10-0.30			
MADE GROUND: Brown-grey silty gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint, brick and concrete.	0.35	10.89					
MADE GROUND: Yellow-brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint.	0.45	10.79					
			ES2	0.60-0.80			
MADE GROUND: Grey-brown clayey very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint with occasional brick.	0.80	10.44	ES3	0.80-1.00			
MADE GROUND: Stiff brown-grey CLAY.	1.10	10.14					
			C1	1.20-2.00			
MADE GROUND: Firm to stiff brown slightly gravelly CLAY with rootlets. Gravel is angular to subangular fine to coarse brick and flint.	1.30	9.94					
			ES4	1.50-1.60			
MADE GROUND: Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint and brick.	1.60	9.64					
			C2 ES5	2.00-3.00 2.00-2.10			
MADE GROUND: Soft to firm dark brown-grey slightly gravelly silty CLAY. Gravel is angular to rounded fine to coarse flint and brick with slight hydrocarbon odour at 2.00mbgl.	2.40	8.84					
Stiff grey mottled brown CLAY. (ALLUVIUM).	2.80	8.44					
Very soft to soft dark brown-black very organic silty CLAY. (ALLUVIUM).	3.00	8.24					

Window Sample Complete at 3.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 21/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Hand pit dug form GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.40mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 2.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl, gravel from 1.00m to 2.40mbgl and bentonite from 2.40m to 3.00mbgl.

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Window Sample Record

WS128

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Contractors ID:

Client: Entec UK Ltd

Engineer: N / A

Ground Level: 12.055mAOD
Coordinates: 535775.98E
192395.75N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test		Remarks and Test Results	PID (ppm)	Installations
				Type	Depth (m)			
MADE GROUND: Grass over dark brown slightly gravelly (approximately 10%) sandy CLAY with rootlets in top 0.05mbgl. Gravel is angular fine to coarse brick and flint.		1.10	10.96	ES1 B1 B2 ES2	0.00-0.20 0.30-0.50 0.80-1.00 0.80-1.00			
MADE GROUND: Firm dark brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse brick, flint and concrete. ...From 1.40mbgl Geotextile and wood fragments. Black hydrocarbon staining and clinker gravel.		1.50	10.56	C1 ES3	1.20-2.00 1.40-1.50			
MADE GROUND: Brown slightly clayey sandy GRAVEL of angular to subrounded fine to coarse flint and brick.		1.77	10.29	ES4	1.50-1.70			
Stiff grey-brown CLAY. (ALLUVIUM).		2.00	10.06					
Window Sample Complete at 2.00 m								

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	16/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.70mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.65mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.70mbgl and bentonite from 1.70m to 2.00mbgl.

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Window Sample Record

WS129

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

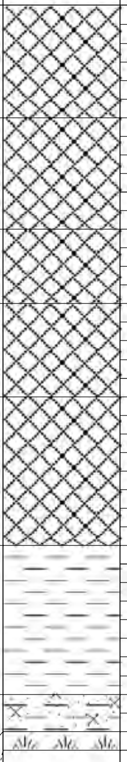
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 11.526mAOD
Coordinates: 535710.48E
192379.49N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Dark brown silty gravelly fine and medium SAND. Gravel is angular fine to coarse flint and brick.	0.60	10.93
MADE GROUND: Firm brown-grey sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular to subangular fine to coarse flint, brick and concrete.	1.20	10.33
MADE GROUND: Brown clayey gravelly SAND. Gravel is angular to rounded fine to coarse flint and brick.	1.60	9.93
MADE GROUND: Dark brown and black clayey gravelly SAND. Gravel is subangular to rounded fine to coarse flint with rare brick.	2.10	9.43
MADE GROUND: Firm to stiff grey and dark grey slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint and brick. ...From 2.30mbgl grey mottled brown. ...From 2.70mbgl dark grey.	2.90	8.63
Firm to stiff grey CLAY. (ALLUVIUM). ...From 3.00mbgl grey mottled brown. ...From 3.30mbgl soft.	3.70	7.83
Firm light grey and black slightly sandy clayey SILT with shell fragments. (ALLUVIUM).	3.90	7.63
Stiff dark brown and black pseudo fibrous PEAT. (ALLUVIUM).	4.00	7.53

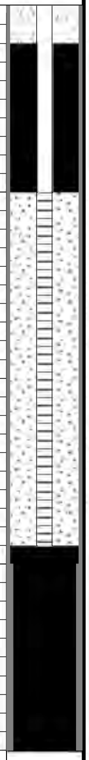
Window Sample Complete at 4.00 m



Sample Test Type	Sample Test Depth (m)
ES1	0.10-0.30
ES2	0.70-0.90
C1	1.20-2.00
ES3	1.40-1.50
ES4	1.70-1.80
C2	2.00-3.00
ES5	2.80-2.90
C3	3.00-4.00

Remarks and Test Results PID (ppm)

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	
86	4.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client:	Entec UK Ltd
Engineer:	N / A
Date:	21/03/2011
Plant:	Terrier
Drilled By:	M. Lane
Logged By:	J. T / T. K
Checked By:	D.Dunn

Remarks:
1. Hand pit dug from GL to 1.10mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.90mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 2.90mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl, gravel from 1.00m to 2.90mbgl and bentonite from 2.90m to 4.00mbgl.

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Window Sample Record

WS130
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

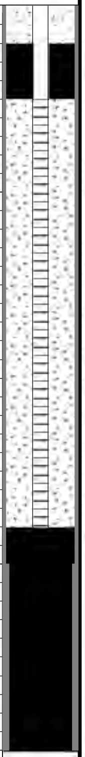
Client: Entec UK Ltd
Engineer: N / A

Ground Level: 12.820mAOD
Coordinates: 535706.30E
192342.70N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Brown-grey clayey gravelly fine and medium SAND. Gravel is angular to subangular flint, brick and concrete.	0.60	12.22
MADE GROUND: Firm to stiff brown-grey sandy slightly gravelly (approximately 10%) CLAY. Gravel is angular fine to coarse brick, concrete, flint and glass with occasional cobbles (low cobble content) of brick.	1.40	11.42
MADE GROUND: Firm to stiff brown slightly sandy gravelly CLAY with low cobble content of brick. Gravel is angular fine to coarse brick, concrete, flint and rare clinker.	1.90	10.92
MADE GROUND: Brown slightly clayey gravelly SAND. Gravel is angular fine to coarse brick, concrete and flint.	2.60	10.22
MADE GROUND: Firm to stiff grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded flint.	2.80	10.02
Firm to stiff grey slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. (ALLUVIUM).	3.95	8.87
Firm dark brown pseudo fibrous (peaty) very organic CLAY. (ALLUVIUM).	4.00	8.82
Window Sample Complete at 4.00 m		

Sample Test Type	Depth (m)	Remarks and Test Results	PID (ppm)
ES1	0.20-0.40		
ES2	1.00-1.20		
C1	1.20-2.00		
ES3	1.70-1.80		
C2	2.00-3.00		
ES4	2.30-2.40		
C3	3.00-4.00		

Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102 86	3.00 4.00	

Client: Entec UK Ltd
Engineer: N / A
Date: 15/03/2011-16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.80mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 2.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 2.80mbgl and bentonite from 2.80m to 4.00mbgl.

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Window Sample Record

WS131
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688

Contractors ID:

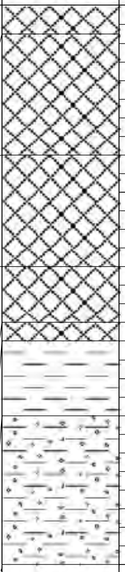
Client: Entec UK Ltd

Engineer: N / A

Ground Level: 12.384mAOD
Coordinates: 535751.04E
192358.39N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Dark brown clayey gravelly fine and medium SAND. Gravel is angular to subangular fine to coarse flint.	0.15	12.23
MADE GROUND: Brown-grey clayey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse brick, concrete and flint.	0.80	11.58
MADE GROUND: Firm brown-grey slightly sandy slightly gravelly (approximately 5%) CLAY. Gravel is angular to subangular fine to coarse flint.	1.40	10.98
MADE GROUND: Stiff brown-grey slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse brick, flint and clinker. ...From 1.55mbgl dark brown with some black staining.	1.70	10.68
MADE GROUND: Firm to stiff brown sandy slightly gravelly CLAY with low flint cobble content. Gravel is angular to subrounded brick and flint.	1.80	10.58
Firm to stiff brown mottled grey CLAY. (ALLUVIUM). ...From 1.90mbgl slightly sandy.	2.20	10.18
Firm to stiff grey slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse flint. (ALLUVIUM).	3.00	9.38

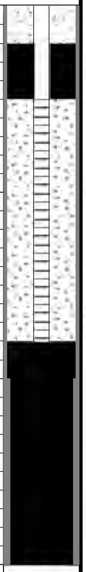
Window Sample Complete at 3.00 m



Sample Test Type	Sample Test Depth (m)
ES1	0.20-0.40
ES2	0.80-1.00
C1	1.20-2.00
ES3	1.60-1.70
C2	2.00-3.00

Remarks and Test Results | PID (ppm)

Installations



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	
86	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 21/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Hand pit sug from GL to 1.20mbgl.
2. Hole cased at 2.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.80mbgl and bentonite from 1.80m to 3.00mbgl.

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Window Sample Record

WS132
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 10.968mAOD
Coordinates: 535715.05E
192304.25N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Slightly clayey gravelly (ashy) SAND. Gravel is angular fine to coarse brick, concrete, ceramics, glass and flint.		0.20	10.77	ES1	0.20-0.30			
MADE GROUND: Stiff slightly sandy gravelly CLAY. Gravel is angular fine to coarse brick, concrete, flint and clinker.		0.40	10.57	ES2	0.50-0.60			
MADE GROUND: Stiff sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse brick, flint, concrete, glass and clinker.		0.70	10.27					
MADE GROUND: Brown gravelly SAND with high content of bricks. Gravel is angular fine to coarse brick and flint.		1.30	9.67	C1	1.20-2.00			
Stiff grey CLAY. (ALLUVIUM).		1.35	9.62					
Stiff dark brown-black very organic slightly clayey fibrous PEAT. (ALLUVIUM).		1.95	9.02					
Firm to stiff green-grey CLAY. (ALLUVIUM).		2.00	8.97					

Window Sample Complete at 2.00 m

Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	2.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 23/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D. Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Installation details: 40mm HDPE Standpipe installed from GL to 1.30mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.30mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.30mbgl and bentonite from 1.30m to 2.00mbgl.

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Window Sample Record

WS133

Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

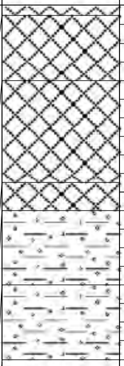
Project ID: SI1688

Contractors ID:

Client: Entec UK Ltd

Engineer: N / A

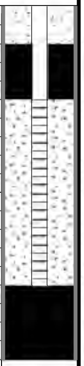
Ground Level: 11.154mAOD
Coordinates: 535756.32E
192325.77N



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)
MADE GROUND: Grass over firm brown slightly sandy gravelly CLAY with rootlets. Gravel is angular to subrounded fine to coarse flint and brick.	0.05	11.10	ES1	0.30-0.40		
MADE GROUND: Brown sandy gravelly CLAY. Gravel is angular to subrounded fine to coarse flint, brick, clinker and concrete with low cobble content of brick and clinker.	0.40	10.75	ES2	0.50-0.60		
MADE GROUND: Dark brown slightly sandy slightly gravelly very organic CLAY. Gravel is angular to subangular fine to coarse brick and flint. ...From 0.75mbgl becoming gravelly with low cobble content of brick and concrete.	0.95	10.20	ES3	1.00-1.10		
MADE GROUND: Light brown slightly gravelly silty SAND with low cobble content of bricks. Gravel is angular fine to coarse brick and clinker.	1.10	10.05	C1	1.10-1.90		
POSSIBLE MADE GROUND: Soft to firm grey slightly gravelly CLAY. Gravel is subangular fine to medium flint.	1.50	9.65				
Very soft to soft grey slightly gravelly CLAY. Gravel is subrounded fine to medium flint. (ALLUVIUM).	1.90	9.25				

Window Sample Complete at 1.90 m

Installations



Drive Records		
Diameter (mm)	To (m)	Recovery (%)
102	1.90	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 22/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1 Hand pit dug form GL to 1.20mbgl.
2. Installation details: 40mm HDPE Standpipe installed from GL to 1.50mbgl. Plain pipe from GL to 0.50mbgl and a slotted pipe from 0.50m to 1.50mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 0.50mbgl, gravel from 0.50m to 1.50mbgl and bentonite from 1.50m to 1.90mbgl.

May Gurney Limited
Geotechnical - Site Investigation
Ayton Road, Wymondham, NR18 0RH
Tel: 01953 609856 Fax: 01953 609819
Web: www.maygurney.co.uk

Window Sample Record

WS134
Sheet 1 of 1

Project: London Waste Ecopark, Edmonton

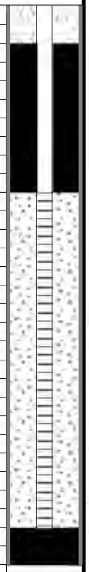
Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 12.035mAOD
Coordinates: 535839.21E
192883.53N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Tarmac		0.25	11.79					
MADE GROUND: Red-brown gravelly SAND. Gravel is angular to subangular fine to coarse granite (Road Sub-base).		0.50	11.54					
MADE GROUND: Yellow-brown very gravelly SAND. Gravel is subangular to subrounded fine to coarse flint.		1.10	10.94	B1 ES1 B2	0.50-0.60 0.50-0.60 0.80-1.00			
MADE GROUND: Firm brown-grey CLAY. ...From 1.30mbgl Very stiff		2.00	10.04	B3 C1 ES2	1.10-1.20 1.20-2.00 1.50-1.60			
MADE GROUND: Orange-brown gravelly SAND. Gravel is angular to subangular fine to coarse flint.		2.45	9.59	C2 ES3	2.00-3.00 2.20-2.30			
MADE GROUND: Very stiff brown slightly sandy gravelly CLAY. Gravel is angular fine to coarse flint and brick		2.75	9.29	ES4	2.50-2.60			
Stiff brown mottled grey CLAY with many fine rootlets. (ALLUVIUM).		3.00	9.04					

Window Sample Complete at 3.00 m



Drive Records

Diameter (mm)	To (m)	Recovery (%)
102	3.00	

Water Level Observations

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 16/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from GL to 1.20mbgl.
2. Hole cased at 3.00mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 2.80mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 2.80mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl, gravel from 1.00m to 2.80mbgl and bentonite from 2.80m to 3.00mbgl.

MAY GURNEY

May Gurney Limited
Geotechnical - Site Investigation
Ayton Road, Wymondham, NR18 0RH
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Window Sample Record

WS135
Sheet 1 of 1

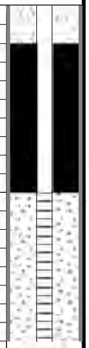
Project: London Waste Ecopark, Edmonton

Project ID: SI1688
Contractors ID:

Client: Entec UK Ltd
Engineer: N / A

Ground Level: 12.936mAOD
Coordinates: 535735.00E
192399.31N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	Remarks and Test Results	PID (ppm)	Installations
MADE GROUND: Brown-grey silty gravelly fine and medium SAND. Gravel is angular fine to coarse flint, brick and concrete.	▨	0.70	12.24	ES1	0.10-0.30			
MADE GROUND: Brown-grey clayey gravelly fine and medium SAND. Gravel is angular fine to coarse flint, brick and concrete.	▨	1.10	11.84	ES2	0.70-0.90			
MADE GROUND: Firm brown slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse concrete, brick, flint and rare clinker. ...From 1.50m to 1.60mbgl gravelly sand. ...At 1.80mbgl concrete obstruction.	▨	1.80	11.14	C1 ES3	1.10-1.80 1.40-1.50			
Window Sample Complete at 1.80 m								



Water Level Observations

Drive Records Diameter (mm)	To (m)	Recovery (%)
102	1.80	

Date	Water Strike (m)	Standing Time (Mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
	No Groundwater Encountered				

Client: Entec UK Ltd
Engineer: N / A
Date: 22/03/2011
Plant: Terrier
Drilled By: M. Lane
Logged By: J. T / T. K
Checked By: D.Dunn

Remarks:
1. Hand pit dug from Gl to 1.10mbgl.
2. Hole cased at 1.80mbgl utilising 128mm diameter casing.
3. Installation details: 40mm HDPE Standpipe installed from GL to 1.80mbgl. Plain pipe from GL to 1.00mbgl and a slotted pipe from 1.00m to 1.70mbgl. Hole backfilled with concrete from GL to 0.20mbgl, bentonite from 0.20m to 1.00mbgl, gravel from 1.00m to 1.80mbgl.
4. Window sample hole terminated at 1.80mbgl on concrete obstruction.

APPENDIX B

INSTRUMENTATION

Summary of instrumentation and monitoring points:

Exploratory Hole ID	RESPONSE ZONE		Pipe depth m bgl	Pipe dia. mm	Target strata
	Top m AOD	Base m AOD			
BH101	7.76	4.66	7.000	50	KEMPTON PARK GRAVEL
BH102	8.51	4.51	8.000	50	ALLUVIUM / KEMPTON PARK GRAVEL
BH103	7.67	4.47	6.700	50	KEMPTON PARK GRAVEL
BH104	8.42	4.82	7.400	50	ALLUVIUM / KEMPTON PARK GRAVEL
BH105	7.82	3.62	8.500	50	KEMPTON PARK GRAVEL
BH106	8.10	5.80	7.800	50	KEMPTON PARK GRAVEL
BH107	8.39	5.49	5.800	50	KEMPTON PARK GRAVEL
BH108	8.32	5.82	5.300	50	KEMPTON PARK GRAVEL
BH109	8.03	5.53	5.300	50	KEMPTON PARK GRAVEL
BH110	7.95	4.45	6.300	50	KEMPTON PARK GRAVEL
BH113	7.37	4.87	6.300	50	ALLUVIUM / KEMPTON PARK GRAVEL
BH114	10.29	8.49	2.300	50	MADE GROUND / ALLUVIUM
BH115	8.14	4.54	7.100	50	KEMPTON PARK GRAVEL / LONDON CLAY FORMATION
BH116	8.55	5.65	6.100	50	KEMPTON PARK GRAVEL
BH117	7.81	5.71	6.000	50	KEMPTON PARK GRAVEL
BH118	7.08	5.38	5.600	50	KEMPTON PARK GRAVEL
BH119	6.39	5.09	6.100	50	KEMPTON PARK GRAVEL
BH120	7.26	3.96	7.100	50	KEMPTON PARK GRAVEL / REWORKED LONDON CLAY FORMATION
BH121	7.04	5.14	6.200	50	KEMPTON PARK GRAVEL

Exploratory Hole ID	RESPONSE ZONE		Pipe depth m bgl	Pipe dia. mm	Target strata
	Top m AOD	Base m AOD			
BH122	7.64	4.04	8.600	50	ALLUVIUM / KEMPTON PARK GRAVEL
BH123	6.76	3.66	7.300	50	KEMPTON PARK GRAVEL
BH124	7.72	3.72	7.300	50	KEMPTON PARK GRAVEL
WS101	11.73	8.53	3.700	40	MADE GROUND
WS102	12.05	9.15	3.400	40	MADE GROUND
WS103	10.79	9.49	1.800	40	MADE GROUND
WS104	11.72	8.62	3.600	40	MADE GROUND / ALLUVIUM
WS105	10.38	9.08	1.800	40	MADE GROUND
WS106	13.43	12.13	1.800	40	MADE GROUND
WS107	13.67	9.37	5.000	40	MADE GROUND
WS108	13.81	9.81	4.600	40	MADE GROUND
WS109	10.43	9.93	1.000	40	MADE GROUND
WS110	11.13	9.33	2.300	40	MADE GROUND
WS111	11.16	9.36	2.300	40	MADE GROUND / ALLUVIUM
WS112	11.00	9.50	2.000	40	MADE GROUND / ALLUVIUM
WS113	10.79	9.49	1.800	40	MADE GROUND
WS115	10.27	8.77	2.000	40	MADE GROUND / ALLUVIUM
WS116	9.92	8.92	1.500	40	MADE GROUND / ALLUVIUM
WS117	9.87	9.27	1.100	40	MADE GROUND
WS119	10.29	9.69	1.100	40	MADE GROUND

Exploratory Hole ID	**RESPONSE ZONE**		**Pipe depth m bgl**	**Pipe dia. mm**	**Target strata**
	Top m AOD	**Base m AOD**			
WS120	10.24	9.54	1.200	40	MADE GROUND
WS121	10.20	8.90	1.800	40	MADE GROUND
WS122	10.24	8.44	2.300	40	MADE GROUND
WS123	10.17	7.67	3.500	40	MADE GROUND / ALLUVIUM
WS124	10.71	9.31	1.900	40	MADE GROUND
WS125	10.09	8.09	2.500	40	MADE GROUND / ALLUVIUM
WS126	10.39	9.09	1.800	40	MADE GROUND / ALLUVIUM
WS127	10.74	10.24	1.000	40	MADE GROUND
WS128	11.56	9.66	2.400	40	MADE GROUND / ALLUVIUM
WS129	11.03	9.83	1.700	40	MADE GROUND
WS130	11.82	9.92	2.900	40	MADE GROUND / ALLUVIUM
WS131	11.88	9.58	2.800	40	MADE GROUND / ALLUVIUM
WS132	10.47	9.17	1.800	40	MADE GROUND / ALLUVIUM
WS133	10.65	9.85	1.300	40	MADE GROUND
WS134	11.04	9.24	2.800	40	MADE GROUND / ALLUVIUM
WS135	11.94	11.24	1.700	40	MADE GROUND

Notes RESPONSE ZONE m aOD based on depth below ground Elevation.

APPENDIX C

GEOTECHNCIAL LABORATORY TEST RESULTS

SI1688, LondonWaste EcoPark -
Geotechnical Laboratory Summary Chain of Custody

SAMPLE DETAILS						CLASSIFICATION DETAILS					TRIAXIAL TESTS						MISC TESTS			OTHER	CHEMICAL TESTS						REMARKS
					Log Amended to Result	2/3	2/4.3 2/4.4	2/7.2 2/3.3	2/9	2/9	7/9	7/8			7/4 7/5	7/7 8/7 8/8	5/3	4/3	4/5	Please Specify	3/3 3/4	3/9	3/5.2 3/5.3 3/5.4	TRL447 / BRE / Concrete Suites			
HOLE_ID	SAMP_TYPE	SAMP_REF	SAMP_TOP	SAMP_BASE	Tick indicates complete √	W	PL/LL 1 pt	Bulk &Dry	PSD Sieve 9.2 (Wet)	PSD Fine 9.4 (Hyd) 9.5 (pip)	Multi	UU Single	Dia (mm)	Cell Pressures	Shear Box Small	Un CU CD	OED k	Comp 1 l Mould	MCV	FPL	Org	pH	SO3 Acid Sol Water Sol Gdw	Greenfield	Brownfield Suite	Pyrite Suite	PSD always wet unless otherwise stated. Fine sieve always
BH101	U	1	3.000	-	√						1		100	50, 100, 200			1										oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800 kPa
BH101	D	5	3.500	3.600	√																				1		
BH101	B	7	5.000	6.000	√				1	R																	Insufficent fines
BH101	U	2	8.000	-	√						1		100	75, 150, 300													
BH101	D	11	8.400	8.500	√	1	1																				
BH101	U	4	13.000	-	√						1		100	125, 250, 500													
BH101	D	15	13.400	13.500	√	1	1																				
BH102	D	5	3.000	3.450	√	1	1																				
BH102	W	1	4.100	-	√																				M		Missing Samples
BH102	B	7	5.000	6.000	√				1	R																	
BH102	D	10	8.000	8.450	√	1	1																				
BH103	D	2	2.000	2.450	√																				1		
BH103	U	1	3.000	-	√						1		100	30, 60, 120			1										Oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800
BH103	B	7	4.000	4.500	√				1	R																	
BH103	D	6	6.000	6.450	√																				1		
BH103	U	2	7.000	-	√						1		100	75, 150, 300													
BH103	D	8	7.450	7.550	√	1	1																				
BH103	U	3	8.700	-	√						1		100	100, 200, 400													
BH103	D	9	9.150	9.250	√	1	1																				
BH103	D	10	10.000	10.450	√																				1		
BH103	U	4	11.500	-	√						1		100	150, 300, 600													
BH103	D	11	11.950	12.050	√	1	1																				
BH104	U	1	1.200	-	√							1	100	15, 30, 60			1										Failed on first pressure
BH104	D	4	1.7	1.8	√	1	1																				
BH104	D	5	2.000	2.450	√																				1		
BH104	U	2	3.000	-	√						1		100	50, 100, 200			1										oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800 kPa
BH104	W	1	3.900	-	√																				1		
BH104	B	9	5.000	6.000	√				1	R																	Insufficent fines
BH104	U	3	8.000	-	√						1		100	75, 150, 300													
BH104	D	12	8.400	8.500	√	1	1																				
BH104	D	13	9.000	9.450	√																				1		
BH105	U	2	4.000	-	√						1		100	40, 80, 160			1										Oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800
BH105	W	1	4.300	-	√																				1		
BH105	B	8	6.000	7.000	√				1	R																	
BH105	D	12	8.500	8.700	√	1	1																				
BH106	D	6	3.500	3.950	√	1	1																				
BH106	U	1	5.100	-	√						1		100	50, 100, 200			1										oedometer pressures 100, 200, 400, 800, 200, 400, 800, 1600 kPa
BH106	D	9	5.550	-	√																				1		
BH106	B	8	6.500	7.000	√				1	1																	
BH106	U	2	8.500	-	√						1		100	75, 150, 300			1										oedometer pressures 100, 200, 400, 800, 200, 400, 800, 1600 kPa
BH106	D	14	8.950	-	√	1	1																				
BH106	B	11	9.500	10.000	√				1	1																	

MAY GURNEY

SI1688, LondonWaste EcoPark -
Geotechnical Laboratory Summary Chain of Custody

SAMPLE DETAILS						CLASSIFICATION DETAILS					TRIAXIAL TESTS						MISC TESTS			OTHER	CHEMICAL TESTS						REMARKS
					Log Amended to Result	2/3	2/4.3 2/4.4	2/7.2 2/3.3	2/9	2/9	7/9	7/8			7/4 7/5	7/7 8/7 8/8	5/3	4/3	4/5	Please Specify	3/3 3/4	3/9	3/5.2 3/5.3 3/5.4	TRL447 / BRE / Concrete Suites			
HOLE_ID	SAMP_TYPE	SAMP_REF	SAMP_TOP	SAMP_BASE	Tick indicates complete √	W	PL/LL 1 pt	Bulk &Dry	PSD Sieve 9.2 (Wet)	PSD Fine 9.4 (Hyd) 9.5 (pip)	Multi	UU Single	Dia (mm)	Cell Pressures	Shear Box Small	Un CU CD	OED k	Comp 1 l Mould	MCV	FPL	Org	pH	SO3 Acid Sol Water Sol Gdw	Greenfield	Brownfield Suite	Pyrite Suite	PSD always wet unless otherwise stated. Fine sieve always
BH106	U	3	11.000	-	√						1		100	100, 200, 400													
BH106	D	16	11.450	-	√	1	1																				
BH106	D	17	12.500	12.950	√																				1		
BH106	U	4	14.000	-	√						1		100	150, 300, 600													
BH106	D	18	14.450	-	√	1	1																				
BH107	D	2	1.100	-	√																				1		
BH107	D	2	1.100	-	√																				1		
BH107	D	3	1.400	-	√	1	1																				
BH107	D	6	2.400	-	√	1	1																				
BH107	B	6	3.500	4.000	√				1	1																	
BH107	D	11	5.800	-	√																				1		
BH107	D	11	5.800	-	√																				1		
BH107	U	1	6.500	-	√						1		100	50, 100, 200			1										oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800 kPa
BH107	D	12	6.950	-	√	1	1																				
BH107	D	13	7.500	7.950	√																						
BH107	U	2	8.500	-	√						1		100	100, 200, 400			1										
BH107	D	14	8.950	-	√	1	1																				
BH108	D	6	2.100	-	√																				1		
BH108	B	7	3.500	4.000	√				1	R																	Insufficent fines
BH108	U	1	6.500	-	√						1		100	50, 100, 200													
BH108	D	14	6.950	-	√	1	1																				
BH108	U	3	10.500	-	√						1		100	100, 200, 400													
BH108	D	18	10.950	-	√	1	1																				
BH109	B	9	3.500	4.000	√				M	M																	Missing Samples
BH109	D	10	5.200	5.650	√																				1		
BH109	U	1	6.500	-	√						M		100	75, 150, 300													Missing Samples
BH109	D	11	6.950	-	√	M	M																				Missing Samples
BH109	U	3	10.500	-	√						1		100	100, 200, 400													
BH110	D	5	1.900	-	√																				1		
BH110	D	6	2.200	-	√	1	1																				
BH110	U	1	2.500	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH110	D	8	2.800	-	√	1	1																				
BH110	B	7	3.300	3.500	√				1	1																	
BH110	W	1	3.600	-	√																				1		
BH110	B	11	5.300	6.000	√				1	1																	
BH110	U	2	7.500	-	√						1		100	75, 150, 300													
BH110	D	13	7.950	-	√	1	1																				
BH110	D	14	8.500	8.950	√																				1		
BH110	U	3	9.500	-	√						1		100	100, 200, 400													

<u>SI1688, LondonWaste EcoPark -</u>
<u>Geotechnical Laboratory Summary Chain of Custody</u>

SAMPLE DETAILS						CLASSIFICATION DETAILS					TRIAXIAL TESTS						MISC TESTS			OTHER	CHEMICAL TESTS						REMARKS
					Log Amended to Result	2/3	2/4.3 2/4.4	2/7.2 2/3.3	2/9	2/9	7/9	7/8			7/4 7/5	7/7 8/7 8/8	5/3	4/3	4/5	Please Specify	3/3 3/4	3/9	3/5.2 3/5.3 3/5.4	TRL447 / BRE / Concrete Suites			
HOLE_ID	SAMP_TYPE	SAMP_REF	SAMP_TOP	SAMP_BASE	Tick indicates complete √	W	PL/LL 1 pt	Bulk &Dry	PSD Sieve 9.2 (Wet)	PSD Fine 9.4 (Hyd) 9.5 (pip)	Multi	UU Single	Dia (mm)	Cell Pressures	Shear Box Small	Un CU CD	OED k	Comp 1 l Mould	MCV	FPL	Org	pH	SO3 Acid Sol Water Sol Gdw	Greenfield	Brownfield Suite	Pyrite Suite	PSD always wet unless otherwise stated. Fine sieve always
BH110	D	15	9.950	-	√	1	1																				
BH113	U	1	2.000	-	√						1		100	25, 50, 100			1										Oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800
BH113	D	2	2.450	2.850	√																				1		
BH113	D	3	3.000	3.450	√	1	1																				
BH113	U	2	4.000	-	√						1		100	50, 100, 200			1										Oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800
BH113	B	7	4.500	5.500	√				1	R																	
BH114	D	2	2.000	2.450	√																				1		
BH114	B	6	3.000	3.450	√				1	1																	
BH114	B	9	6.000	6.450	√				1	R																	
BH115	W	1	1.900	-	√																				1		
BH115	D	7	3.000	-	√	M	M																				Missing Samples
BH115	D	9	4.500	4.950	√	M	M																				Missing Samples
BH116	W	1	1.000	-	√																				1		
BH116	U	1	2.500	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH116	B	6	3.400	4.000	√				1	1																	
BH116	B	7	4.500	5.000	√				1	1																	
BH116	D	12	6.100	6.500	√	1	1																				
BH116	U	2	7.500	-	√							1	100	75, 150, 300			1										Failed on first pressure
BH116	D	13	7.950	-	√	1	1																				
BH116	U	3	9.500	-	√							1	100	100, 200, 400													Failed on first pressure
BH116	D	15	9.950	-	√	1	1																				
BH116	D	17	12.450	-	√																				1		
BH116	U	5	15.000	-	√						1		100	150, 300, 600													
BH116	D	20	15.450	-	√	1	1																				
BH116	D	21	16.500	16.950	√																				1		
BH116	U	6	18.000	-	√						1		100	200, 400, 800													
BH116	D	22	18.450	-	√	1	1																				
BH116	U	7	21.000	-	√						1		100	200, 400, 800													
BH116	D	24	21.450	24.000	√	1	1																				
BH117	U	1	2.500	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH117	W	1	2.900	-	√																				1		
BH117	D	6	2.950	-	√	1	1																				
BH117	B	8	4.500	5.000	√				1	R																	Insufficent fines
BH118	D	3	1.200	-	√																				1		
BH118	U	1	1.500	-	√						1		100	15, 30, 60			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH118	D	4	1.950	2.000	√	1	1																				
BH118	U	2	3.000	-	√						1		100	30, 60, 120			1										oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800 kPa
BH118	W	1	3.400	-	√																				1		
BH118	D	6	3.450	3.500	√	1	1																				
BH118	B	6	4.000	4.500	√				1	R																	Insufficent fines

SI1688, LondonWaste EcoPark -
Geotechnical Laboratory Summary Chain of Custody

SAMPLE DETAILS						CLASSIFICATION DETAILS					TRIAXIAL TESTS						MISC TESTS			OTHER	CHEMICAL TESTS						REMARKS
					Log Amended to Result	2/3	2/4.3 2/4.4	2/7.2 2/3.3	2/9	2/9	7/9	7/8			7/4 7/5	7/7 8/7 8/8	5/3	4/3	4/5	Please Specify	3/3 3/4	3/9	3/5.2 3/5.3 3/5.4	TRL447 / BRE / Concrete Suites			
HOLE_ID	SAMP_TYPE	SAMP_REF	SAMP_TOP	SAMP_BASE	Tick indicates complete √	W	PL/LL 1 pt	Bulk &Dry	PSD Sieve 9.2 (Wet)	PSD Fine 9.4 (Hyd) 9.5 (pip)	Multi	UU Single	Dia (mm)	Cell Pressures	Shear Box Small	Un CU CD	OED k	Comp 1 l Mould	MCV	FPL	Org	pH	SO3 Acid Sol Water Sol Gdw	Greenfield	Brownfield Suite	Pyrite Suite	PSD always wet unless otherwise stated. Fine sieve always
BH118	U	3	6.500	-	√						1		100	75, 150, 300													
BH118	D	9	6.950	7.000	√																				1		
BH118	U	4	8.000	-	√						1		100	75, 150, 300													
BH118	D	11	8.450	8.500	√	1	1																				
BH118	W	2	11.800	-	√																				1		
BH118	B	12	14.500	16.000	√				1	1																	
BH119	D	3	3.000	3.450	√																				1		
BH119	D	4	4.000	4.200	√	1	1																				
BH119	U	1	4.000	-	√						1		100	50, 100, 200			1										oedometer pressures 50, 100, 200, 400, 100, 200, 400, 800 kPa
BH119	B	9	5.000	5.450	√				1	1																	
BH119	U	2	7.000	-	√						1		100	75, 150, 300			1										oedometer pressures 100, 200, 400, 800, 200, 400, 800, 1600 kPa
BH119	D	7	7.450	7.550	√	1	1																				
BH119	D	8	8.000	8.450	√																				1		
BH119	U	3	9.000	-	√						1		100	100, 200, 400													
BH119	D	9	9.450	9.550	√	1	1																				
BH120	D	7	2.000	2.200	√	1	1																				
BH120	D	8	2.200	2.300	√																				1		
BH120	D	9	3.000	3.450	√	1	1																				
BH120	W	1	4.000	-	√																				1		
BH120	B	10	5.000	6.000	√				1	1																	
BH120	U	1	8.000	-	√						1		100	100, 200, 400													
BH120	D	15	8.450	8.500	√	1	1																				
BH120	D	16	9.000	9.450	√																				1		
BH121	U	1	2.000	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH121	D	2	2.450	2.550	√	1	1																				
BH121	D	3	3.000	3.450	√																				M		Missing Samples
BH121	D	4	4.000	4.450	√	1	1																				
BH121	B	8	5.000	5.450	√				1	1																	
BH121	U	2	7.000	-	√						1		100	75, 150, 300													
BH121	D	7	7.450	7.550	√	1	1																				
BH121	D	8	8.000	8.450	√																				1		
BH121	U	3	9.000	-	√						1		100	100, 200, 400													
BH121	D	9	9.450	9.550	√	1	1																				
BH121	D	10	10.000	10.000	√																						
BH122	U	1	3.000	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH122	D	5	5.000	5.450	√	1	1																				
BH122	W	1	5.300	-	√																				1		
BH122	B	10	6.000	7.000	√				1	1																	
BH122	D	7	7.000	7.450	√																				1		
BH122	U	2	9.200	-	√						1		100	100, 200, 400													

SI1688, LondonWaste EcoPark -
Geotechnical Laboratory Summary Chain of Custody

SAMPLE DETAILS						CLASSIFICATION DETAILS					TRIAXIAL TESTS						MISC TESTS			OTHER	CHEMICAL TESTS						REMARKS
					Log Amended to Result	2/3	2/4.3 2/4.4	2/7.2 2/3.3	2/9	2/9	7/9	7/8			7/4 7/5	7/7 8/7 8/8	5/3	4/3	4/5	Please Specify	3/3 3/4	3/9	3/5.2 3/5.3 3/5.4	TRL447 / BRE / Concrete Suites			
HOLE_ID	SAMP_TYPE	SAMP_REF	SAMP_TOP	SAMP_BASE	Tick indicates complete √	W	PL/LL 1 pt	Bulk &Dry	PSD Sieve 9.2 (Wet)	PSD Fine 9.4 (Hyd) 9.5 (pip)	Multi	UU Single	Dia (mm)	Cell Pressures	Shear Box Small	Un CU CD	OED k	Comp 1 l Mould	MCV	FPL	Org	pH	SO3 Acid Sol Water Sol Gdw	Greenfield	Brownfield Suite	Pyrite Suite	PSD always wet unless otherwise stated. Fine sieve always
BH122	D	10	9.650	9.800	√	1	1																				
BH122	D	11	9.800	10.250	√																				1		
BH123	D	1	1.200	1.650	√																				1		
BH123	D	2	2.000	2.450	√	1	1																				
BH123	B	6	3.400	4.000	√				1	R																	Insufficent fines
BH123	B	8	5.000	5.450	√				1	R																	Insufficent fines
BH123	U	1	8.500	-	√						1		100	85, 170, 340													
BH123	D	8	8.950	9.050	√	1	1																				
BH123	D	9	10.000	10.450	√																				1		
BH123	D	10	10.600	-	√	1	1																				
BH123	D	15	13.000	13.450	√	1	1																				
BH123	U	2	14.500	-	√						R		100	150, 300, 600													Insufficent intact sample for test
BH123	B	16	17.500	18.000	√				1	1																	
BH124	D	1	1.200	1.650	√																				1		
BH124	D	2	2.000	2.450	√	1	1																				
BH124	U	1	3.000	-	√						1		100	25, 50, 100			1										oedometer pressures 25, 50, 100, 200, 50, 100, 200, 400 kPa
BH124	B	8	4.000	4.450	√				1	1																	
BH124	B	11	6.800	7.300	√				1	1																	
BH124	U	2	8.500	-	√						1		100	100, 200, 400													
BH124	D	7	8.950	9.050	√	1	1																				
Lab Results Scheduled, Lab result received						53	53		28	16	45	3					22								42		
Lab Results Scheduled, Lab result not received - Restricted										12	1																
Lab Results Scheduled,Sample noted as missing at Laboratory						3	3		1	1	1														2		

PROJECT NAME **EDMONTON ECOPARK**

PROJECT NO: **GEO / 16819**

Date	06/05/2011
Approved	Simon Burke
Page	1 of 4

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH101	5.00 - 6.00	7	B	Brown and grey sandy GRAVEL																Particle Size Distribution Test
BH101	8.40 - 8.50	11	D	Dark grey silty CLAY	27	76	27	49	100											
BH101	13.40 - 13.50	15	D	Dark grey fine sandy silty CLAY	23	49	19	30	100											
BH101	3.00	1	U	Soft grey organic silty CLAY with rare plant remains	80					1.56	0.87	50 100 200	60 66 70	33	28	1.5				Oedometer Consolidation Test
BH101	8.00	2	U	Firm to stiff fissured grey silty CLAY	31					1.96	1.50	75 150 300	155 159 165	80	74	1				
BH101	13.00	4	U	Very stiff dark grey silty CLAY	23					2.09	1.69	125 250 500	299 318 337	159	138	2.5				
BH104	5.00 - 6.00	9	B	Brown sandy GRAVEL																Particle Size Distribution Test
BH104	1.70 - 1.80	4	D	Dark grey silty CLAY with rare fine sand and gravel	30	64	23	41	98											
BH104	8.40 - 8.50	12	D	Dark grey silty CLAY	25	70	26	44	100											
BH104	1.20	1	U	MADE GROUND: (Firm dark brown silty clay with rare fine to medium gravel, brick and mortar fragments)	27					1.99	1.57	15	115	57						Sample failed on first stage of multistage test Oedometer Consolidation Test
BH104	3.00	2	U	Firm brown and dark grey calcareous CLAY with rare gravel	33					1.95	1.47	50 100 200	108 109 110	55	53	0.5				
BH104	8.00	3	U	Firm dark grey silty CLAY with rare fine sand	27					2.03	1.61	75 150 300	130 134 138	67	63	1				

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

PROJECT NAME **EDMONTON ECOPARK**

PROJECT NO: **GEO / 16819**

Date	06/05/2011
Approved	Simon Burke
Page	2 of 4

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH108	3.50 - 4.00	7	B	Brown sandy GRAVEL																Particle Size Distribution Test
BH108	6.95	14	D	Dark grey-brown silty CLAY with rare coarse sand	30	70	25	45	99											
BH108	10.95	18	D	Dark grey - brown slightly fine sandy silty CLAY	25	61	23	38	99											
BH108	2.50	1	U	Soft dark brown clayey PEAT	67					1.44	0.87	50 100 200	33 36 39	18	15	1				
BH108	8.50	3	U	Stiff dark grey silty CLAY with rare fine sand	25					2.01	1.61	100 200 400	251 260 267	130	120	1.5				
BH117	4.50 - 5.00	8	B	Grey slightly sandy GRAVEL																Particle Size Distribution Test
BH117	2.95	6	D	Mottled brown and grey slightly fine sandy silty CLAY with rare medium to coarse sand	50	91	35	56	99											
BH117	2.50	1	U	Soft grey organic CLAY	69					1.54	0.91	25 50 100	49 51 55	26	22	2.5				Oedometer Consolidation Test
BH118	4.00 - 4.50	6	B	Dark grey and black sandy GRAVEL																Particle Size Distribution Test
BH118	14.50 - 16.0	12	B	Grey silty sandy CLAY																Particle Size Distribution Test
BH118	1.95 - 2.00	4	D	Dark brown and dark grey sandy gravelly CLAY	34	69	24	45	77											
BH118	3.45 - 3.50	6	D	Dark brown and black clayey fibrous PEAT	179	260	109	151	100											

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

PROJECT NAME	**EDMONTON ECOPARK**	Date	06/05/2011
		Approved	Simon Burke
PROJECT NO:	**GEO / 16819**	Page	3 of 4

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH118	8.45 - 8.50	11	D	Grey - brown fine sandy silty CLAY	22	57	22	35	100											
BH118	1.50	1	U	Soft to firm dark grey CLAY with rare fine sand and black staining	28					1.96	1.53	15 30 60	82 86 94	44	34	7				Oedometer Consolidation Test
BH118	3.00	2	U	Soft to firm dark brown clayey PEAT	180					1.28	0.46	30 60 120	94 94 95	47	46	0.5				Oedometer Consolidation Test
BH118	6.50	3	U	Firm to stiff fissured dark grey CLAY with rare fine sand	30					2.03	1.56	75 150 300	171 181 188	90	81	2				
BH118	8.00	4	U	Very stiff dark grey silty CLAY with rare fine sand	23					2.12	1.72	75 150 300	334 367 430	189	126	10				
BH123	3.40 - 4.00	6	B	Dark grey slightly clayey silty sandy GRAVEL																Particle Size Distribution Test
BH123	5.00 - 5.45	8	B	Black and grey sandy GRAVEL																Particle Size Distribution Test
BH123	17.50 - 18.0	16	B	Brown silty clayey SAND																Particle Size Distribution Test
BH123	2.00 - 2.45	2	D	MADE GROUND: (Grey and brown organic silty clay with rare gravel and brick fragments)	83	118	56	62	99											
BH123	8.95 - 9.05	8	D	Brown and grey fine sandy silty CLAY	22	52	22	30	100											
BH123	10.60	10	D	Brown slightly fine sandy silty CLAY	24	56	23	33	100											
BH123	13.00 - 13.4	15	D	Grey silty CLAY	28	69	30	39	100											

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME EDMONTON ECOPARK

PROJECT NO: GEO / 16819

Date	06/05/2011
Approved	Simon Burke
Page	4 of 4

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH123	8.50	1	U	Firm to stiff dark grey silty CLAY with rare fine sand	22					2.05	1.68	85 170 340	175 181 187	90	84	1.5				

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
PROJECT NO:	**GEO/16786**	Approved	Simon Burke
		Page	1 of 2

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m^3)	Dry (Mg/m^3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH102	5.00 - 6.00	7	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH102	3.00 - 3.45	5	D	MADE GROUND: (Brown and grey slightly organic clayey sandy silt with rare fine sandstone and brick fragments)	54	107	44	63	99											
BH102	8.00 - 8.45	10	D	Dark grey - brown silty CLAY with rare fine flint gravel	32	68	25	43	96											
BH103	4.00 - 4.50	7	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH103	7.45 - 7.55	8	D	Dark grey brown silty CLAY	31	75	26	49	100											
BH103	9.15 - 9.25	9	D	Dark grey brown silty CLAY	28	71	25	46	100											
BH103	11.95 - 12.05	11	D	Dark brown fine sandy CLAY	23	56	21	35	100											
BH103	3.00	1	U	Soft black organic CLAY	124					1.31	0.59	30 60 120	68 68 67	34	34	0				Oedometer Consolidation Test
BH103	7.00	2	U	Firm dark grey silty CLAY with rare fine to medium sand and gravel	32					2.05	1.55	75 150 300	114 114 118	58	55	0.5				
BH103	8.70	3	U	Stiff dark grey silty CLAY	23					2.06	1.67	100 200 400	263 278 287	138	125	2				
BH103	11.50	4	U	Very stiff dark grey silty CLAY with rare pyrite nodules	24					2.08	1.68	150 300 600	430 500 553	247	179	6.5				
BH105	6.00 - 7.00	8	B	Grey - brown sandy GRAVEL																Particle Size Distribution Test

SUMMARY OF GEOTECHNICAL TESTING

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Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) ☐ J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
PROJECT NO:	**GEO/16786**	Approved	Simon Burke
		Page	2 of 2

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH105	8.50 - 8.70	12	D	Dark grey brown silty CLAY with rare sand and fine gravel	28	72	25	47	97											
BH105	4.00	2	U	Firm dark grey gravelly sandy CLAY	17					1.96	1.67	40 80 160	60 69 81	35	25	4.5				Oedometer Consolidation Test
BH113	4.50 - 5.50	7	B	Dark grey sandy GRAVEL																Particle Size Distribution Test
BH113	3.00 - 3.45	3	D	Black fibrous PEAT with rare fine gravel and wood fragments	204	176	80	96	98											
BH113	2.00	1	U	Firm dark grey slightly organic CLAY	48					1.85	1.26	25 50 100	80 85 88	42	37	3				Oedometer Consolidation Test
BH113	4.00	2	U	Soft sandy gravelly CLAY	12					2.13	1.90	50 100 200	66 79 87	39	29	3.5				Oedometer Consolidation Test

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
	Project No: SI1688	Approved	J Sturges
PROJECT NO:	**GEO / 16762**	Page	1 of 7

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH106	6.50 - 7.00	8	B	Grey brown sandy GRAVEL																Particle Size Distribution Test
BH106	9.50 - 10.00	11	B	Brown silty CLAY																Particle Size Distribution Test
BH106	3.50 - 3.95	6	D	Dark orange clayey SAND and GRAVEL	6.2	25	16	9	17											
BH106	8.95	14	D	Dark grey brown silty CLAY	33	78	32	46	100											
BH106	11.45	16	D	Dark grey brown silty CLAY	29	72	27	45	100											
BH106	14.45	18	D	Dark grey brown silty CLAY	25	64	25	39	100											
BH106	5.10	1	U	Soft mottled light grey and grey CLAY with rare shell fragments and roots	31					2.00	1.52	50 100 200	54 56 57	28	27	0.5				Oedometer Consolidation Test
BH106	8.50	2	U	Firm to stiff dark grey CLAY	32					1.98	1.50	75 150 300	150 150 152	75	74	0				Oedometer Consolidation Test
BH106	11.00	3	U	Stiff dark grey silty CLAY	28					2.06	1.61	100 200 400	263 270 276	135	127	1				
BH106	14.00	4	U	Stiff dark grey fine sandy silty CLAY	25					2.01	1.60	150 300 600	278 287 291	143	136	1				
BH107	3.50 - 4.00	6	B	Grey brown sandy GRAVEL																Particle Size Distribution Test
BH107	1.40	3	D	Dark orange brown clayey SAND and GRAVEL	7.5	30	15	15	19											

SUMMARY OF GEOTECHNICAL TESTING

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Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
	Project No: SI1688	Approved	J Sturges
PROJECT NO:	**GEO / 16762**	Page	2 of 7

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH107	2.40	6	D	Dark grey brown sandy gravelly CLAY	33	84	32	52	63											
BH107	6.95	12	D	Brown slightly clayey SILTSTONE	13															Unsuitable material for Test
BH107	8.95	14	D	Dark grey brown silty CLAY	35	75	30	45	99											
BH107	6.50	1	U	Firm dark brown CLAY	33					1.97	1.49	75 150 300	114 115 117	58	56	0.5				Oedometer Consolidation Test
BH107	8.50	2	U	Stiff fissured dark grey silty CLAY	35					1.96	1.45	100 200 400	175 171 170	86	86	0				
BH110	3.30 - 3.50	7	B	Brown clayey sandy GRAVEL																Particle Size Distribution Test
BH110	5.30 - 5.60	11	B	Brown sandy GRAVEL																Particle Size Distribution Test
BH110	2.20	6	D	Mottled brown, grey and orange sandy CLAY with rare flint gravel	69	113	45	68	96											
BH110	2.80	8	D	Brown clayey SAND and GRAVEL	9.4	48	19	29	21											
BH110	7.95	13	D	Dark brown fine sandy silty CLAY	23	50	21	29	100											
BH110	9.95	15	D	Dark grey brown silty CLAY	26	67	23	44	100											
BH110	2.50	1	U	Firm black and brown slightly organic gravelly CLAY	48					2.07	1.40	75 150 300	79 95 117	48	31	4.5				Oedometer Consolidation Test

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME	**EDMONTON ECOPARK** **Project No: SI1688**	Date	19/04/2011
PROJECT NO:	**GEO / 16762**	Approved	J Sturges
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Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH110	7.50	2	U	Firm to stiff dark grey silty CLAY	28					2.00	1.56	75 150 300	171 179 184	89	82	1.5				
BH110	9.50	3	U	Very stiff dark grey silty CLAY with rare fine sand	24					2.11	1.70	100 200 400	453 490 618	260	155	12.5				
BH119	5.00 - 5.45	9	B	Grey brown sandy GRAVEL																Particle Size Distribution Test
BH119	4.00 - 4.20	4	D	Brown sandy slightly organic SILT with abundant shell fragments	87	NP	NP	NP	77											Sample Non - Plastic
BH119	7.45 - 7.55	7	D	Dark brown silty CLAY	26	61	25	36	100											
BH119	9.45 - 9.55	9	D	Dark grey brown silty CLAY	31	77	30	47	100											
BH119	4.00	1	U	Soft dark grey slightly organic fine sandy clayey SILT with rare shell fragments	48					1.45	0.98	50 100 200	81 78 77	39	39	0				Oedometer Consolidation Test
BH119	7.00	2	U	Stiff dark grey silty CLAY with rare fine sand	27					2.05	1.62	75 150 300	180 197 206	97	83	3				Oedometer Consolidation Test
BH119	9.00	3	U	Firm fissured dark grey silty CLAY	32					1.98	1.50	100 200 400	110 110 112	55	54	0.5				
BH120	5.00 - 6.00	10	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH120	2.00 - 2.20	7	D	MADE GROUND: (Brown and black slightly sandy gravelly clay Gravel is flint with rare slag)	34	79	36	43	58											
BH120	3.00 - 3.45	9	D	Dark brown amorphous PEAT with abundant shell fragments	98	164	100	64	68											

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME **EDMONTON ECOPARK**
Project No: SI1688
PROJECT NO: **GEO / 16762**

Date	19/04/2011
Approved	J Sturges
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Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m^3)	Dry (Mg/m^3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH120	8.45 - 8.50	15	D	Dark grey brown silty CLAY	28	75	28	47	100											
BH120	8.00	1	U	Firm dark grey silty CLAY with rare pyrite nodules	28					2.03	1.58	100 200 400	177 182 191	92	84	1.5				
BH121	5.00 - 5.45	8	B	Brown sandy GRAVEL																Particle Size Distribution Test
BH121	2.45 - 2.55	2	D	Dark brown slightly organic clayey sandy SILT	67	111	59	52	100											
BH121	4.00 - 4.45	4	D	Dark brown fibrous PEAT and flint GRAVEL	61	NP	NP	NP	44											Sample Non - Plastic
BH121	7.45 - 7.55	7	D	Grey CLAY	28	67	26	41	100											
BH121	9.45 - 9.55	9	D	Grey CLAY	25	72	28	44	100											
BH121	2.00	1	U	Firm very dark grey and pale grey marbled alluvial silty CLAY [2.00 to 2.40 m is MADE GROUND]																Oedometer Consolidation Test Insuffcient sample for QUTxl after Oedometer was taken
BH121	7.00	2	U	Stiff fissured dark grey silty CLAY	27					2.01	1.58	75 150 300	181 189 208	96	81	3.5				
BH121	9.00	3	U	Stiff dark grey silty CLAY with rare fine sand	23					2.00	1.63	100 200 400	277 293 314	147	126	3				
BH122	6.00 - 7.00	10	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH122	5.00 - 5.45	5	D	Dark brown sandy gravelly CLAY	38	45	32	13	66											

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
	Project No: SI1688	Approved	J Sturges
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Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m^3)	Dry (Mg/m^3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH122	9.65 - 9.80	10	D	Dark grey silty CLAY	25	66	24	42	100											
BH122	3.00	1	U	Stiff dark grey CLAY with rare fine to medium gravel	31					1.97	1.50	25 50 100	165 164 169	83	79	1.5				Oedometer Consolidation Test
BH122	9.20	2	U	Stiff dark grey silty CLAY with rare pyrite nodules	26					2.03	1.61	100 200 400	224 230 237	115	108	1				
BH124	4.00 - 4.45	8	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH124	6.80 - 7.30	11	B	Grey slightly sandy GRAVEL																Particle Size Distribution Test
BH124	2.00 - 2.45	2	D	Grey brown slightly organic silty CLAY	71	105	30	75	100											
BH124	8.95 - 9.05	7	D	Grey silty CLAY	27	62	25	37	100											
BH124	3.00	1	U	Soft dark grey sandy gravelly CLAY	16					1.90	1.64	25 50 100	53 65 87	34	18	10.5				Oedometer Consolidation Test
BH124	8.50	2	U	Very stiff grey fine sandy CLAY	25					2.07	1.66	100 200 400	303 342 378	170	127	6				
BH109	10.50	3	U	Stiff dark grey silty fine sandy CLAY	27					2.02	1.59	100 200 400	221 231 242	116	104	2				
BH114	3.00 - 3.45	6	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH114	6.00 - 6.45	9	B	Grey sandy GRAVEL																Particle Size Distribution Test

SUMMARY OF GEOTECHNICAL TESTING

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Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

PROJECT NAME	**EDMONTON ECOPARK**	Date	19/04/2011
	Project No: SI1688	Approved	J Sturges
PROJECT NO:	**GEO / 16762**	Page	6 of 7

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m^3)	Dry (Mg/m^3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH116	3.40 - 4.00	6	B	Grey brown clayey sandy GRAVEL																Particle Size Distribution Test
BH116	4.50 - 5.00	7	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH116	6.10 - 6.50	12	D	Grey silty CLAY	29	71	25	46	100											
BH116	7.95	13	D	Grey silty CLAY	31	75	29	46	100											
BH116	9.95	15	D	Dark grey brown silty CLAY	33	80	31	49	100											
BH116	15.45	20	D	Grey silty CLAY	28	75	27	48	100											
BH116	18.45	22	D	Grey silty CLAY	22	48	20	28	100											
BH116	21.45 - 24.0	24	D	Grey silty CLAY	26	68	26	42	100											
BH116	2.50	1	U	Very dark grey organic CLAY	103					1.52	0.75	25 50 100	38 39 40	19	19	0.5				Oedometer Consolidation Test
BH116	7.50	2	U	Firm to stiff dark grey silty CLAY	33					1.97	1.49	75 150 300	151 154 162	78	71	1.5				Oedometer Consolidation Test
BH116	9.50	3	U	Firm fissured dark brown silty CLAY	33					1.98	1.50	100	126	63						
BH116	15.00	5	U	Stiff fissured dark grey silty CLAY	26					2.00	1.58	150 300 600	227 254 268	125	106	2.5				

SUMMARY OF GEOTECHNICAL TESTING

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PROJECT NAME **EDMONTON ECOPARK**

Project No: SI1688

PROJECT NO: **GEO / 16762**

Date	19/04/2011
Approved	J Sturges
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Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH116	18.00	6	U	Very stiff fissured dark grey sandy CLAY	21					1.97	1.62	200	331	166						Multistage went to 20% on 1st stage
BH116	21.00	7	U	Very stiff dark grey silty CLAY	25					1.99	1.59	200 400 800	215 495 531	207	72	11.5				

SUMMARY OF GEOTECHNICAL TESTING

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BS1377 : Part 2 : Clause 9 : 1990

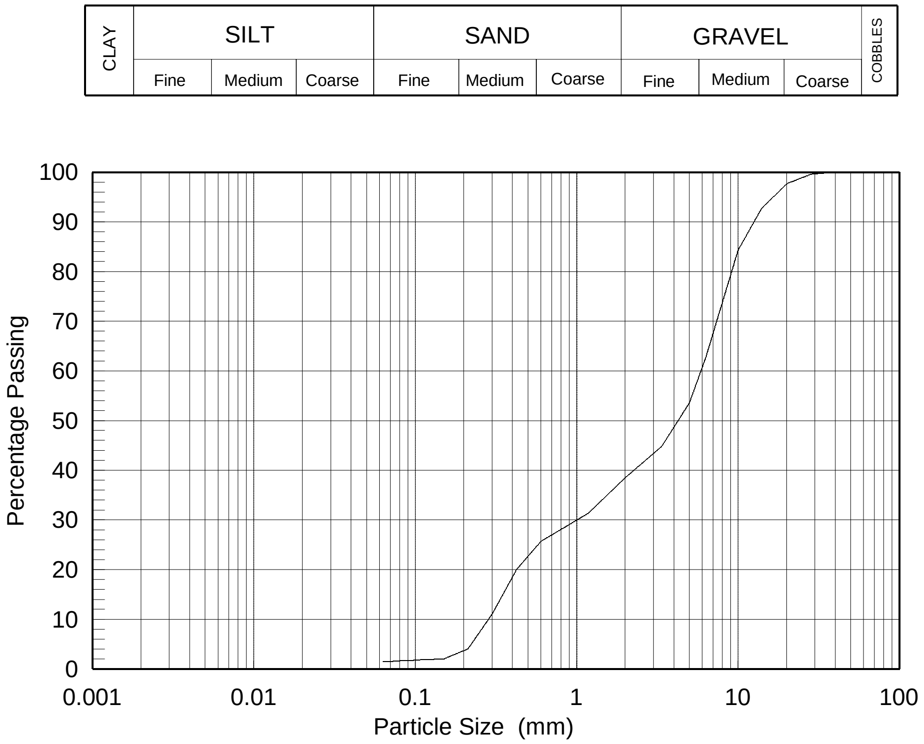
Determination of Particle Size Distribution

Borehole Number: BH101
Sample Number: 7
Depth (m): 5.00 - 6.00

Description:
Brown and grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	98
14 mm	93
10 mm	84
6.3 mm	63
5 mm	54
3.35 mm	45
2 mm	38
1.18 mm	31
600 µm	26
425 µm	20
300 µm	11
212 µm	4
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	61.5	%
Sand	37.0	%
Silt & Clay	1.4	%

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 2 : Clause 9 : 1990

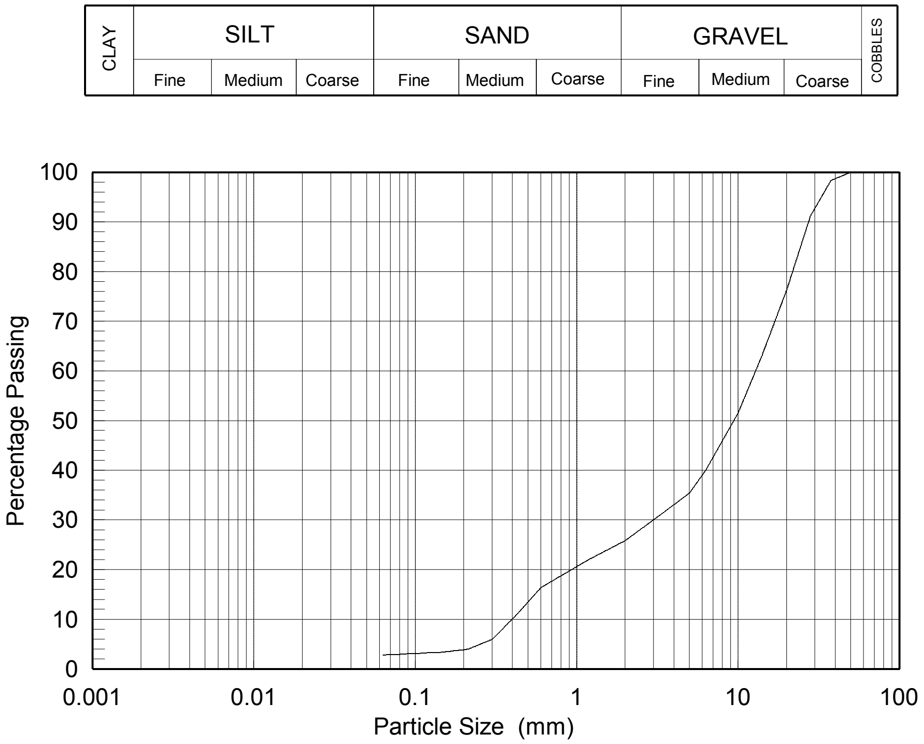
Determination of Particle Size Distribution

Borehole Number:	BH102
Sample Number:	7
Depth (m):	5.00 - 6.00

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
28 mm	91
20 mm	76
14 mm	63
10 mm	52
6.3 mm	40
5 mm	35
3.35 mm	31
2 mm	26
1.18 mm	22
600 µm	16
425 µm	11
300 µm	6
212 µm	4
150 µm	3
63 µm	3



Particle Proportions		
Cobbles	0.0	%
Gravel	74.2	%
Sand	23.0	%
Silt & Clay	2.8	%

Checked and Approved

Initials: JS

Date: 19/04/2011

Project Number:

GEO / 16786

Project Name:

EDMONTON ECOPARK

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

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Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

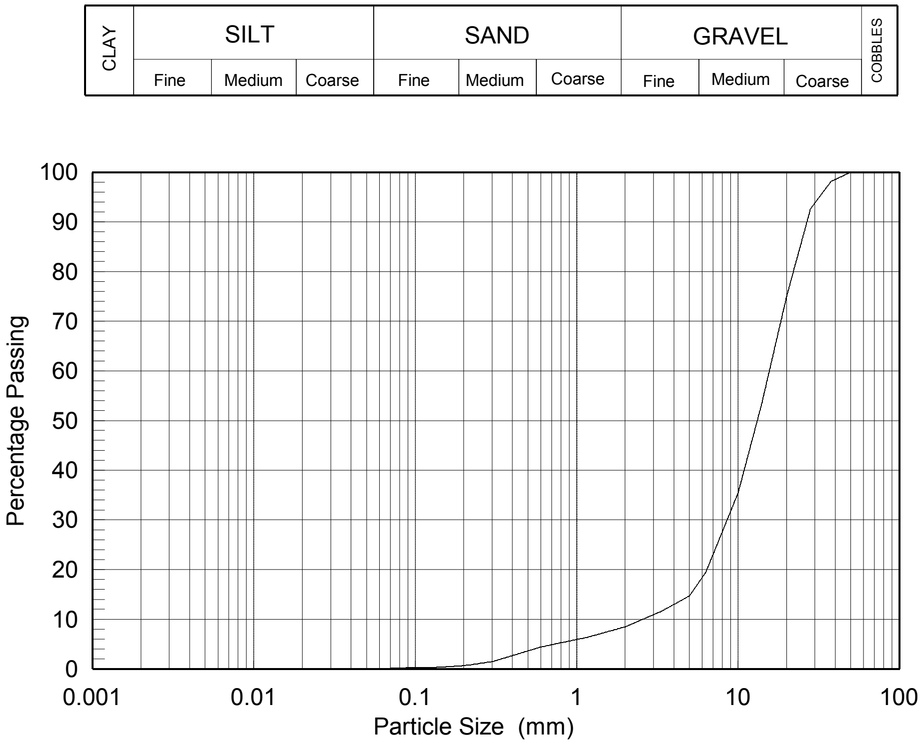
Determination of Particle Size Distribution

Borehole Number: BH103
Sample Number: 7
Depth (m): 4.00 - 4.50

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
28 mm	93
20 mm	75
14 mm	53
10 mm	35
6.3 mm	19
5 mm	15
3.35 mm	12
2 mm	9
1.18 mm	6
600 µm	4
425 µm	3
300 µm	2
212 µm	1
150 µm	0
63 µm	0



Particle Proportions		
Cobbles	0.0	%
Gravel	91.5	%
Sand	8.4	%
Silt & Clay	0.1	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16786

Project Name:
EDMONTON ECOPARK

UKAS TESTING 1982

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ R Platt (Snr Tech)

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Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

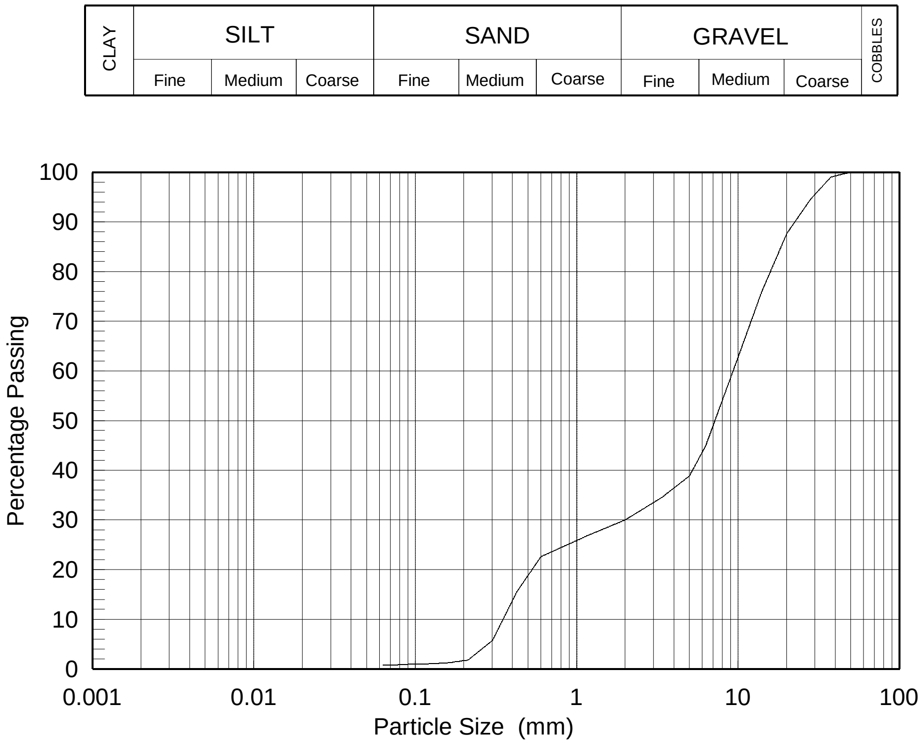
Determination of Particle Size Distribution

Borehole Number: BH104
Sample Number: 9
Depth (m): 5.00 - 6.00

Description:
Brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
28 mm	95
20 mm	88
14 mm	76
10 mm	63
6.3 mm	45
5 mm	39
3.35 mm	35
2 mm	30
1.18 mm	27
600 µm	23
425 µm	15
300 µm	6
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	70.0	%
Sand	29.2	%
Silt & Clay	0.8	%

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number:
GEO / 16819

Project Name:
EDMONTON ECOPARK

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BS1377 : Part 2 : Clause 9 : 1990

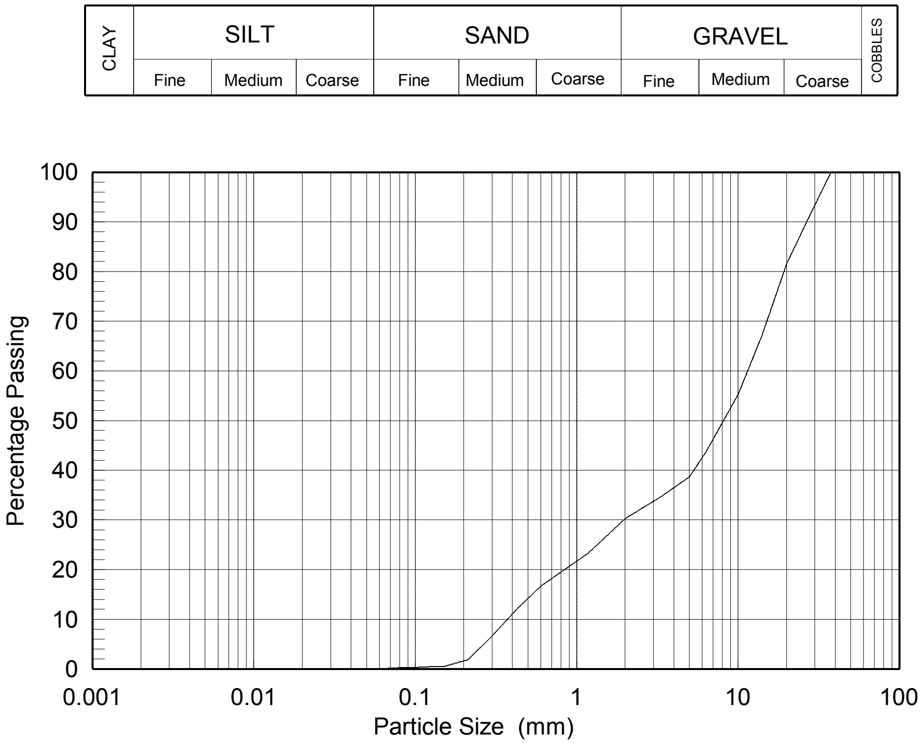
Determination of Particle Size Distribution

Borehole Number: BH105
Sample Number: 8
Depth (m): 6.00 - 7.00

Description:
Grey - brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	92
20 mm	82
14 mm	67
10 mm	55
6.3 mm	44
5 mm	39
3.35 mm	35
2 mm	30
1.18 mm	23
600 µm	17
425 µm	12
300 µm	7
212 µm	2
150 µm	1
63 µm	0



Particle Proportions		
Cobbles	0.0	%
Gravel	69.7	%
Sand	30.1	%
Silt & Clay	0.2	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16786

Project Name:
EDMONTON ECOPARK

UKAS TESTING 1982

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BS1377 : Part 2 : Clause 9 : 1990

Determination of Particle Size Distribution

Borehole Number: 106
Sample Number: 11
Depth (m): 9.50 - 10.00

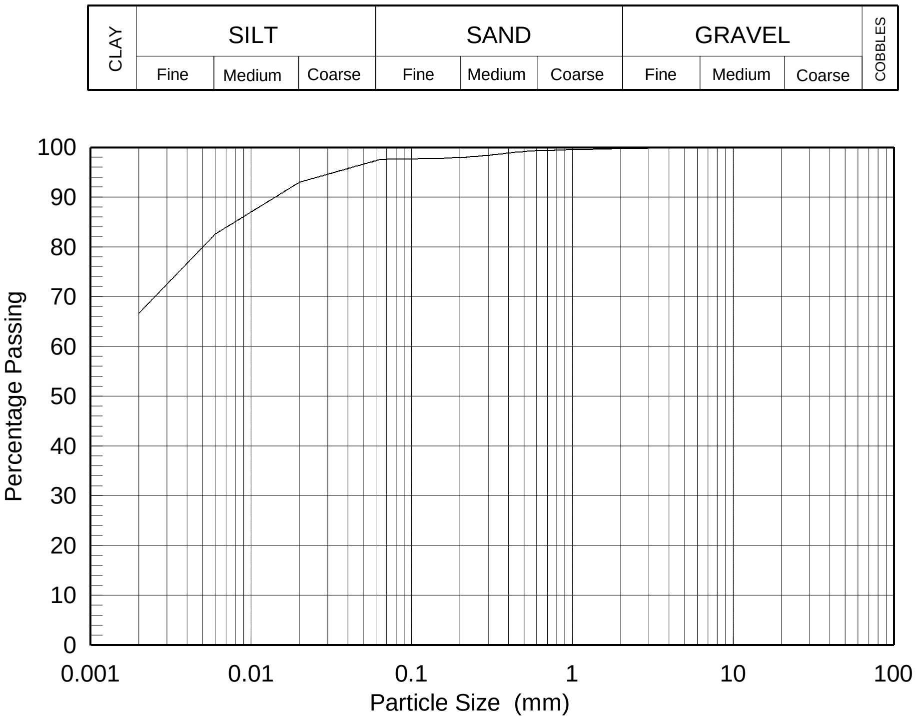
Description:
Brown silty CLAY

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	100
5 mm	100
3.35 mm	100
2 mm	100
1.18 mm	100
600 µm	99
425 µm	99
300 µm	98
212 µm	98
150 µm	98
63 µm	98

PIPETTE	
Particle size	% pass
20.0 µm	93
6.0 µm	83
2.0 µm	67
Preparation: No Pre-treatment used	

Temp (°C)	20



Particle Proportions		
Cobbles	0.0	%
Gravel	0.3	%
Sand	2.2	%
Silt	30.9	%
Clay	66.7	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

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BS1377 : Part 2 : Clause 9 : 1990

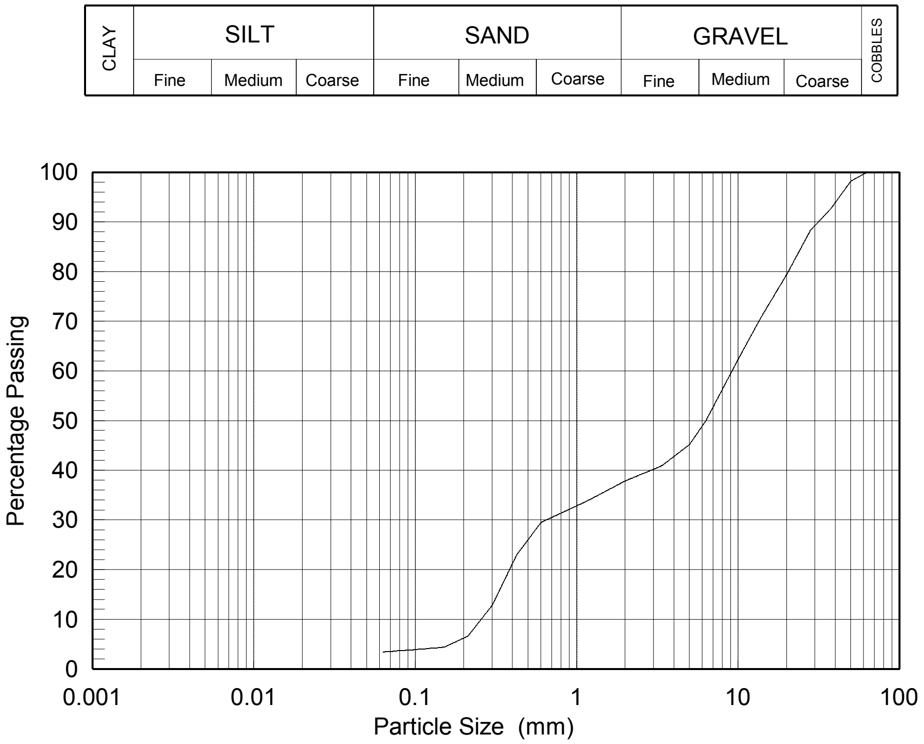
Determination of Particle Size Distribution

Borehole Number: 106
Sample Number: 8
Depth (m): 6.50 - 7.00

Description:
Grey brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	98
37.5 mm	93
28 mm	88
20 mm	79
14 mm	71
10 mm	62
6.3 mm	50
5 mm	45
3.35 mm	41
2 mm	38
1.18 mm	34
600 µm	29
425 µm	23
300 µm	13
212 µm	7
150 µm	4
63 µm	3



Particle Proportions		
Cobbles	0.0	%
Gravel	62.1	%
Sand	34.4	%
Silt & Clay	3.4	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

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BS1377 : Part 2 : Clause 9 : 1990

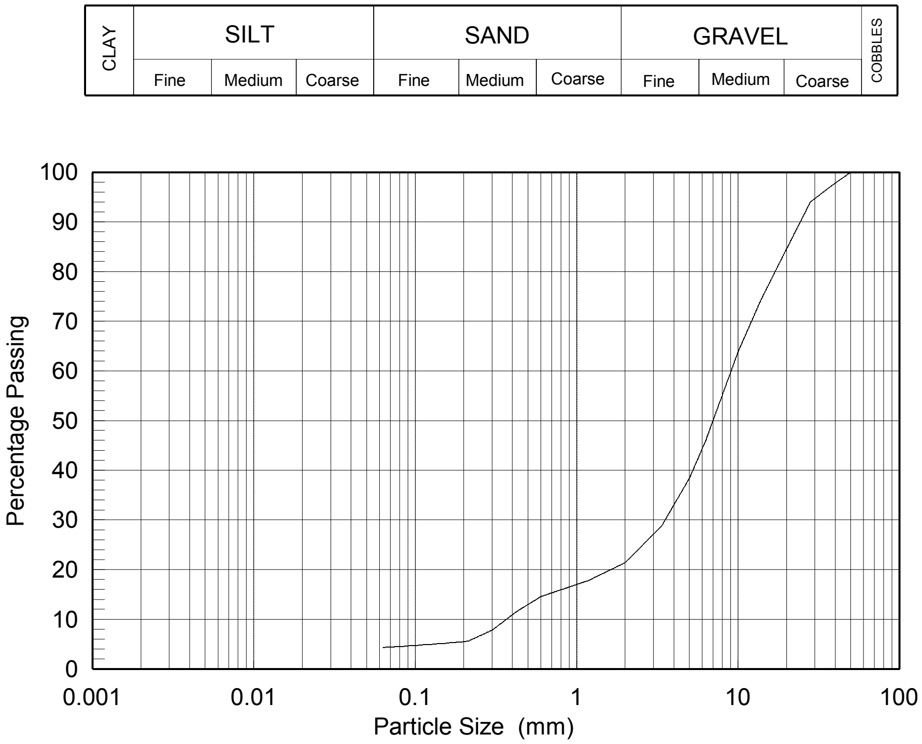
Determination of Particle Size Distribution

Borehole Number: 107
Sample Number: 6
Depth (m): 3.50 - 4.00

Description:
Grey brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	97
28 mm	94
20 mm	85
14 mm	75
10 mm	64
6.3 mm	46
5 mm	38
3.35 mm	29
2 mm	21
1.18 mm	18
600 µm	15
425 µm	12
300 µm	8
212 µm	6
150 µm	5
63 µm	4



Particle Proportions		
Cobbles	0.0	%
Gravel	78.6	%
Sand	17.1	%
Silt & Clay	4.3	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

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BS1377 : Part 2 : Clause 9 : 1990

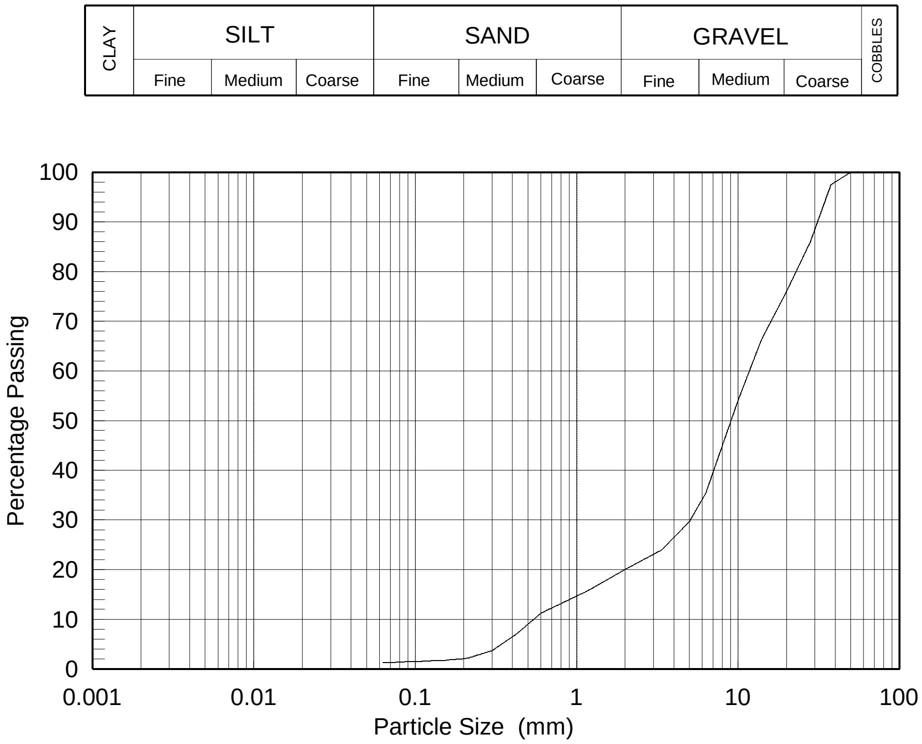
Determination of Particle Size Distribution

Borehole Number:	BH108
Sample Number:	7
Depth (m):	3.50 - 4.00

Description:
Brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
28 mm	86
20 mm	76
14 mm	66
10 mm	54
6.3 mm	35
5 mm	30
3.35 mm	24
2 mm	20
1.18 mm	16
600 µm	11
425 µm	7
300 µm	4
212 µm	2
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	79.9	%
Sand	18.7	%
Silt & Clay	1.3	%

Checked and Approved

Initials: SB

Date: 06/05/2011

Project Number:

GEO / 16819

Project Name:

EDMONTON ECOPARK

UKAS TESTING 1982

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref4669.561076)

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] S Burke (Snr Tech)

GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

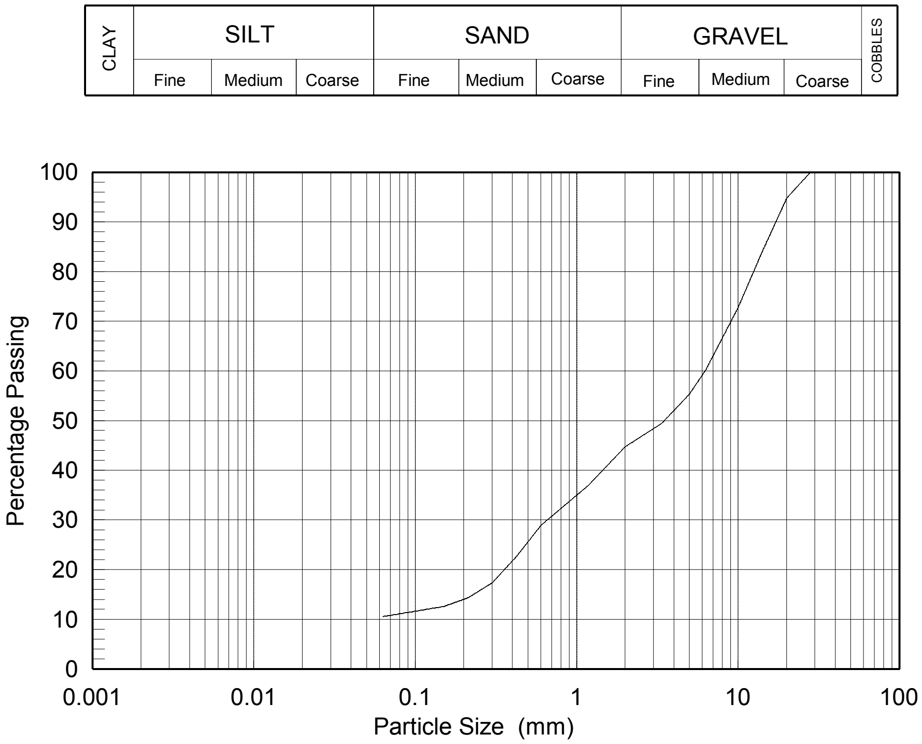
Determination of Particle Size Distribution

Borehole Number: 110
Sample Number: 7
Depth (m): 3.30 - 3.50

Description:
Brown clayey sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	95
14 mm	84
10 mm	73
6.3 mm	60
5 mm	55
3.35 mm	49
2 mm	45
1.18 mm	37
600 µm	29
425 µm	23
300 µm	17
212 µm	14
150 µm	13
63 µm	11



Particle Proportions		
Cobbles	0.0	%
Gravel	55.3	%
Sand	34.1	%
Silt & Clay	10.6	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

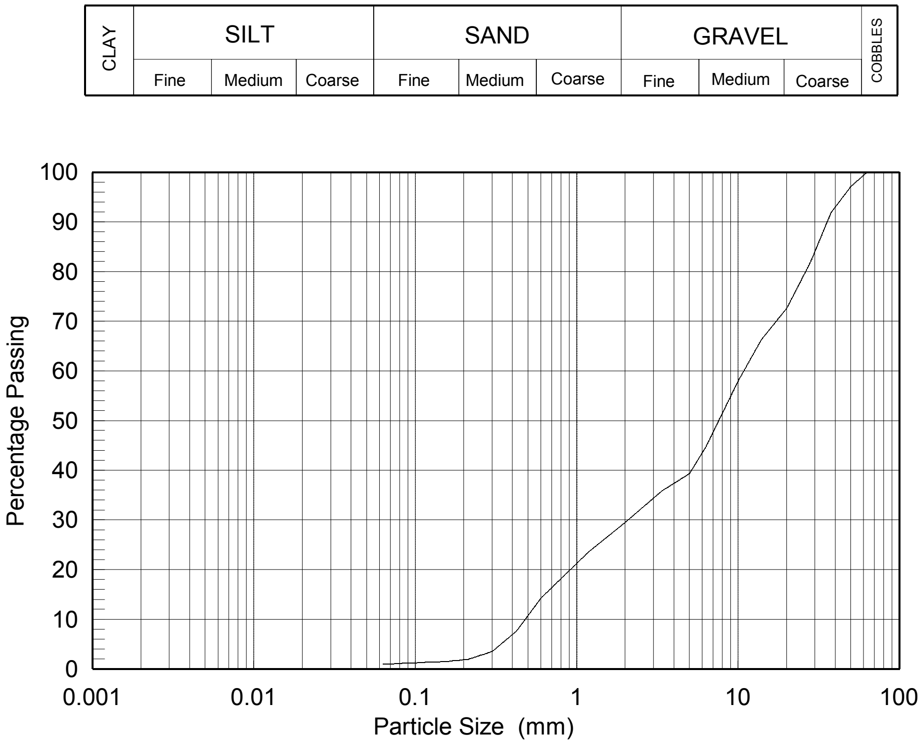
Determination of Particle Size Distribution

Borehole Number:	110
Sample Number:	11
Depth (m):	5.30 - 6.00

Description:
Brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	97
37.5 mm	92
28 mm	82
20 mm	73
14 mm	66
10 mm	58
6.3 mm	45
5 mm	39
3.35 mm	36
2 mm	30
1.18 mm	24
600 µm	14
425 µm	8
300 µm	4
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	70.5	%
Sand	28.6	%
Silt & Clay	1.0	%

Checked and Approved

Initials: JS

Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

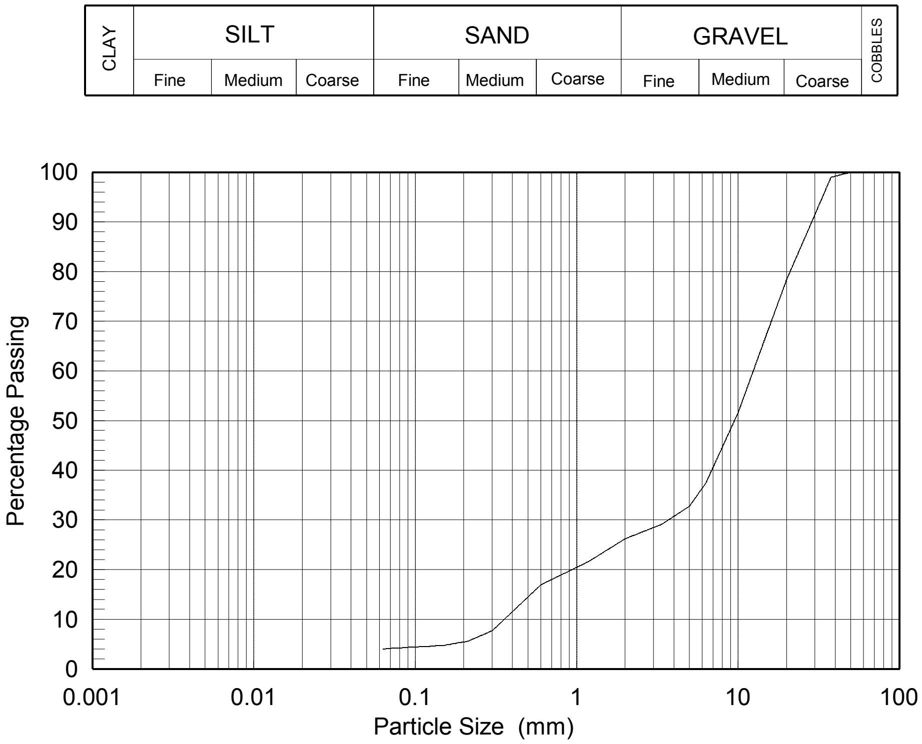
Determination of Particle Size Distribution

Borehole Number: BH113
Sample Number: 7
Depth (m): 4.50 - 5.50

Description:
Dark grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
28 mm	89
20 mm	78
14 mm	65
10 mm	52
6.3 mm	37
5 mm	33
3.35 mm	29
2 mm	26
1.18 mm	22
600 µm	17
425 µm	12
300 µm	8
212 µm	6
150 µm	5
63 µm	4



Particle Proportions		
Cobbles	0.0	%
Gravel	73.8	%
Sand	22.2	%
Silt & Clay	4.1	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number: **GEO / 16786**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 2 : Clause 9 : 1990

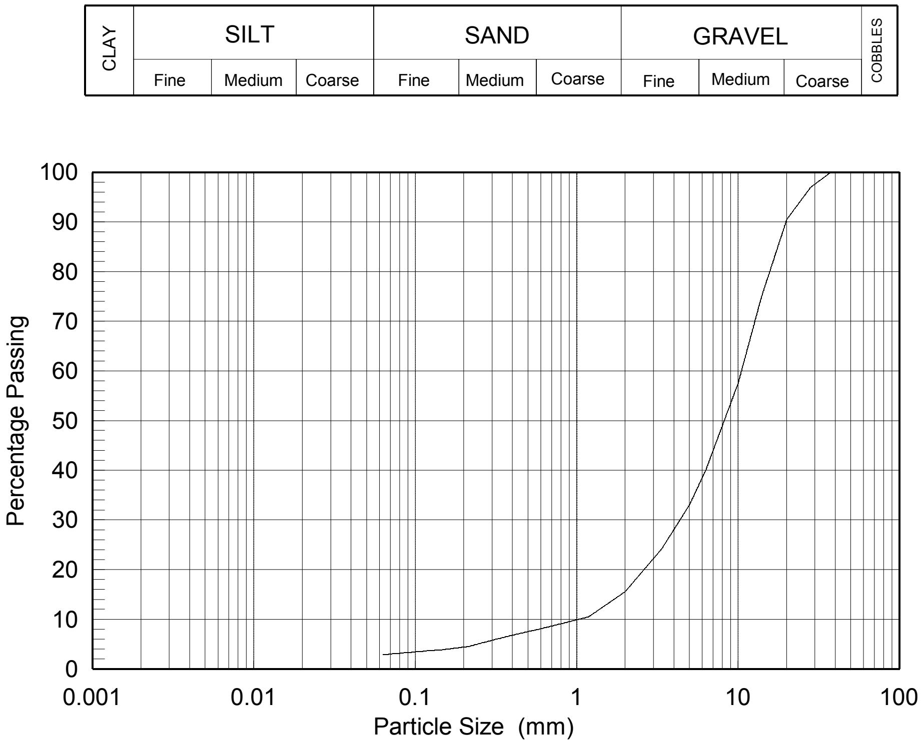
Determination of Particle Size Distribution

Borehole Number: 114
Sample Number: 6
Depth (m): 3.00 - 3.45

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	97
20 mm	91
14 mm	75
10 mm	58
6.3 mm	40
5 mm	33
3.35 mm	24
2 mm	16
1.18 mm	11
600 µm	8
425 µm	7
300 µm	6
212 µm	5
150 µm	4
63 µm	3



Particle Proportions		
Cobbles	0.0	%
Gravel	84.5	%
Sand	12.6	%
Silt & Clay	2.9	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

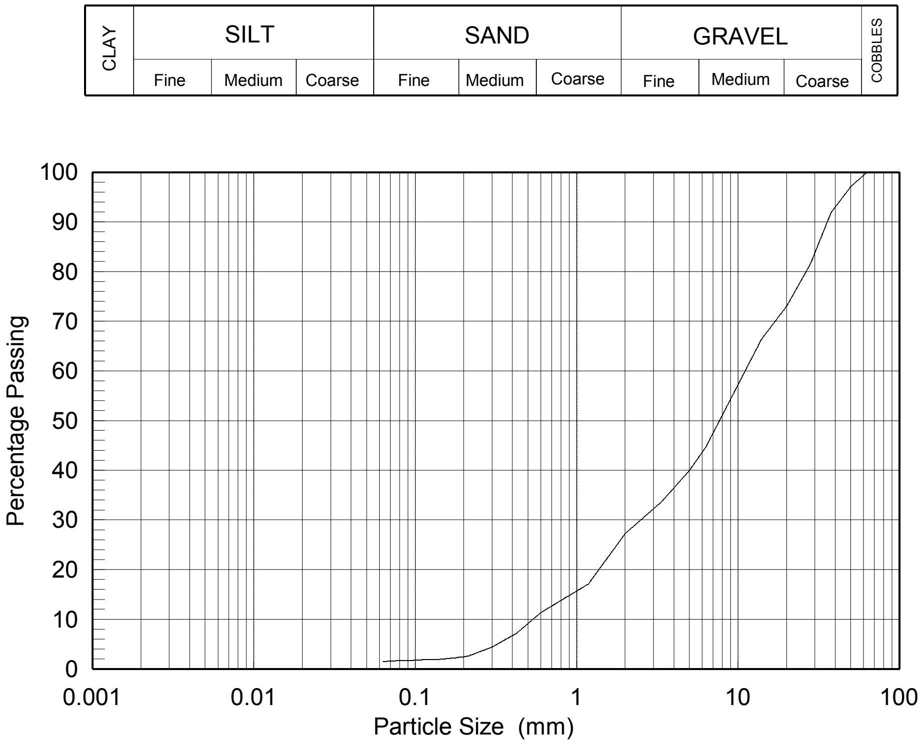
Determination of Particle Size Distribution

Borehole Number:	114
Sample Number:	B9
Depth (m):	6.00 - 6.45

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	97
37.5 mm	92
28 mm	82
20 mm	73
14 mm	66
10 mm	57
6.3 mm	45
5 mm	40
3.35 mm	34
2 mm	27
1.18 mm	17
600 µm	11
425 µm	7
300 µm	4
212 µm	3
150 µm	2
63 µm	2



Particle Proportions		
Cobbles	0.0	%
Gravel	72.7	%
Sand	25.7	%
Silt & Clay	1.6	%

Checked and Approved

Initials: JS

Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

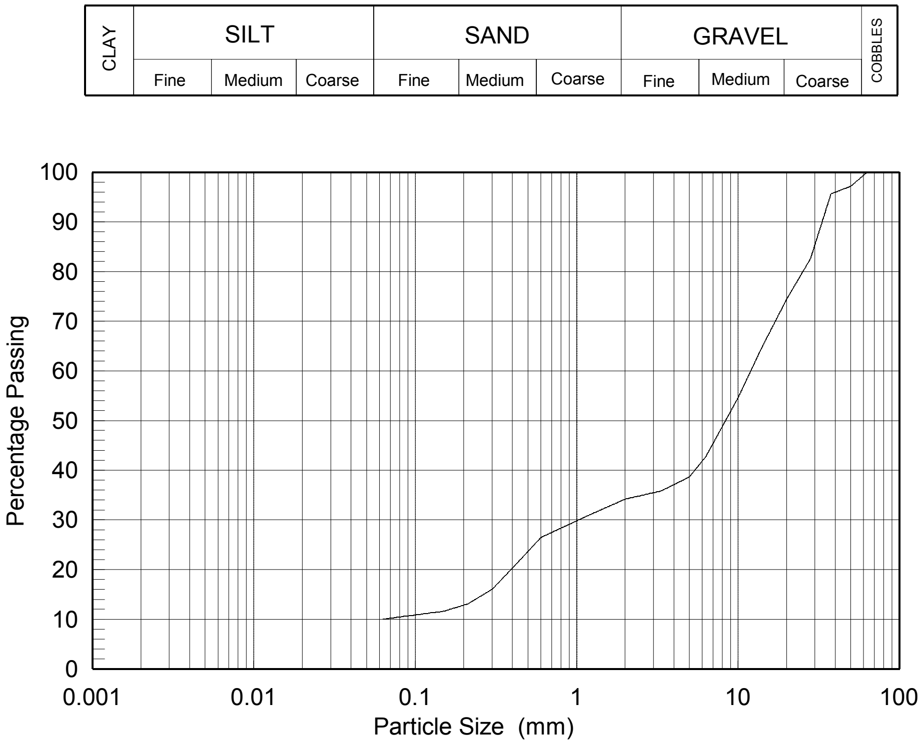
Determination of Particle Size Distribution

Borehole Number: 116
Sample Number: 6
Depth (m): 3.40 - 4.00

Description:
Grey brown clayey sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	97
37.5 mm	96
28 mm	83
20 mm	74
14 mm	65
10 mm	55
6.3 mm	43
5 mm	39
3.35 mm	36
2 mm	34
1.18 mm	31
600 µm	26
425 µm	21
300 µm	16
212 µm	13
150 µm	12
63 µm	10



Particle Proportions		
Cobbles	0.0	%
Gravel	65.8	%
Sand	24.1	%
Silt & Clay	10.1	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ R Platt (Snr Tech)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

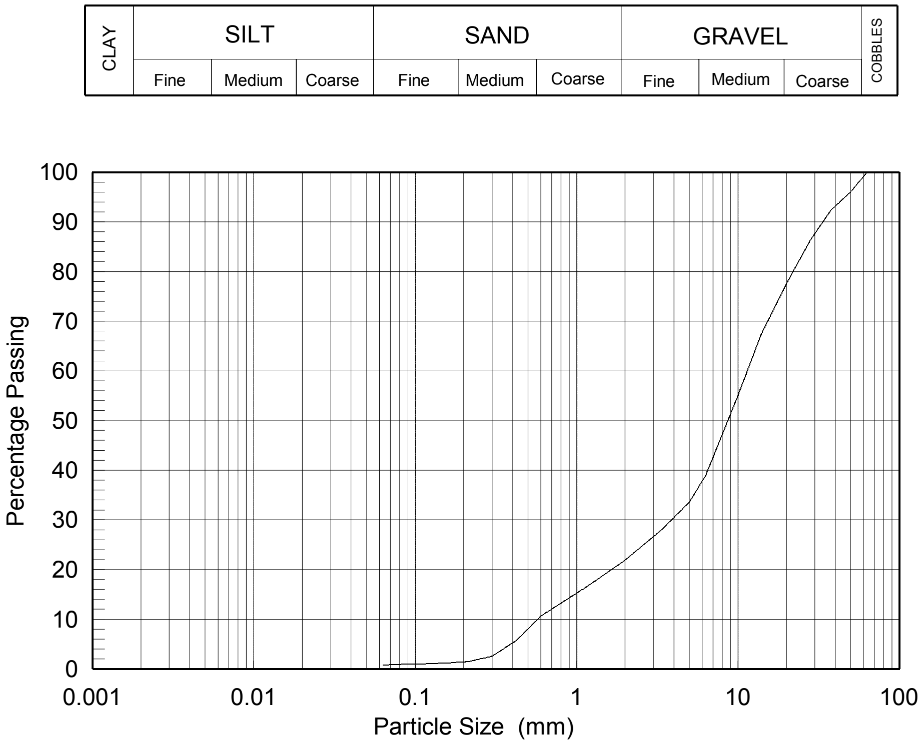
Determination of Particle Size Distribution

Borehole Number: 116
Sample Number: 7
Depth (m): 4.50 - 5.00

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	96
37.5 mm	92
28 mm	86
20 mm	78
14 mm	68
10 mm	55
6.3 mm	39
5 mm	34
3.35 mm	28
2 mm	22
1.18 mm	17
600 µm	11
425 µm	6
300 µm	3
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	78.1	%
Sand	21.1	%
Silt & Clay	0.8	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

BS1377 : Part 2 : Clause 9 : 1990

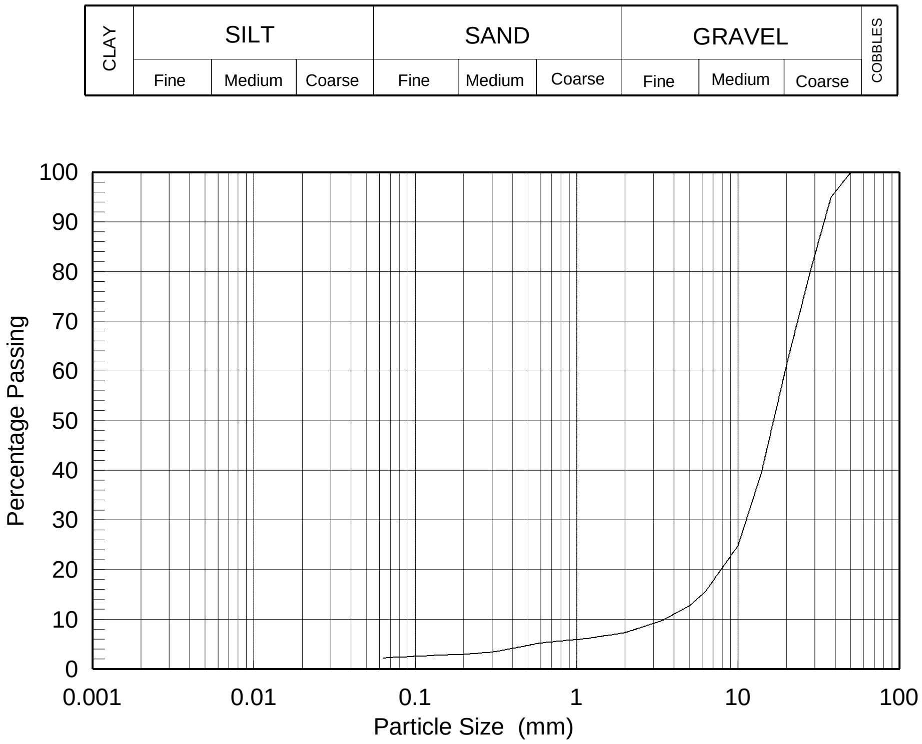
Determination of Particle Size Distribution

Borehole Number:	BH117
Sample Number:	8
Depth (m):	4.50 - 5.00

Description:
Grey slightly sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	95
28 mm	80
20 mm	61
14 mm	40
10 mm	25
6.3 mm	16
5 mm	13
3.35 mm	10
2 mm	7
1.18 mm	6
600 µm	5
425 µm	4
300 µm	3
212 µm	3
150 µm	3
63 µm	2



Particle Proportions		
Cobbles	0.0	%
Gravel	92.7	%
Sand	5.1	%
Silt & Clay	2.2	%

Checked and Approved
Initials:
SB
Date: 06/05/2011

Project Number:
GEO / 16819

Project Name:
EDMONTON ECOPARK

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BS1377 : Part 2 : Clause 9 : 1990

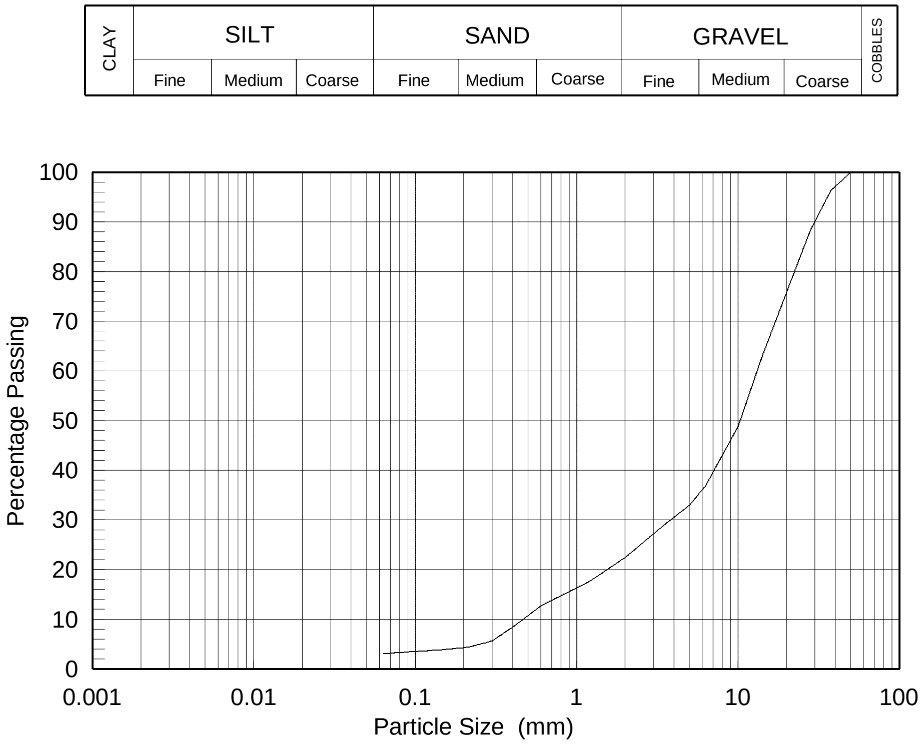
Determination of Particle Size Distribution

Borehole Number: BH118
Sample Number: 6
Depth (m): 4.00 - 4.50

Description:
Dark grey and black sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990   Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	96
28 mm	88
20 mm	76
14 mm	63
10 mm	49
6.3 mm	37
5 mm	33
3.35 mm	29
2 mm	22
1.18 mm	18
600 µm	13
425 µm	9
300 µm	6
212 µm	4
150 µm	4
63 µm	3



Particle Proportions		
Cobbles	0.0	%
Gravel	77.5	%
Sand	19.4	%
Silt & Clay	3.1	%

Checked and Approved

Initials:
SB

Date: 06/05/2011

Project Number:

GEO / 16819

Project Name:

EDMONTON ECOPARK

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BS1377 : Part 2 : Clause 9 : 1990

Determination of Particle Size Distribution

Borehole Number: BH118
Sample Number: 12
Depth (m): 14.50 - 16.00

Description:
Grey silty sandy CLAY

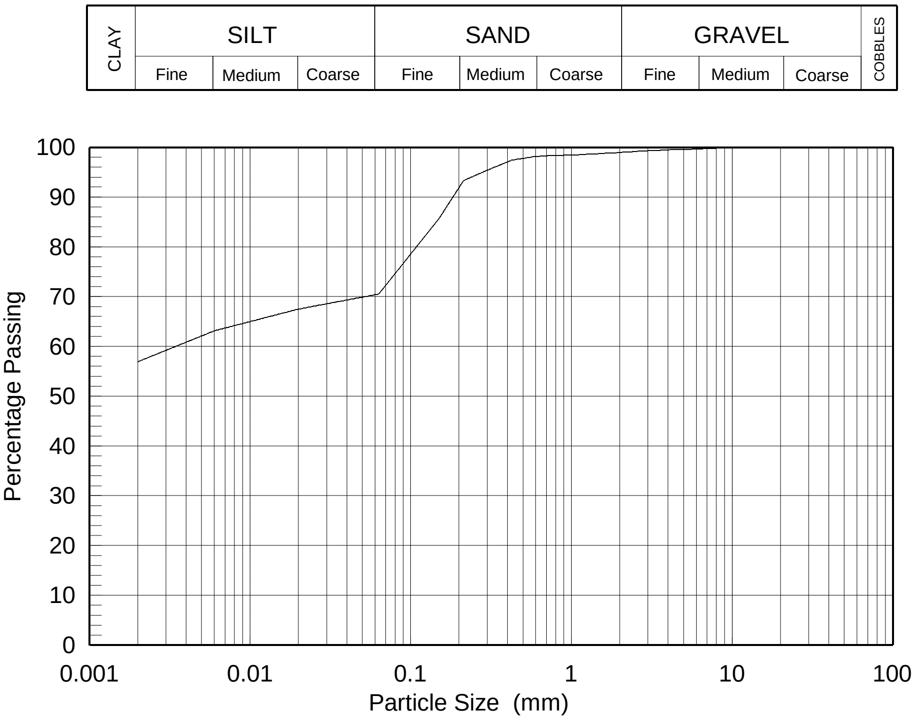
BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	100
5 mm	100
3.35 mm	99
2 mm	99
1.18 mm	99
600 µm	98
425 µm	97
300 µm	95
212 µm	93
150 µm	86
63 µm	71

PIPETTE	
Particle size	% pass
20.0 µm	68
6.0 µm	63
2.0 µm	57

Preparation:
No Pre-treatment used

Temp (°C)	20



Particle Proportions		
Cobbles	0.0	%
Gravel	1.0	%
Sand	28.4	%
Silt	13.6	%
Clay	56.9	%

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number:
GEO / 16819

Project Name:
EDMONTON ECOPARK

UKAS TESTING 1982

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BS1377 : Part 2 : Clause 9 : 1990

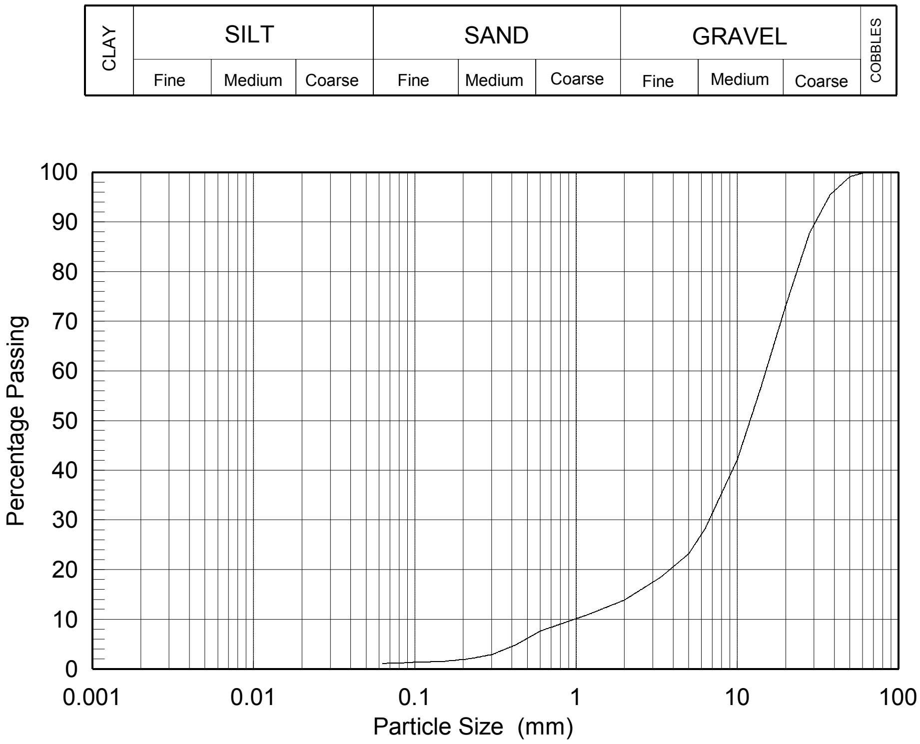
Determination of Particle Size Distribution

Borehole Number: 119
Sample Number: 9
Depth (m): 5.00 - 5.45

Description:
Grey brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	99
37.5 mm	95
28 mm	88
20 mm	73
14 mm	57
10 mm	42
6.3 mm	28
5 mm	23
3.35 mm	19
2 mm	14
1.18 mm	11
600 µm	8
425 µm	5
300 µm	3
212 µm	2
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	86.1	%
Sand	12.8	%
Silt & Clay	1.1	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ R Platt (Snr Tech)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

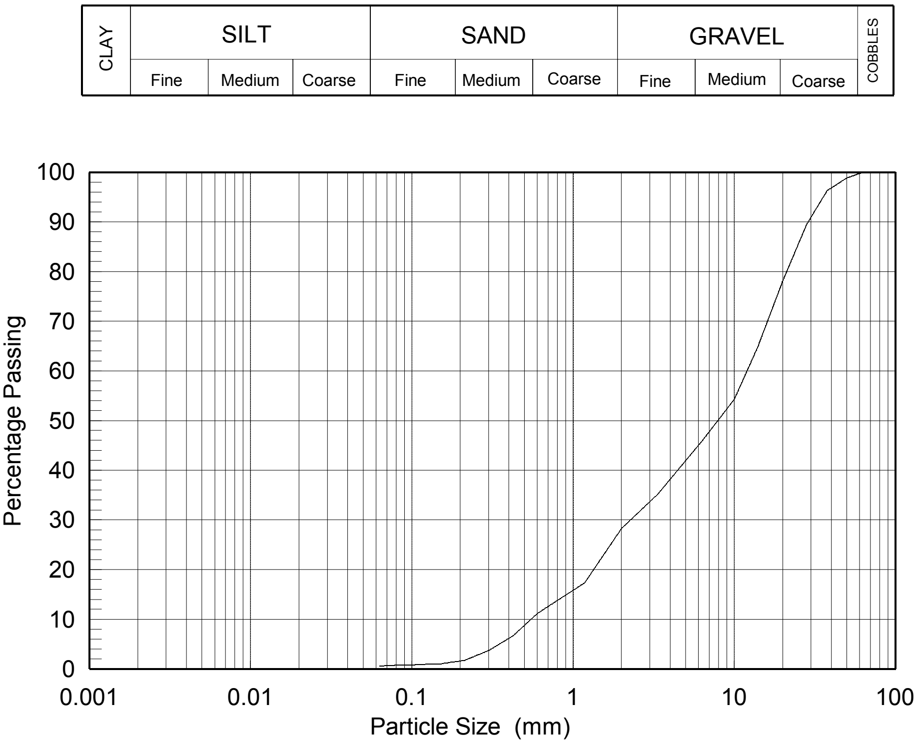
Determination of Particle Size Distribution

Borehole Number: 120
Sample Number: 10
Depth (m): 5.00 - 6.00

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	99
37.5 mm	96
28 mm	89
20 mm	78
14 mm	65
10 mm	54
6.3 mm	46
5 mm	42
3.35 mm	35
2 mm	28
1.18 mm	17
600 µm	11
425 µm	7
300 µm	4
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	71.7	%
Sand	27.6	%
Silt & Clay	0.6	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

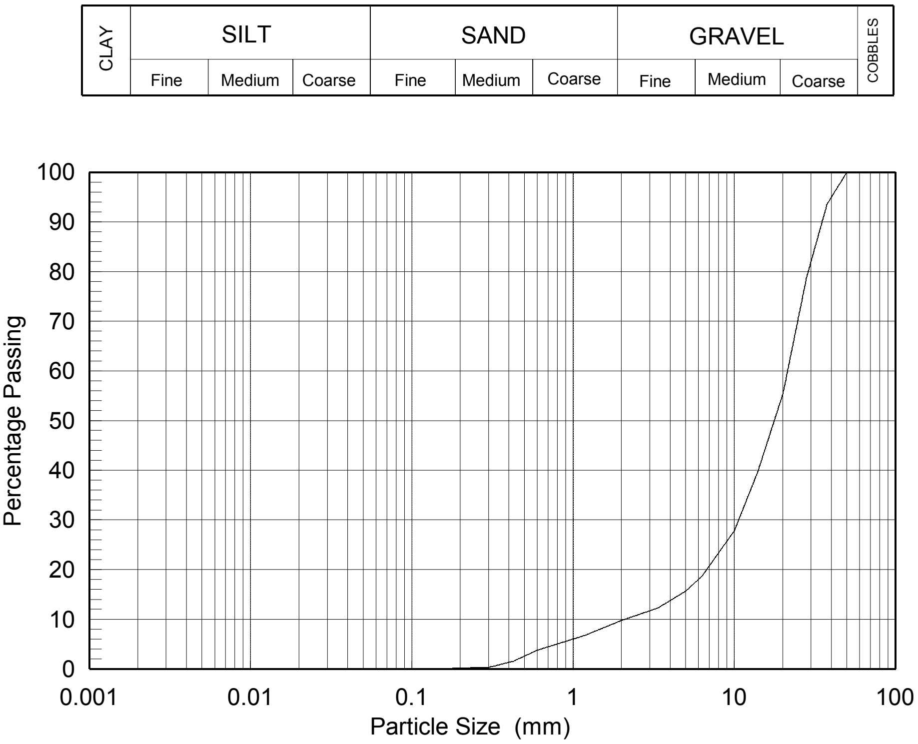
Determination of Particle Size Distribution

Borehole Number:	121
Sample Number:	8
Depth (m):	5.00 - 5.45

Description:
Brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	94
28 mm	79
20 mm	55
14 mm	40
10 mm	28
6.3 mm	19
5 mm	16
3.35 mm	12
2 mm	10
1.18 mm	7
600 µm	4
425 µm	2
300 µm	0
212 µm	0
150 µm	0
63 µm	0



Particle Proportions		
Cobbles	0.0	%
Gravel	90.2	%
Sand	9.7	%
Silt & Clay	0.0	%

Checked and Approved
Initials:
JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 2 : Clause 9 : 1990

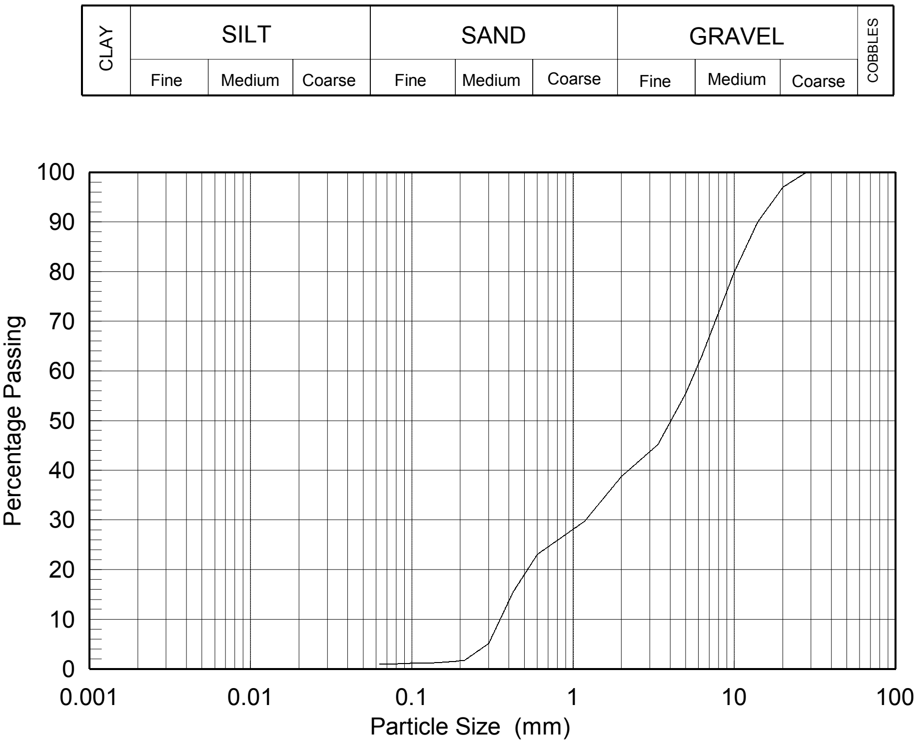
Determination of Particle Size Distribution

Borehole Number: 122
Sample Number: 10
Depth (m): 6.00 - 7.00

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	97
14 mm	90
10 mm	80
6.3 mm	63
5 mm	55
3.35 mm	45
2 mm	39
1.18 mm	30
600 µm	23
425 µm	15
300 µm	5
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	61.2	%
Sand	37.8	%
Silt & Clay	1.0	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ R Platt (Snr Tech)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

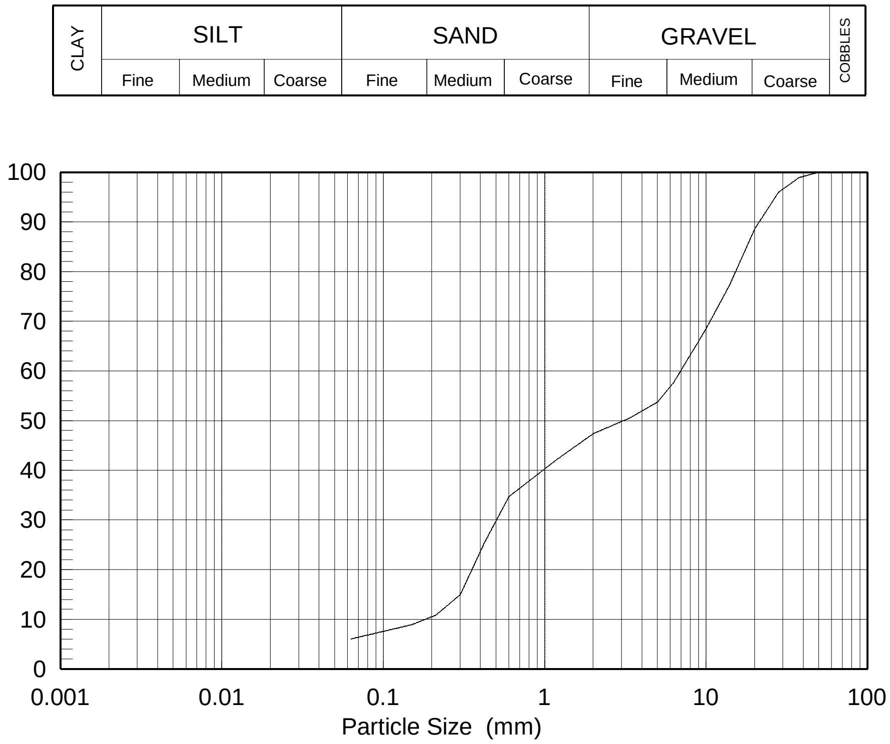
Determination of Particle Size Distribution

Borehole Number: BH123
Sample Number: 6
Depth (m): 3.40 - 4.00

Description:
Dark grey slightly clayey silty sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	99
28 mm	96
20 mm	89
14 mm	77
10 mm	68
6.3 mm	58
5 mm	54
3.35 mm	51
2 mm	47
1.18 mm	42
600 µm	35
425 µm	26
300 µm	15
212 µm	11
150 µm	9
63 µm	6



Particle Proportions		
Cobbles	0.0	%
Gravel	52.6	%
Sand	41.3	%
Silt & Clay	6.0	%

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

GEOLABS ®

BS1377 : Part 2 : Clause 9 : 1990

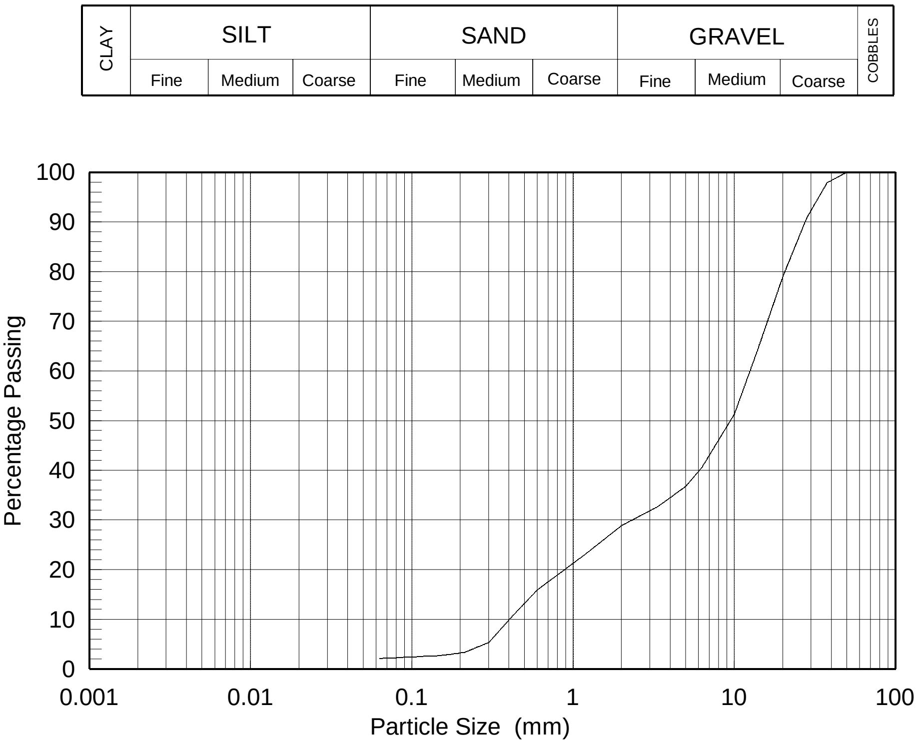
Determination of Particle Size Distribution

Borehole Number: BH123
Sample Number: 8
Depth (m): 5.00 - 5.45

Description:
Black and grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
28 mm	91
20 mm	79
14 mm	64
10 mm	51
6.3 mm	41
5 mm	37
3.35 mm	33
2 mm	29
1.18 mm	23
600 µm	16
425 µm	11
300 µm	5
212 µm	3
150 µm	3
63 µm	2



Particle Proportions		
Cobbles	0.0	%
Gravel	71.1	%
Sand	26.7	%
Silt & Clay	2.2	%

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Initials: SB
Date: 06/05/2011

Project Number:
GEO / 16819

Project Name:
EDMONTON ECOPARK

BS1377 : Part 2 : Clause 9 : 1990

Determination of Particle Size Distribution

Borehole Number: BH123
Sample Number: 16
Depth (m): 17.50 - 18.00

Description:
Brown silty clayey SAND

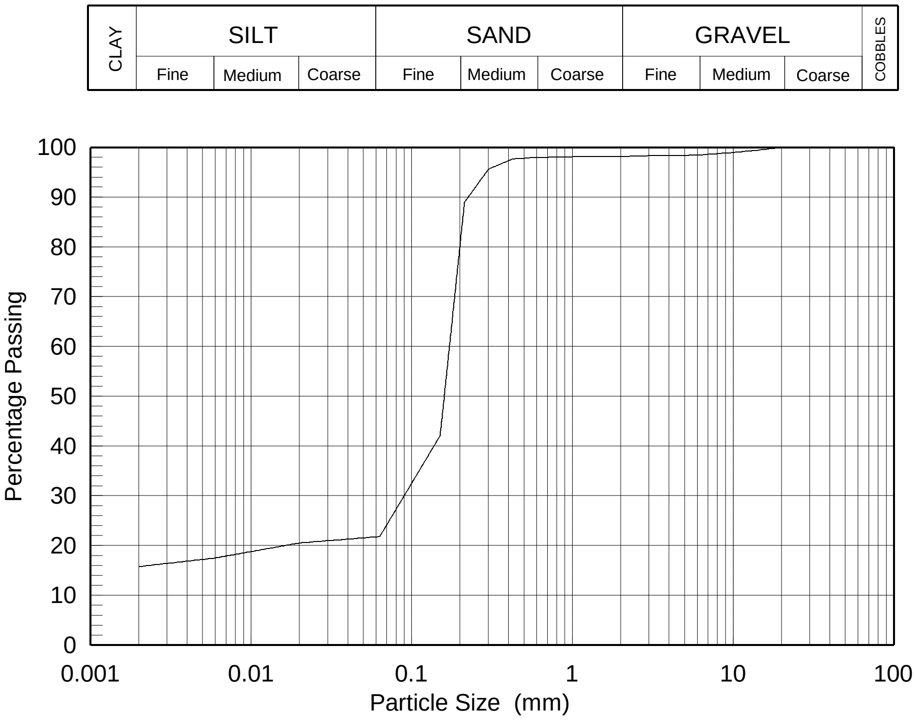
BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	99
10 mm	99
6.3 mm	98
5 mm	98
3.35 mm	98
2 mm	98
1.18 mm	98
600 µm	98
425 µm	98
300 µm	96
212 µm	89
150 µm	42
63 µm	22

PIPETTE	
Particle size	% pass
20.0 µm	21
6.0 µm	18
2.0 µm	16

Preparation:
No Pre-treatment used

Temp (°C)	20



Particle Proportions		
Cobbles	0.0	%
Gravel	1.8	%
Sand	76.4	%
Silt	6.0	%
Clay	15.8	%

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Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**
Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 2 : Clause 9 : 1990

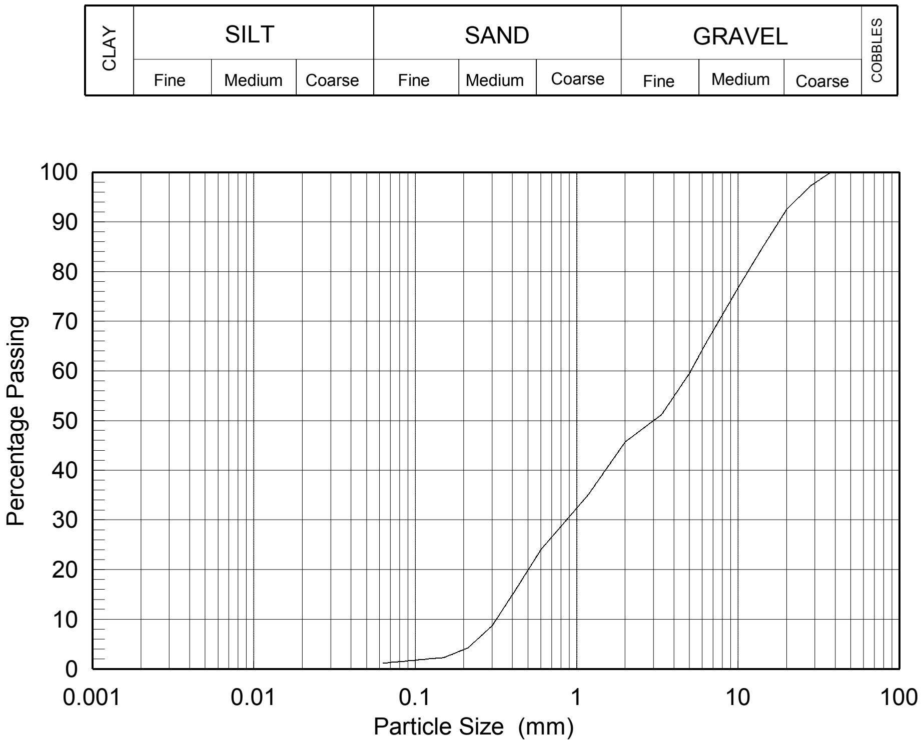
Determination of Particle Size Distribution

Borehole Number: 124
Sample Number: 8
Depth (m): 4.00 - 4.45

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	97
20 mm	93
14 mm	85
10 mm	77
6.3 mm	66
5 mm	60
3.35 mm	51
2 mm	46
1.18 mm	35
600 µm	24
425 µm	16
300 µm	9
212 µm	4
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	54.3	%
Sand	44.6	%
Silt & Clay	1.1	%

Checked and Approved
Initials: JS
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ R Platt (Snr Tech)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 2 : Clause 9 : 1990

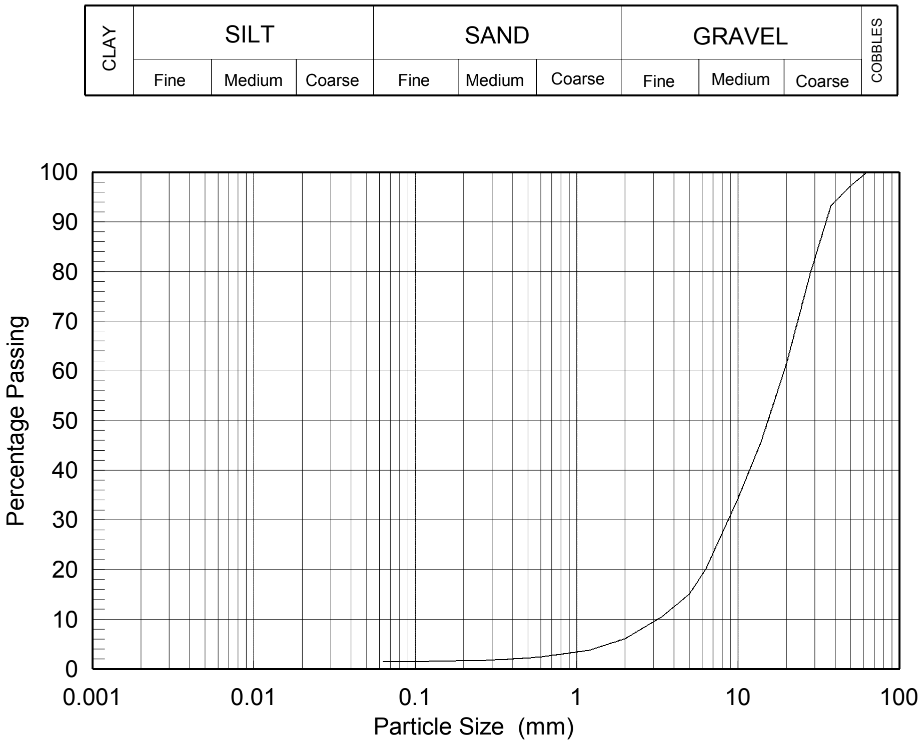
Determination of Particle Size Distribution

Borehole Number: 124
Sample Number: 11
Depth (m): 6.80 - 7.30

Description:
Grey slightly sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	97
37.5 mm	93
28 mm	80
20 mm	62
14 mm	46
10 mm	34
6.3 mm	20
5 mm	15
3.35 mm	10
2 mm	6
1.18 mm	4
600 µm	2
425 µm	2
300 µm	2
212 µm	2
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	93.9	%
Sand	4.6	%
Silt & Clay	1.5	%

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Date: 19/04/2011

Project Number:
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Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

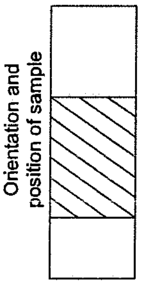
Quick Undrained Triaxial Test

Borehole Number: BH106
Sample Number: 1
Depth (m): 5.10

Description:
Soft mottled light grey and grey CLAY with rare shell fragments and roots

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.0		
Moisture Content (%):	31		
Bulk Density (Mg/m³):	2.00		
Dry Density (Mg/m³):	1.52		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.8	2.0	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	15.4	16.9	19.9
Maximum Deviator Stress (kPa):	54	56	57
Shear Stress Cu (kPa):	27	28	28



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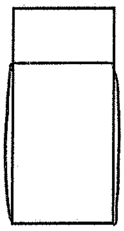

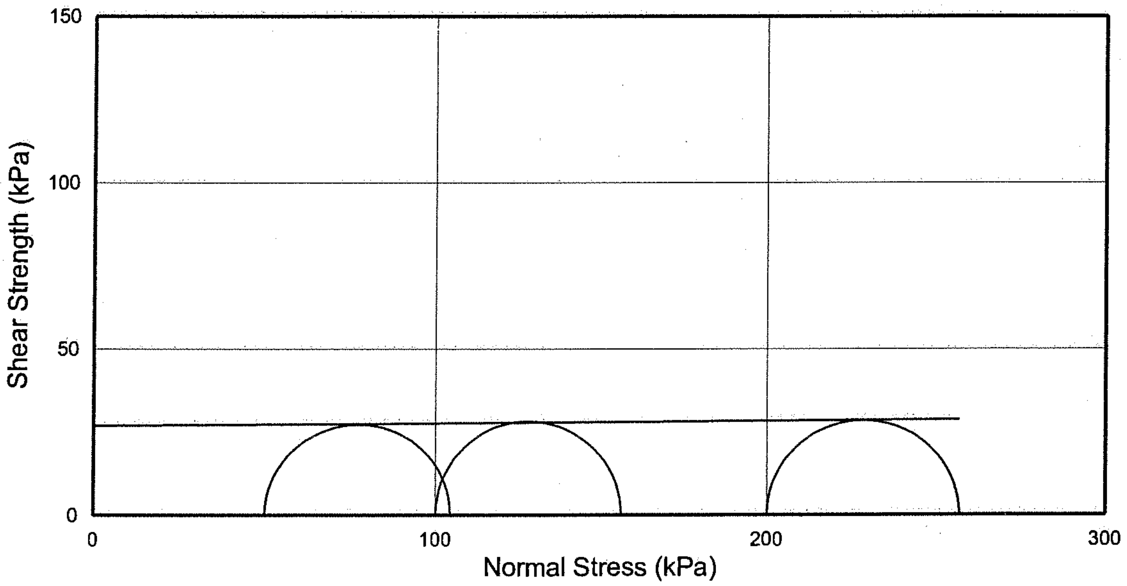

c = 27 kPa Ø = 0.5 °

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EDMONTON ECOPARK
Project No: SI1688

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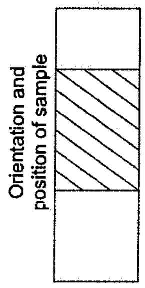
BS1377 : Part 7 : Clause 9 : 1990

Quick Undrained Triaxial Test

Borehole Number:	BH106	Description:
Sample Number:	2	Firm to stiff dark grey CLAY
Depth (m):	8.50	

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.0		
Diameter (mm):	102.5		
Moisture Content (%):	32		
Bulk Density (Mg/m³):	1.98		
Dry Density (Mg/m³):	1.50		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	0.9	1.0
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	5.4	5.9	6.9
Maximum Deviator Stress (kPa):	150	150	151
Shear Stress Cu (kPa):	75	75	76



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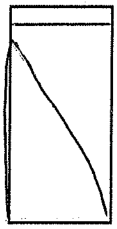

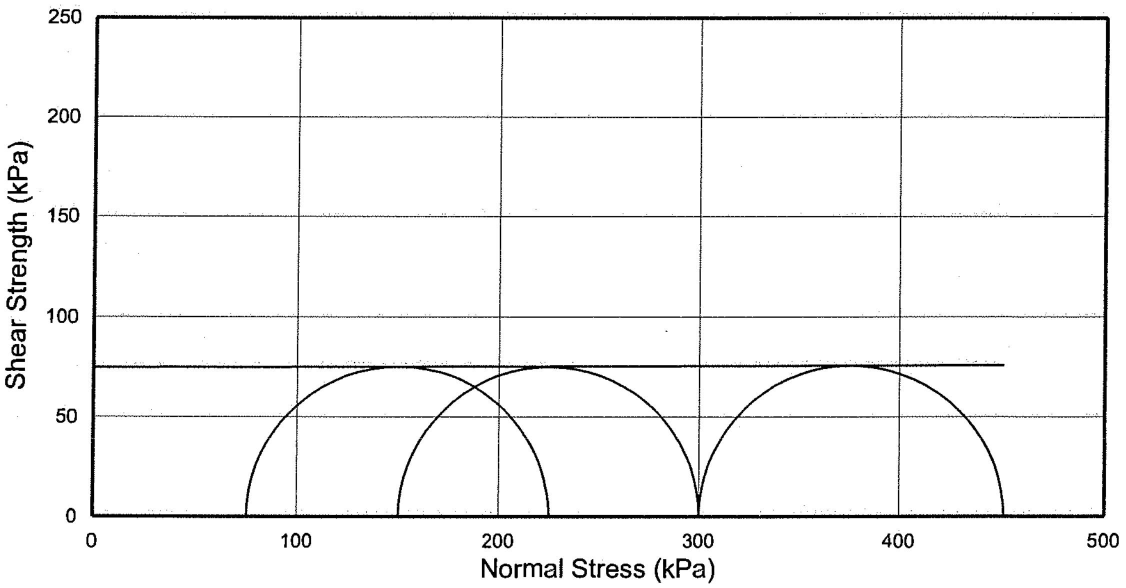

c = 75 kPa Ø = 0 °

Checked and Approved	Project Number:
Initials: SB	GEO / 16762
Date: 19/04/2011	Project Name:
	EDMONTON ECOPARK
	Project No: SI1688

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Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

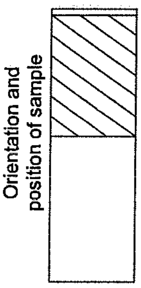
Quick Undrained Triaxial Test

Borehole Number: BH106
Sample Number: 3
Depth (m): 11.00

Description:
Stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.7		
Diameter (mm):	101.3		
Moisture Content (%):	28		
Bulk Density (Mg/m³):	2.06		
Dry Density (Mg/m³):	1.61		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.5	0.6	0.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	6.4	8.9	9.9
Maximum Deviator Stress (kPa):	261	269	274
Shear Stress Cu (kPa):	131	135	137



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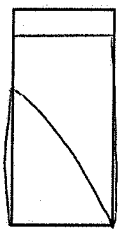

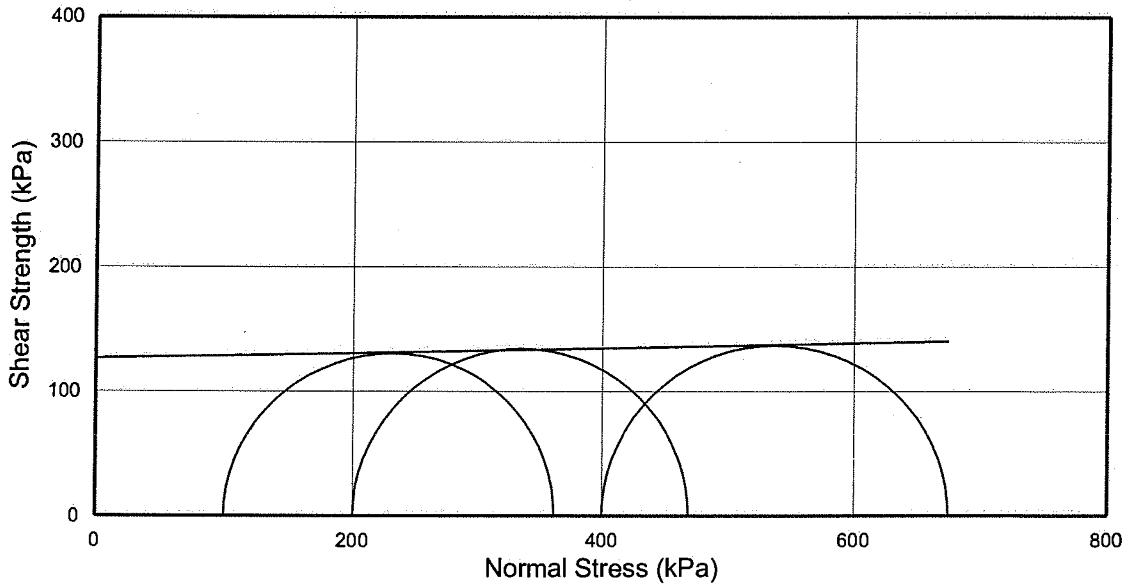

c = 127 kPa Ø = 1 °

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Initials: SB
Date: 19/04/2011

Project Number: **GEO / 16762**

Project Name: **EDMONTON ECOPARK**

Project No: SI1688

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Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir) GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

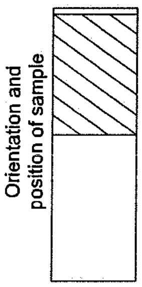
Quick Undrained Triaxial Test

Borehole Number: BH106
Sample Number: 4
Depth (m): 14.00

Description:
Stiff dark grey fine sandy silty CLAY

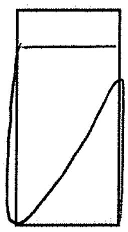
3 Stage Specimen

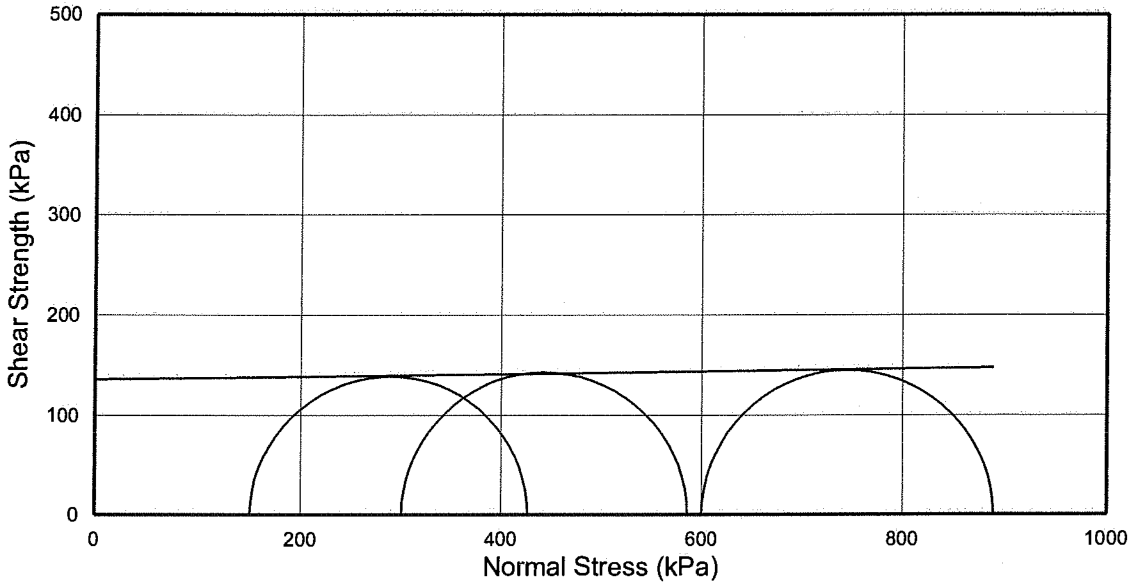
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.2
Diameter (mm):	102.7
Moisture Content (%):	25
Bulk Density (Mg/m^3):	2.01
Dry Density (Mg/m^3):	1.60



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.2	1.4	1.6
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	150	300	600
Strain at failure (%):	8.4	10.4	12.9
Maximum Deviator Stress (kPa):	277	286	290
Shear Stress Cu (kPa):	139	143	145

Mode of failure:





c = 136 kPa Ø = 0.5 °

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Initials: SB
Date: 19/04/2011

Project Number:
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Project Name:
EDMONTON ECOPARK
Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

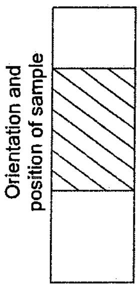
Quick Undrained Triaxial Test

Borehole Number: BH107
Sample Number: 1
Depth (m): 6.50

Description:
Firm dark brown CLAY

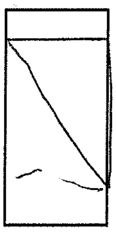
3 Stage Specimen

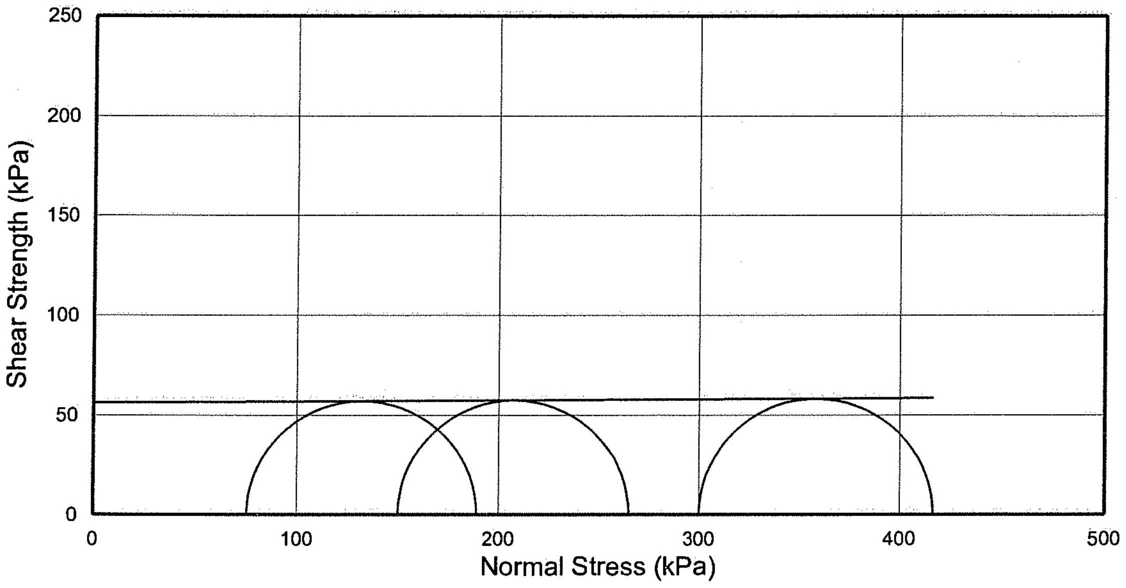
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	156.2
Diameter (mm):	103.0
Moisture Content (%):	33
Bulk Density (Mg/m³):	1.97
Dry Density (Mg/m³):	1.49



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.1	1.3
Axial displacement rate (%/min):	2.6	2.6	2.6
Cell pressure (kPa):	75	150	300
Strain at failure (%):	7.0	7.7	9.6
Maximum Deviator Stress (kPa):	114	115	116
Shear Stress Cu (kPa):	57	57	58

Mode of failure:





c = 56 kPa Ø = 0.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

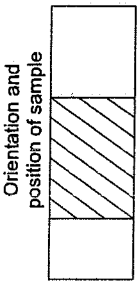
Quick Undrained Triaxial Test

Borehole Number: BH107
Sample Number: 2
Depth (m): 8.50

Description:
Stiff fissured dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.2		
Diameter (mm):	102.8		
Moisture Content (%):	35		
Bulk Density (Mg/m³):	1.96		
Dry Density (Mg/m³):	1.45		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.6	0.6	0.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	3.5	4.0	4.5
Maximum Deviator Stress (kPa):	175	171	170
Shear Stress Cu (kPa):	88	85	85



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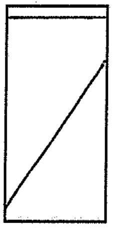

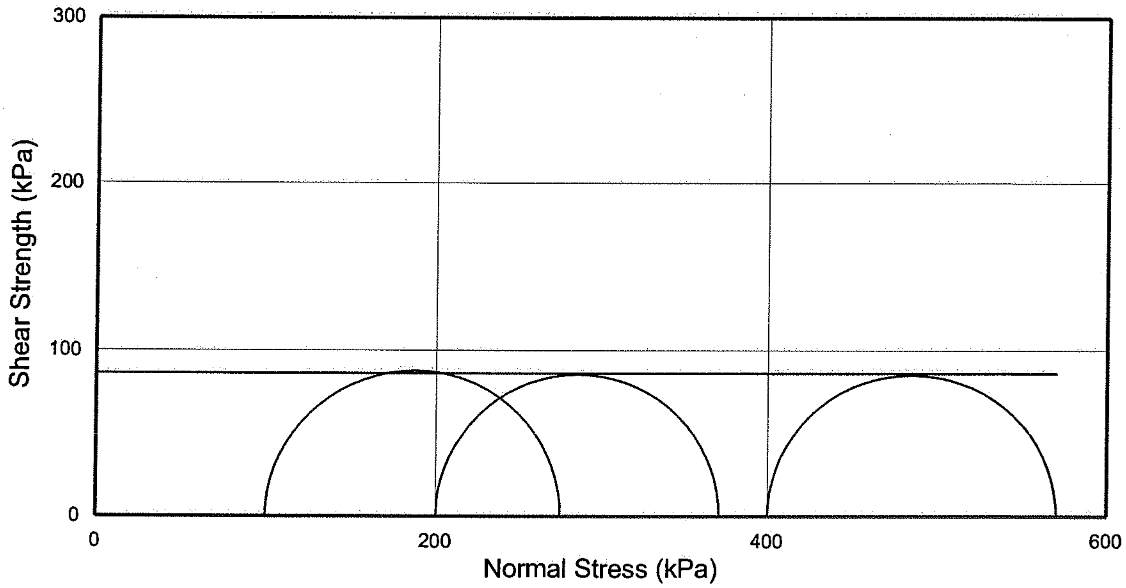

c = 86 kPa Ø = 0 °

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Initials: SB
Date: 19/04/2011

Project Number:
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Project Name:
EDMONTON ECOPARK
Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

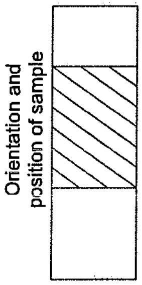
Quick Undrained Triaxial Test

Borehole Number: BH110
Sample Number: 1
Depth (m): 2.50

Description:
Firm black and brown slightly organic gravelly CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.6		
Moisture Content (%):	48		
Bulk Density (Mg/m³):	2.07		
Dry Density (Mg/m³):	1.40		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.3	1.5	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	9.4	12.4	19.9
Maximum Deviator Stress (kPa):	79	94	117
Shear Stress Cu (kPa):	40	47	58



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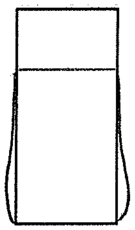

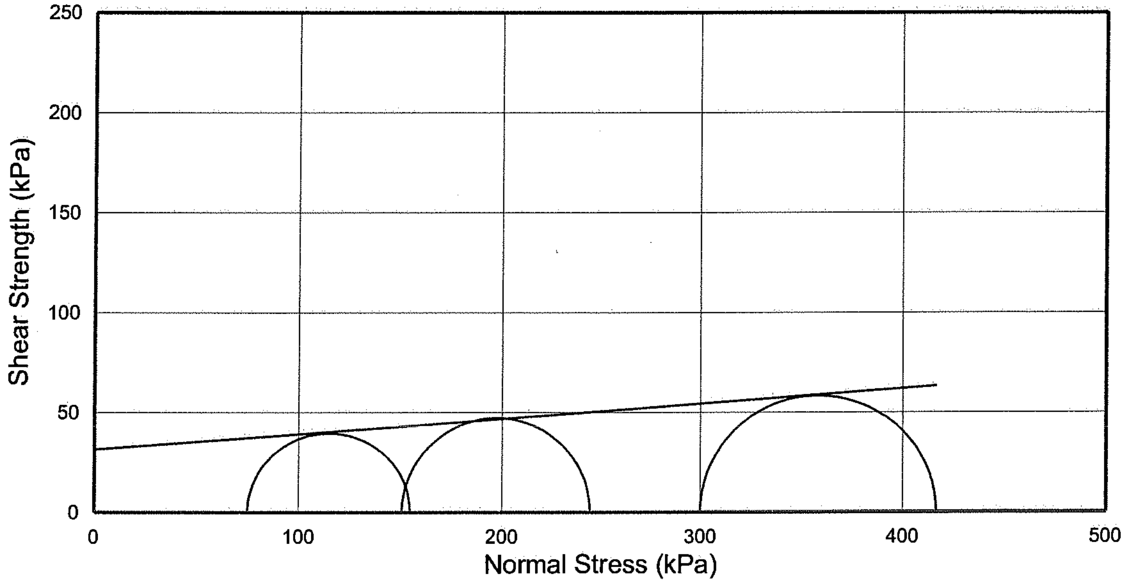

c = 31 kPa Ø = 4.5 °

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Initials:
SB
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

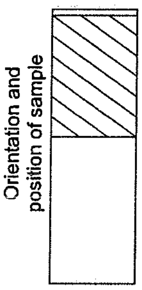
Quick Undrained Triaxial Test

Borehole Number: BH110
Sample Number: 2
Depth (m): 7.50

Description:
Firm to stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.3		
Diameter (mm):	103.0		
Moisture Content (%):	28		
Bulk Density (Mg/m³):	2.00		
Dry Density (Mg/m³):	1.56		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.7	1.1	1.5
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	4.5	7.9	11.4
Maximum Deviator Stress (kPa):	171	179	183
Shear Stress Cu (kPa):	86	89	91



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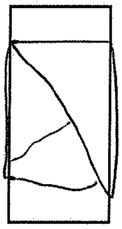

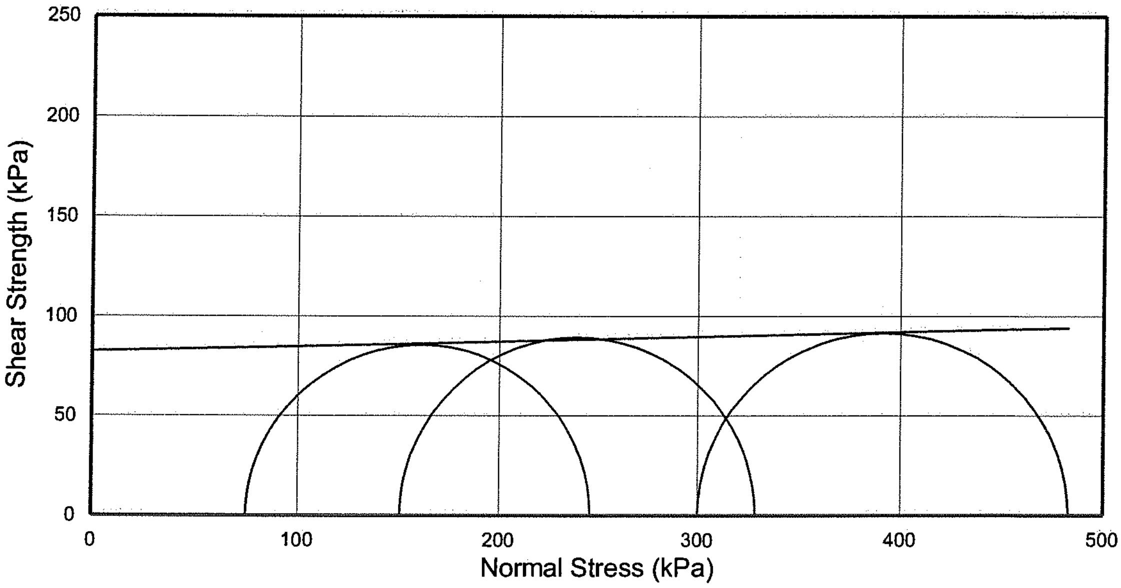

c = 82 kPa Ø = 1.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

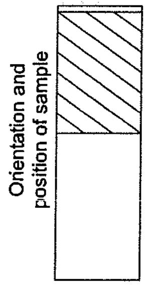
Quick Undrained Triaxial Test

Borehole Number: BH110
Sample Number: 3
Depth (m): 9.50

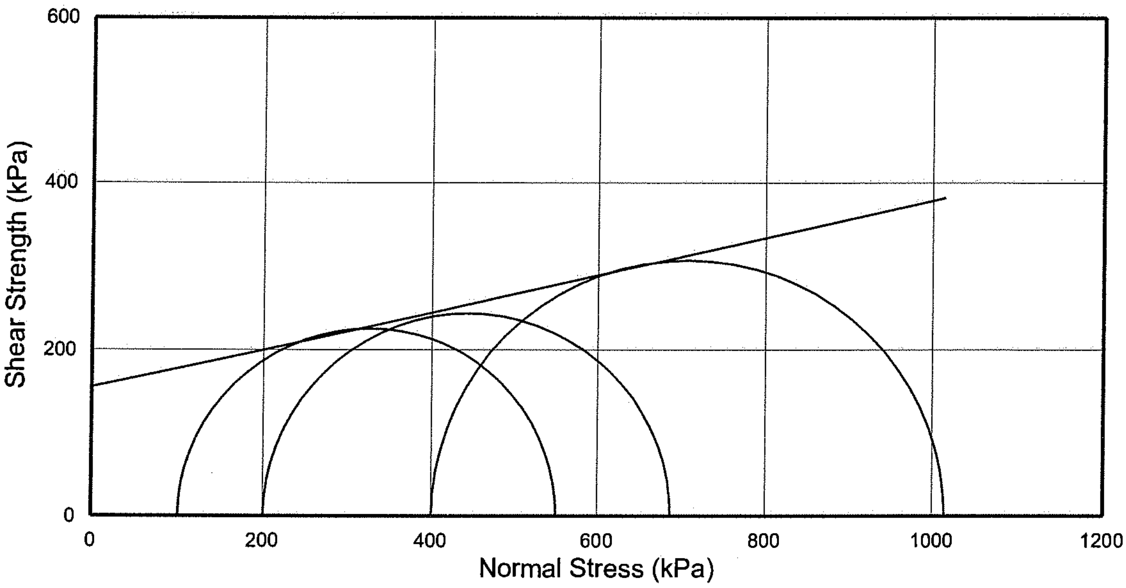
Description:
Very stiff dark grey silty CLAY with rare fine sand

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.3		
Diameter (mm):	103.1		
Moisture Content (%):	24		
Bulk Density (Mg/m³):	2.11		
Dry Density (Mg/m³):	1.70		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	1.2	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	6.0	8.4	10.9
Maximum Deviator Stress (kPa):	451	487	614
Shear Stress Cu (kPa):	225	244	307



Mode of failure:



c = 155 kPa Ø = 12.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir)

GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

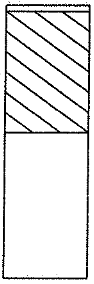
Quick Undrained Triaxial Test

Borehole Number: BH119
Sample Number: 1
Depth (m): 4.00

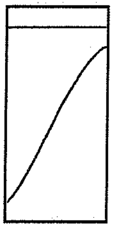
Description:
Soft dark grey slightly organic fine sandy clayey SILT with rare shell fragments

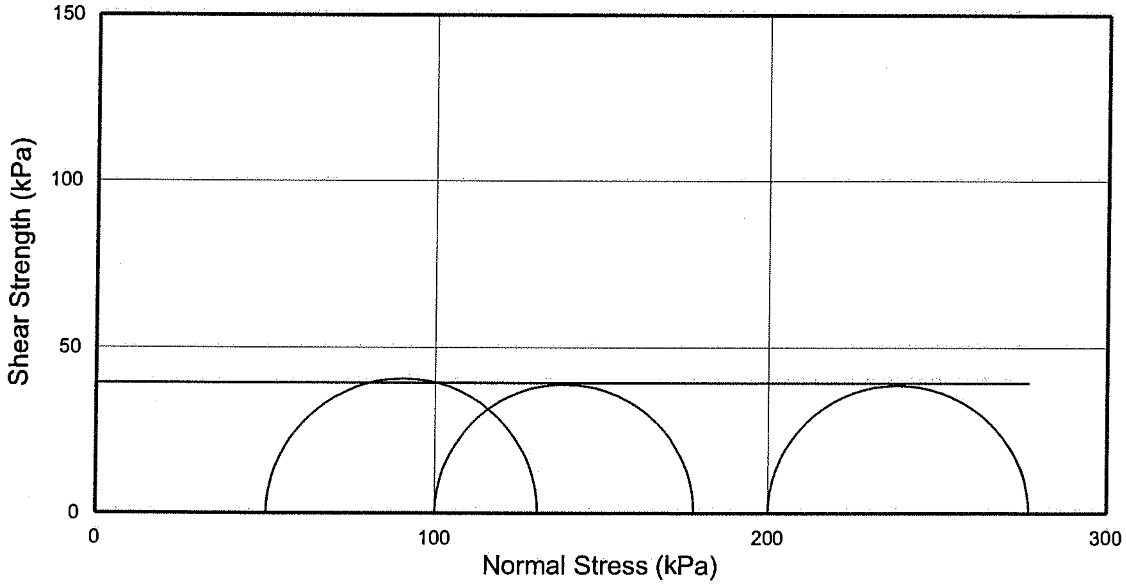
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.2		
Diameter (mm):	102.8		
Moisture Content (%):	48		
Bulk Density (Mg/m³):	1.45		
Dry Density (Mg/m³):	0.98		
Test details	**Stage 1**	**Stage 2**	**Stage 3**
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	1.0	1.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	5.5	7.0	7.5
Maximum Deviator Stress (kPa):	81	78	77
Shear Stress Cu (kPa):	41	39	39



Mode of failure:





c = 39 kPa Ø = 0 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

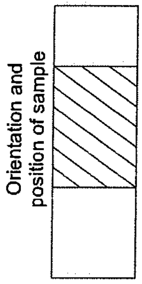
Quick Undrained Triaxial Test

Borehole Number:	BH119
Sample Number:	2
Depth (m):	7.00

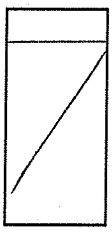
Description:
Stiff dark grey silty CLAY with rare fine sand

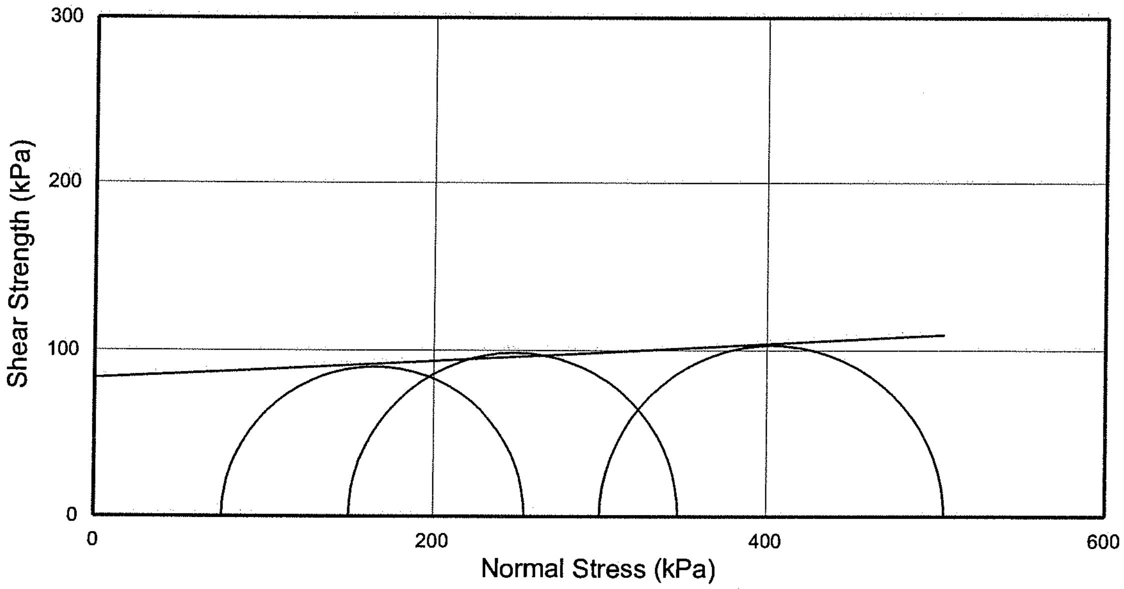
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	103.8		
Moisture Content (%):	27		
Bulk Density (Mg/m³):	2.05		
Dry Density (Mg/m³):	1.62		
Test details	**Stage 1**	**Stage 2**	**Stage 3**
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.2	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	7.4	9.4	11.4
Maximum Deviator Stress (kPa):	180	197	206
Shear Stress Cu (kPa):	90	98	103



Mode of failure:





c = 83 kPa Ø = 3 °

Checked and Approved	Project Number: **GEO / 16762**
Initials: SB	Project Name: **EDMONTON ECOPARK**
Date: 19/04/2011	**Project No: SI1688**

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BS1377 : Part 7 : Clause 9 : 1990

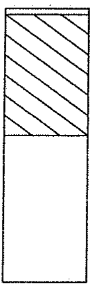
Quick Undrained Triaxial Test

Borehole Number: BH119
Sample Number: 3
Depth (m): 9.00

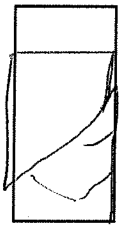
Description:
Firm fissured dark grey silty CLAY

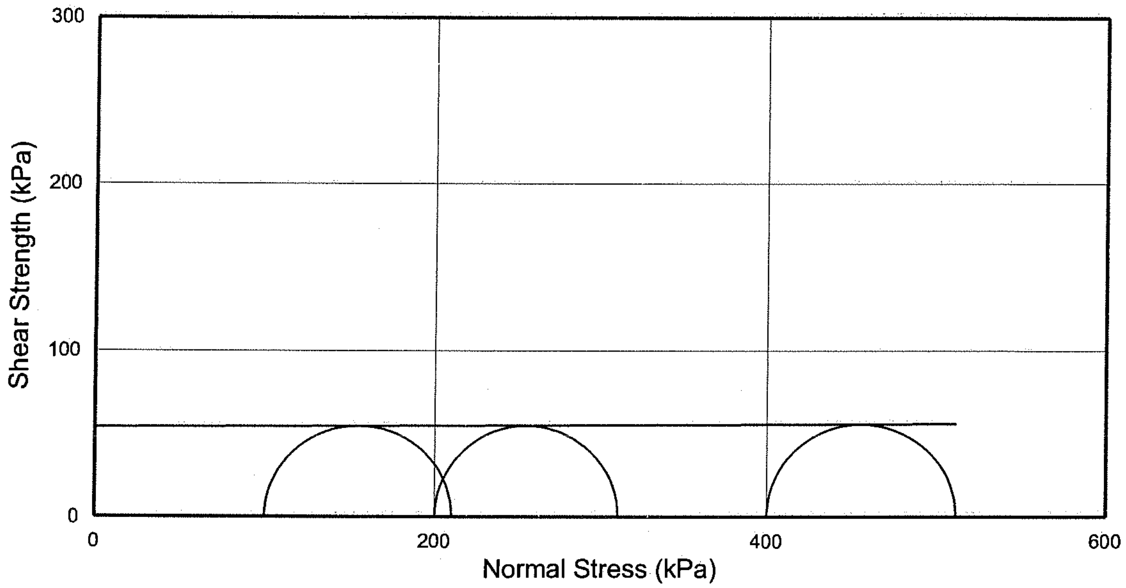
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	103.1		
Moisture Content (%):	32		
Bulk Density (Mg/m³):	1.98		
Dry Density (Mg/m³):	1.50		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.6	1.8	1.9
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	13.4	14.9	15.9
Maximum Deviator Stress (kPa):	110	110	112
Shear Stress Cu (kPa):	55	55	56



Mode of failure:





c = 54 kPa Ø = 0 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

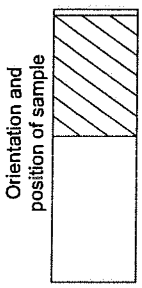
Quick Undrained Triaxial Test

Borehole Number: BH120
Sample Number: 1
Depth (m): 8.00

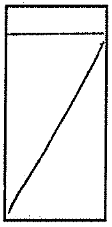
Description:
Firm dark grey silty CLAY with rare pyrite nodules

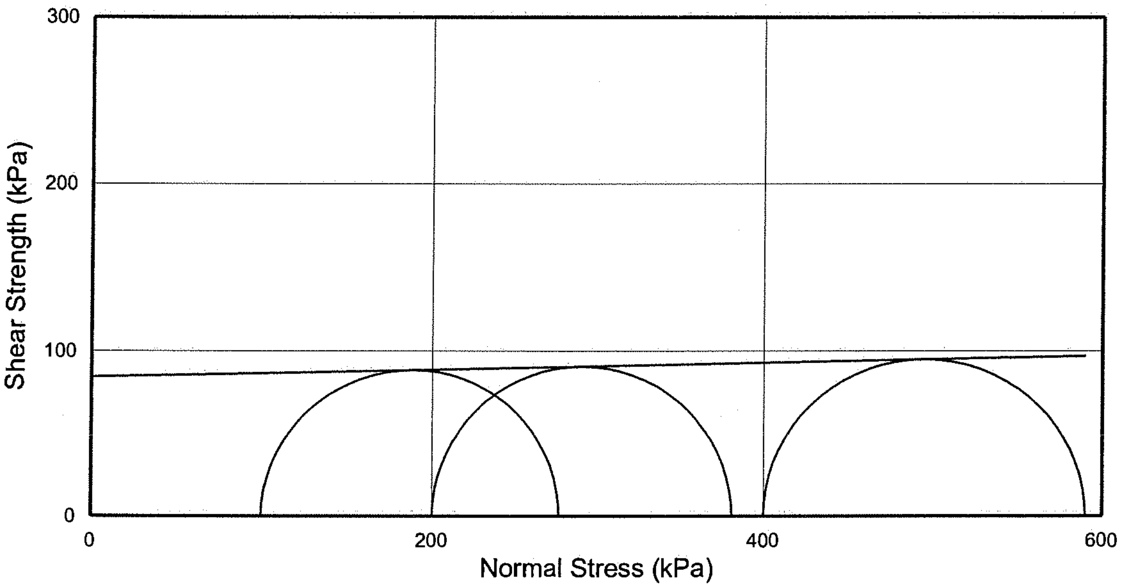
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.9		
Moisture Content (%):	28		
Bulk Density (Mg/m³):	2.03		
Dry Density (Mg/m³):	1.58		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	1.0	1.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	5.0	6.9	8.4
Maximum Deviator Stress (kPa):	177	181	190
Shear Stress Cu (kPa):	88	90	95



Mode of failure:





c = 84 kPa Ø = 1 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

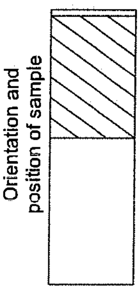
Quick Undrained Triaxial Test

Borehole Number:	BH121
Sample Number:	2
Depth (m):	7.00

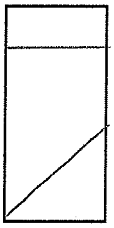
Description:
Stiff fissured dark grey silty CLAY

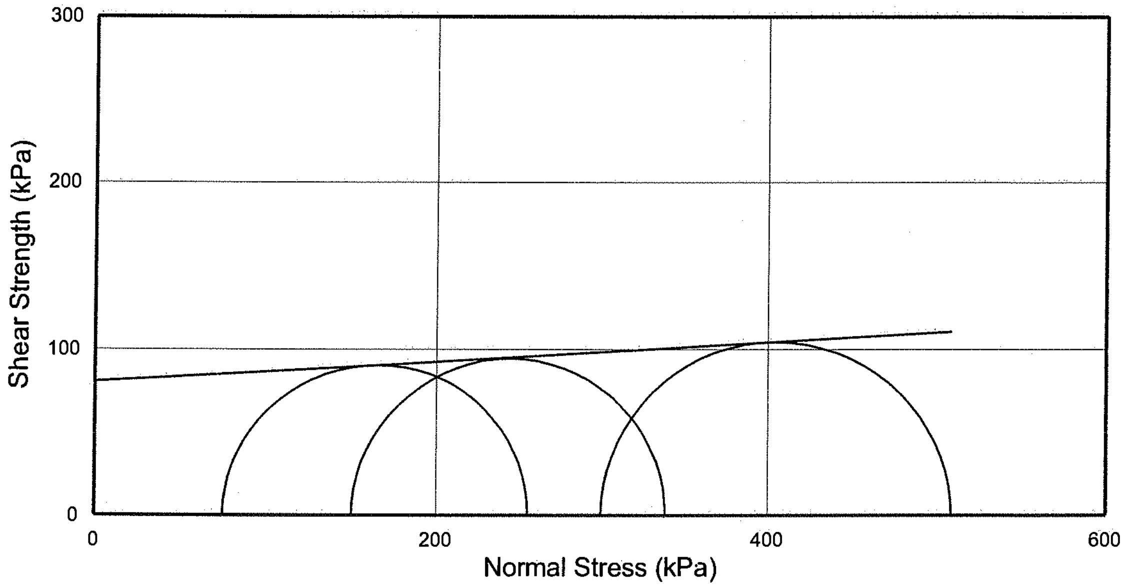
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	103.0		
Moisture Content (%):	27		
Bulk Density (Mg/m³):	2.01		
Dry Density (Mg/m³):	1.58		
Test details	**Stage 1**	**Stage 2**	**Stage 3**
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.3	1.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	7.9	9.9	13.9
Maximum Deviator Stress (kPa):	181	189	208
Shear Stress Cu (kPa):	90	94	104



Mode of failure:





c = 81 kPa Ø = 3.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO / 16762**

Project Name: **EDMONTON ECOPARK**

Project No: SI1688

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

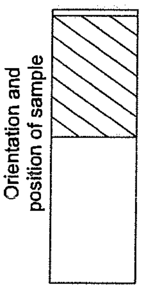
Quick Undrained Triaxial Test

Borehole Number: BH121
Sample Number: 3
Depth (m): 9.00

Description:
Stiff dark grey silty CLAY with rare fine sand

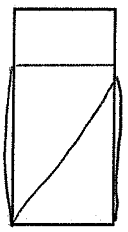
3 Stage Specimen

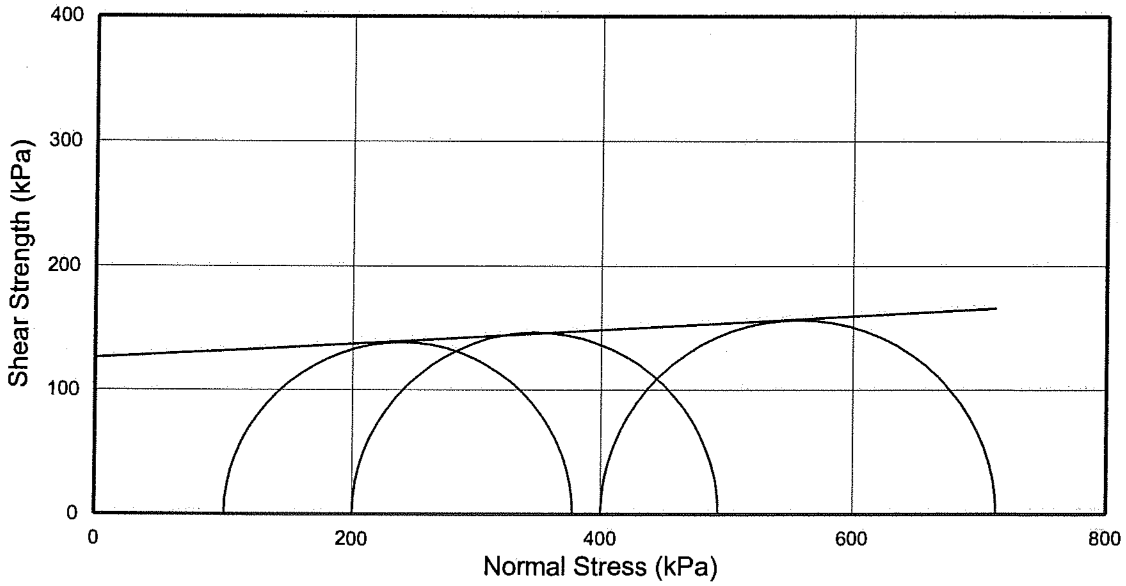
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.5
Diameter (mm):	103.5
Moisture Content (%):	23
Bulk Density (Mg/m³):	2.00
Dry Density (Mg/m³):	1.63



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.8	2.0	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	15.9	18.4	19.9
Maximum Deviator Stress (kPa):	277	293	314
Shear Stress Cu (kPa):	139	147	157

Mode of failure:





c = 126 kPa   Ø = 3 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

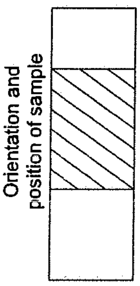
Quick Undrained Triaxial Test

Borehole Number:	BH122
Sample Number:	1
Depth (m):	3.00

Description:
Stiff dark grey CLAY with rare fine to medium gravel

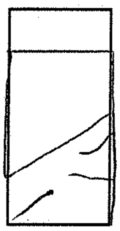
3 Stage Specimen

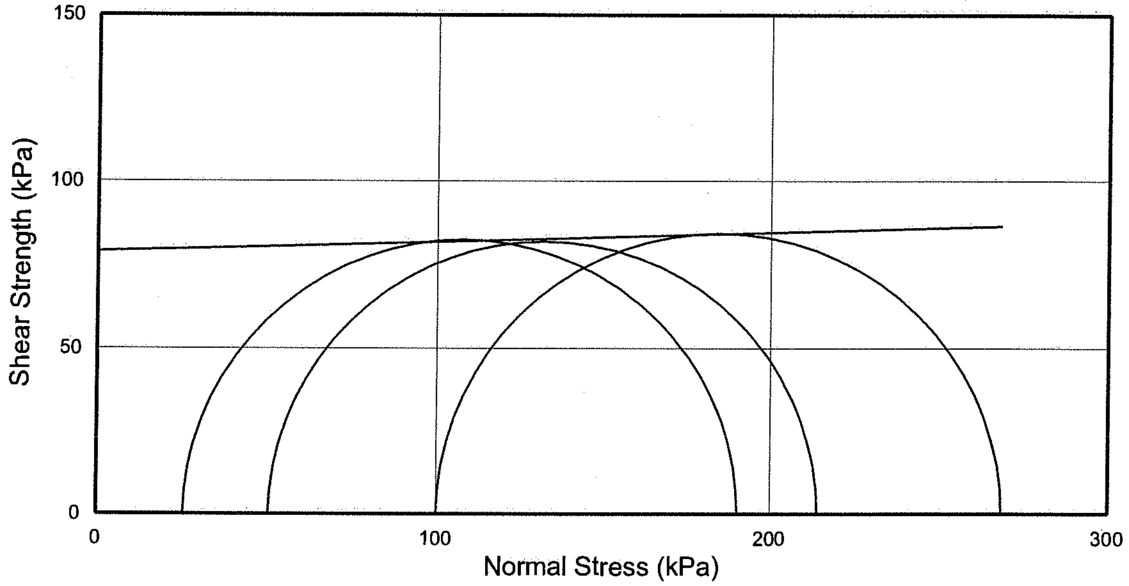
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	75.0
Diameter (mm):	37.6
Moisture Content (%):	31
Bulk Density (Mg/m³):	1.97
Dry Density (Mg/m³):	1.50



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.9	2.1	2.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	10.7	12.7	14.7
Maximum Deviator Stress (kPa):	165	164	169
Shear Stress Cu (kPa):	83	82	84

Mode of failure:





c = 79 kPa Ø = 1.5 °

Checked and Approved

Initials: SB

Date: 19/04/2011

Project Number: **GEO / 16762**

Project Name: **EDMONTON ECOPARK**

Project No: SI1688

UKAS TESTING 1962

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

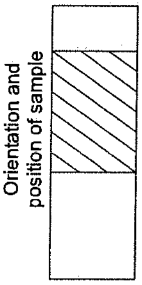
Quick Undrained Triaxial Test

Borehole Number: BH122
Sample Number: 2
Depth (m): 9.20

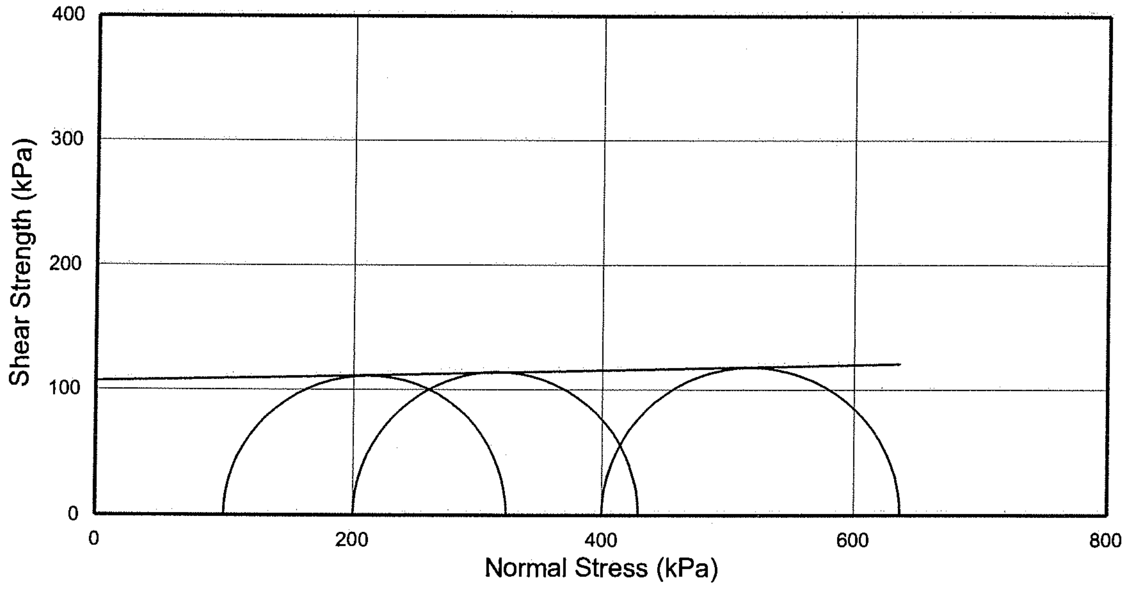
Description:
Stiff dark grey silty CLAY with rare pyrite nodules

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	103.0		
Moisture Content (%):	26		
Bulk Density (Mg/m³):	2.03		
Dry Density (Mg/m³):	1.61		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.2	1.4	1.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	8.9	10.9	14.4
Maximum Deviator Stress (kPa):	223	229	236
Shear Stress Cu (kPa):	111	115	118



Mode of failure:



c = 107 kPa Ø = 1 °

Checked and Approved

Initials: SB

Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

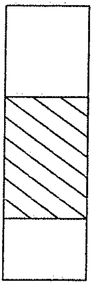
Quick Undrained Triaxial Test

Borehole Number:	BH124
Sample Number:	1
Depth (m):	3.00

Description:
Soft dark grey sandy gravelly CLAY

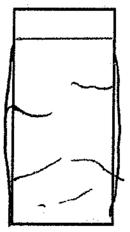
3 Stage Specimen

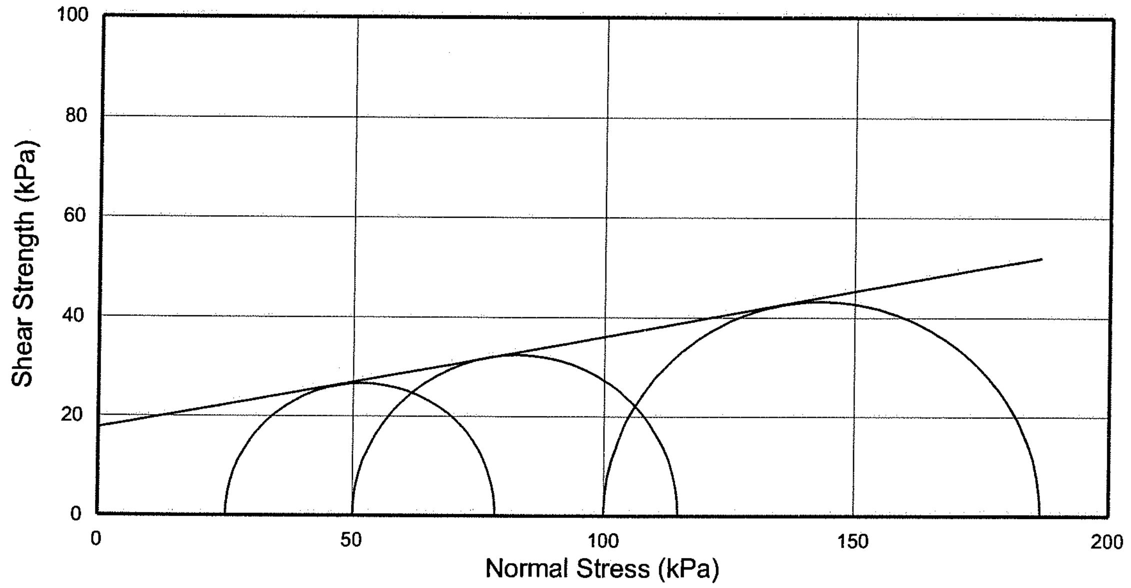
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.5
Diameter (mm):	103.5
Moisture Content (%):	16
Bulk Density (Mg/m³):	1.90
Dry Density (Mg/m³):	1.64



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	0.9	1.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	5.5	6.5	9.9
Maximum Deviator Stress (kPa):	53	65	86
Shear Stress Cu (kPa):	27	32	43

Mode of failure:





c = 18 kPa Ø = 10.5 °

Checked and Approved

Initials: SB

Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

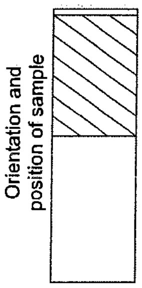
Quick Undrained Triaxial Test

Borehole Number: BH124
Sample Number: 2
Depth (m): 8.50

Description:
Very stiff grey fine sandy CLAY

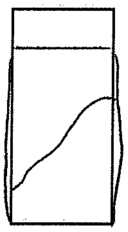
3 Stage Specimen

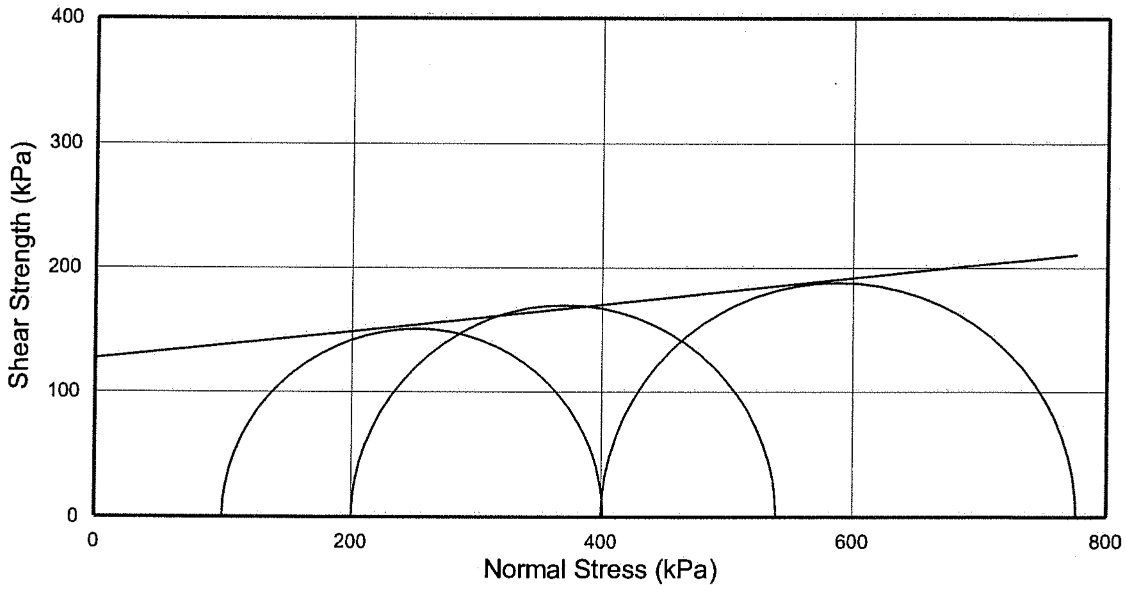
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.5
Diameter (mm):	103.6
Moisture Content (%):	25
Bulk Density (Mg/m³):	2.07
Dry Density (Mg/m³):	1.66



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.6	0.7	0.8
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	7.9	10.4	12.9
Maximum Deviator Stress (kPa):	301	340	376
Shear Stress Cu (kPa):	151	170	188

Mode of failure:





c = 127 kPa Ø = 6 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

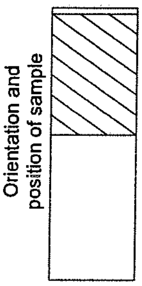
Quick Undrained Triaxial Test

Borehole Number: BH109
Sample Number: 3
Depth (m): 10.50

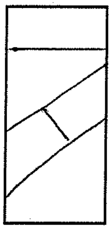
Description:
Stiff dark grey silty fine sandy CLAY

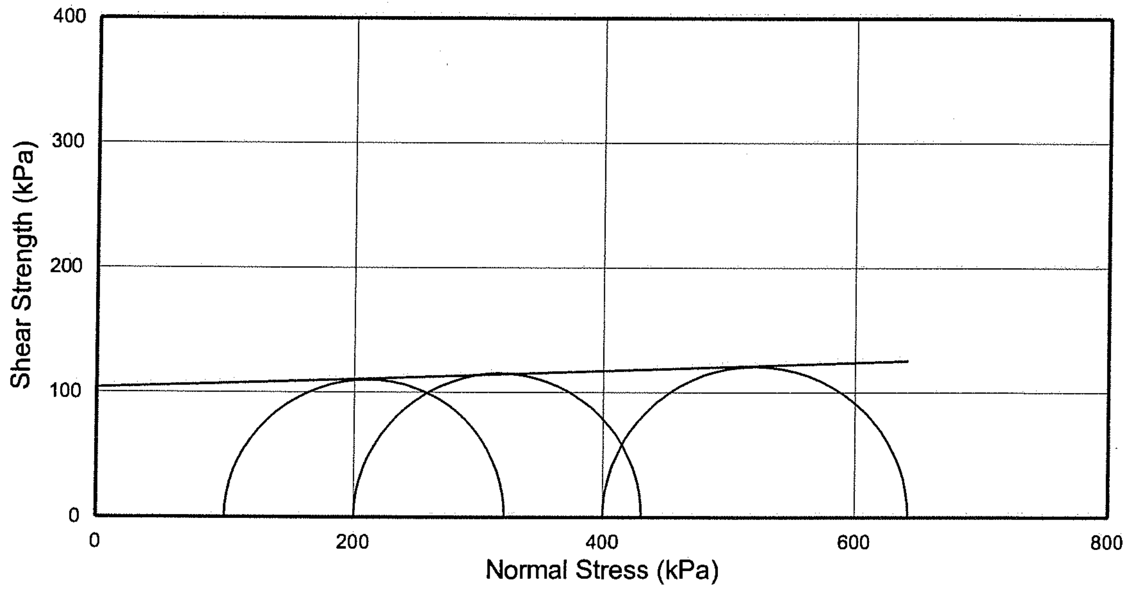
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.6		
Moisture Content (%):	27		
Bulk Density (Mg/m³):	2.02		
Dry Density (Mg/m³):	1.59		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.3	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	7.9	9.4	10.9
Maximum Deviator Stress (kPa):	221	231	242
Shear Stress Cu (kPa):	110	115	121



Mode of failure:





c = 104 kPa Ø = 2 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

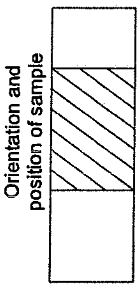
Quick Undrained Triaxial Test

Borehole Number:	BH116
Sample Number:	1
Depth (m):	2.50

Description:
Very dark grey organic CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.6		
Diameter (mm):	102.0		
Moisture Content (%):	103		
Bulk Density (Mg/m³):	1.52		
Dry Density (Mg/m³):	0.75		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.4	1.5
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	7.9	10.4	11.9
Maximum Deviator Stress (kPa):	38	39	39
Shear Stress Cu (kPa):	19	19	20



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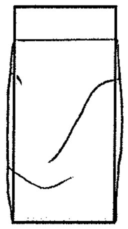

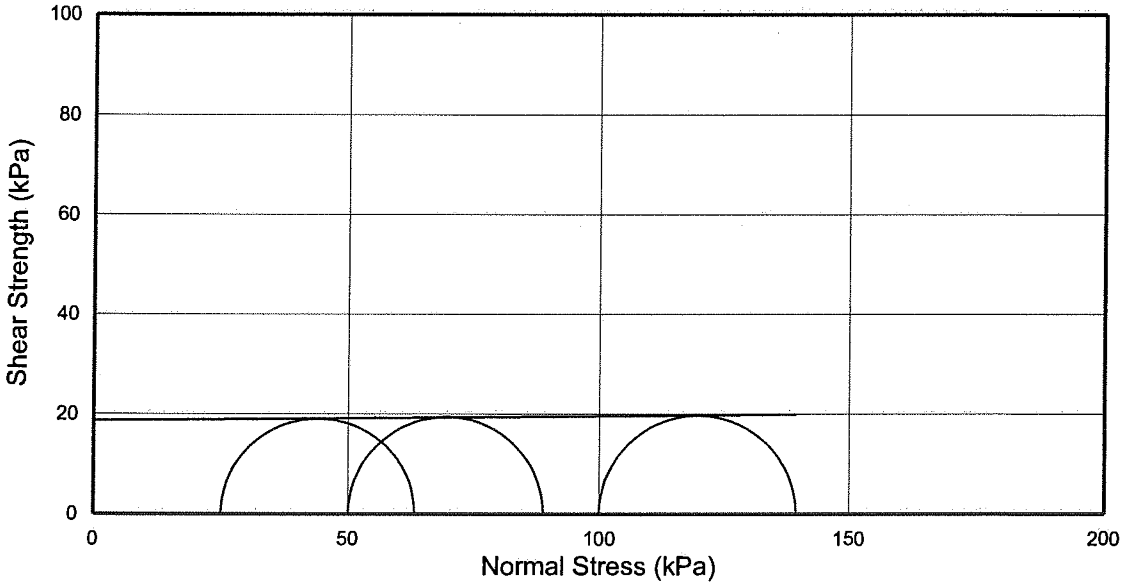

c = 19 kPa Ø = 0.5 °

Checked and Approved

Initials: SB

Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

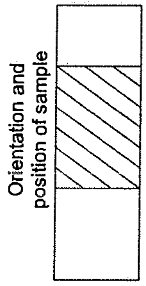
Quick Undrained Triaxial Test

Borehole Number: BH116
Sample Number: 2
Depth (m): 7.50

Description:
Firm to stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.7		
Diameter (mm):	102.7		
Moisture Content (%):	33		
Bulk Density (Mg/m³):	1.97		
Dry Density (Mg/m³):	1.49		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.1	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	6.9	7.9	10.9
Maximum Deviator Stress (kPa):	151	154	162
Shear Stress Cu (kPa):	75	77	81



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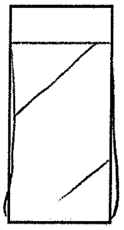

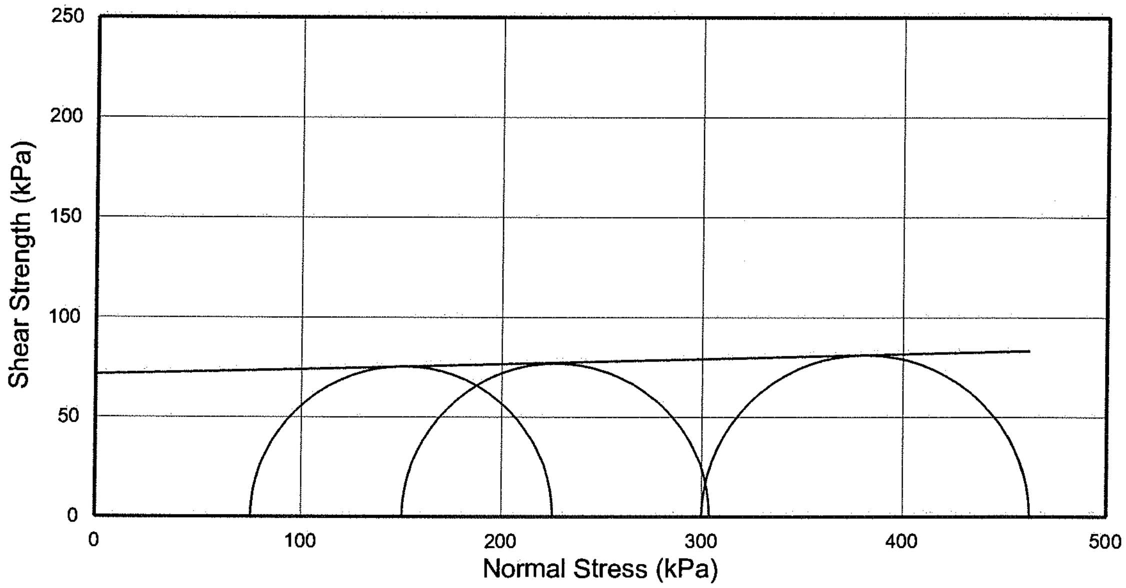

c = 71 kPa Ø = 1.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 7 : Clause 8 : 1990

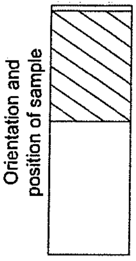
Quick Undrained Triaxial Test

Borehole Number:	BH116
Sample Number:	3
Depth (m):	9.50

Description:
Firm fissured dark brown silty CLAY

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	201.3
Diameter (mm):	101.9
Moisture Content (%):	33
Bulk Density (Mg/m³):	1.98
Dry Density (Mg/m³):	1.50
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	0.4
Axial displacement rate (%/min):	2.0
Cell pressure (kPa):	100
Strain at failure (%):	2.5
Maximum Deviator Stress (kPa):	127
Shear Stress Cu (kPa):	63



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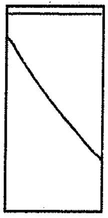

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Initials:
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Date: 19/04/2011

Project Number:
GEO / 16762

Project Name:
EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

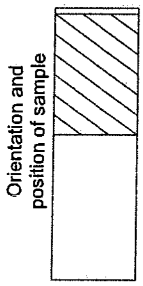
Quick Undrained Triaxial Test

Borehole Number: BH116
Sample Number: 5
Depth (m): 15.00

Description:
Stiff fissured dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.1		
Moisture Content (%):	26		
Bulk Density (Mg/m³):	2.00		
Dry Density (Mg/m³):	1.58		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	1.2	1.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	150	300	600
Strain at failure (%):	6.0	8.9	9.9
Maximum Deviator Stress (kPa):	227	254	268
Shear Stress Cu (kPa):	114	127	134



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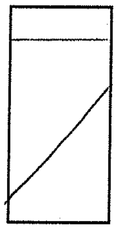

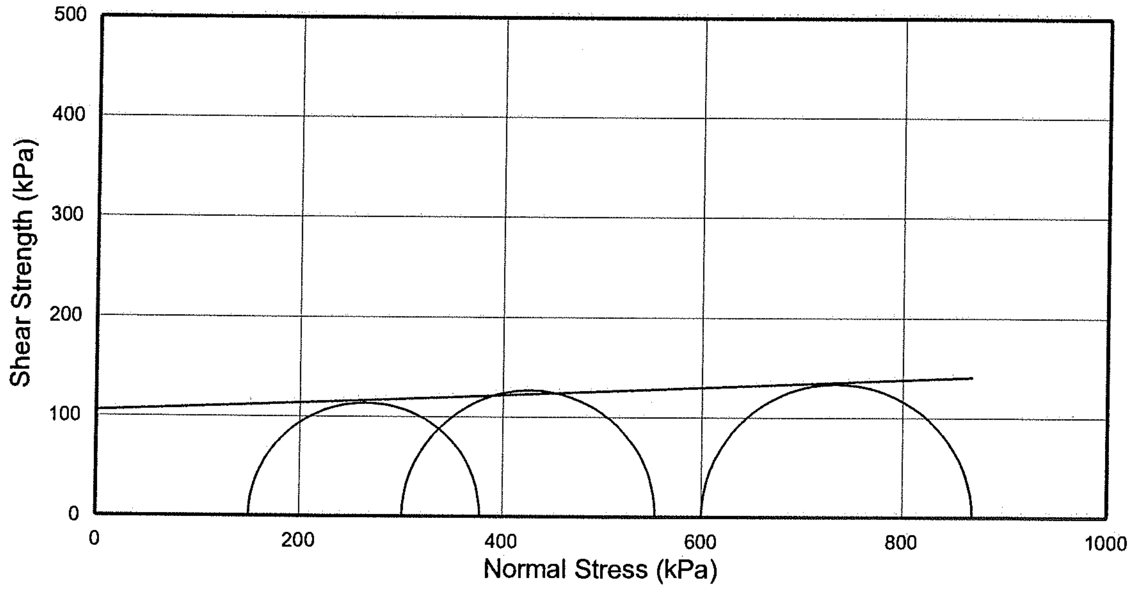

c = 106 kPa Ø = 2.5 °

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Initials: SB
Date: 19/04/2011

Project Number:
GEO / 16762
Project Name:
EDMONTON ECOPARK
Project No: SI1688

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BS1377 : Part 7 : Clause 8 : 1990

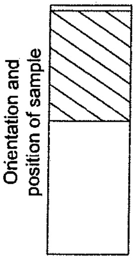
Quick Undrained Triaxial Test

Borehole Number: BH116
Sample Number: 6
Depth (m): 18.00

Description:
Very stiff fissured dark grey sandy CLAY

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	201.5
Diameter (mm):	101.6
Moisture Content (%):	21
Bulk Density (Mg/m³):	1.97
Dry Density (Mg/m³):	1.62
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	2.2
Axial displacement rate (%/min):	2.0
Cell pressure (kPa):	200
Strain at failure (%):	19.9
Maximum Deviator Stress (kPa):	331
Shear Stress Cu (kPa):	166



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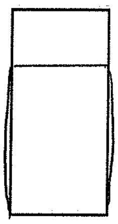

Multistage went to 20% on 1st stage

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Project Name: EDMONTON ECOPARK
Project No: SI1688

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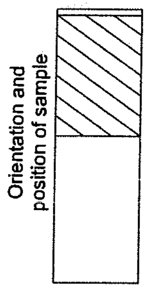
Quick Undrained Triaxial Test

Borehole Number: BH116
Sample Number: 7
Depth (m): 21.00

Description:
Very stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.3		
Diameter (mm):	102.9		
Moisture Content (%):	25		
Bulk Density (Mg/m³):	1.99		
Dry Density (Mg/m³):	1.59		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.8	2.0	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	200	400	800
Strain at failure (%):	14.9	17.4	19.9
Maximum Deviator Stress (kPa):	215	495	531
Shear Stress Cu (kPa):	108	248	266



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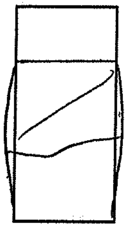

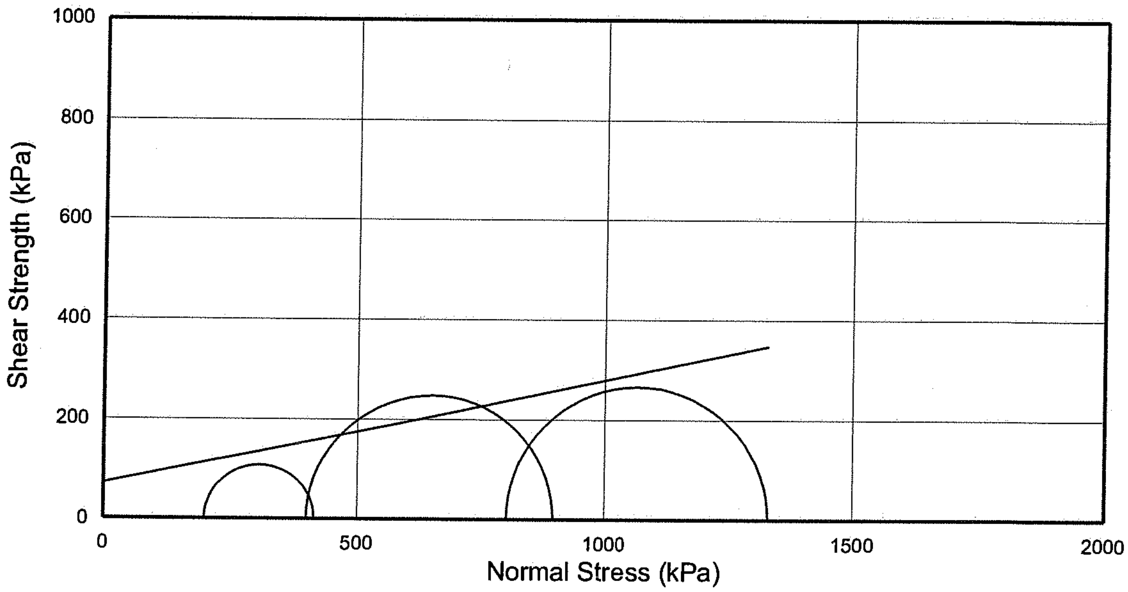

c = 72 kPa Ø = 11.5 °

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Initials: SB
Date: 19/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

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BS1377 : Part 7 : Clause 9 : 1990

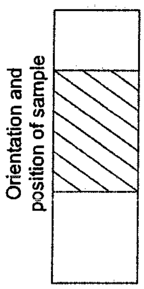
Quick Undrained Triaxial Test

Borehole Number: BH103
Sample Number: 1
Depth (m): 3.00

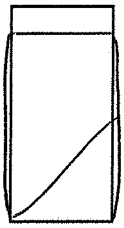
Description:
Soft black organic CLAY

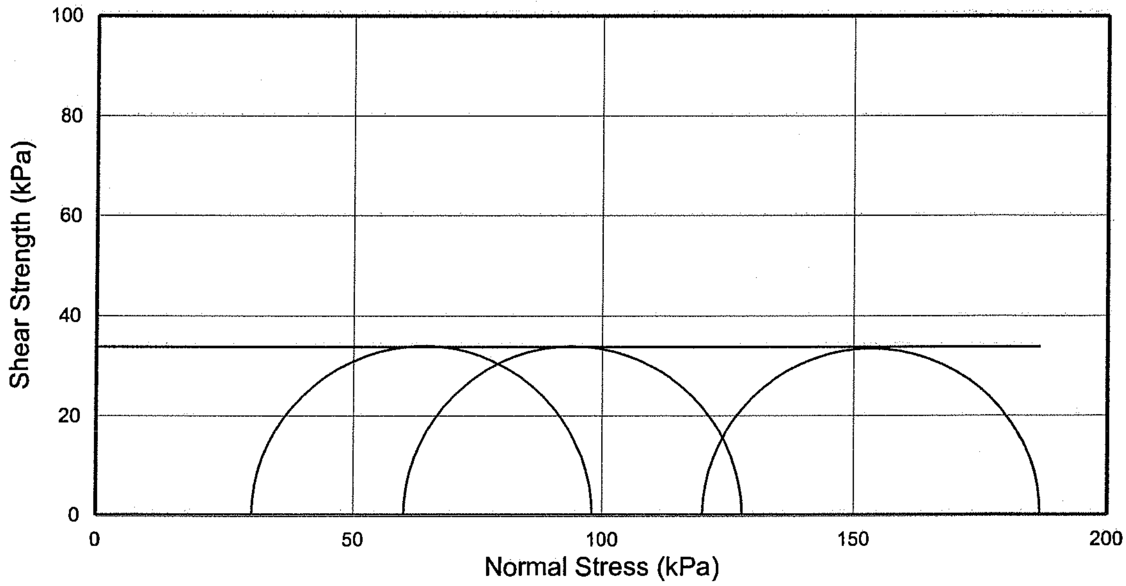
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.4		
Moisture Content (%):	124		
Bulk Density (Mg/m³):	1.31		
Dry Density (Mg/m³):	0.59		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.1	1.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	30	60	120
Strain at failure (%):	6.9	7.9	9.4
Maximum Deviator Stress (kPa):	68	68	67
Shear Stress Cu (kPa):	34	34	33



Mode of failure:





c = 34 kPa Ø = 0 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

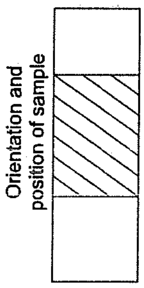
Quick Undrained Triaxial Test

Borehole Number: BH103
Sample Number: 2
Depth (m): 7.00

Description:
Firm dark grey silty CLAY with rare fine to medium sand and gravel

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.0		
Moisture Content (%):	32		
Bulk Density (Mg/m³):	2.05		
Dry Density (Mg/m³):	1.55		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	0.9	0.9
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	5.7	5.7	6.2
Maximum Deviator Stress (kPa):	114	114	118
Shear Stress Cu (kPa):	57	57	59



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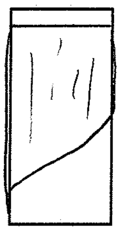

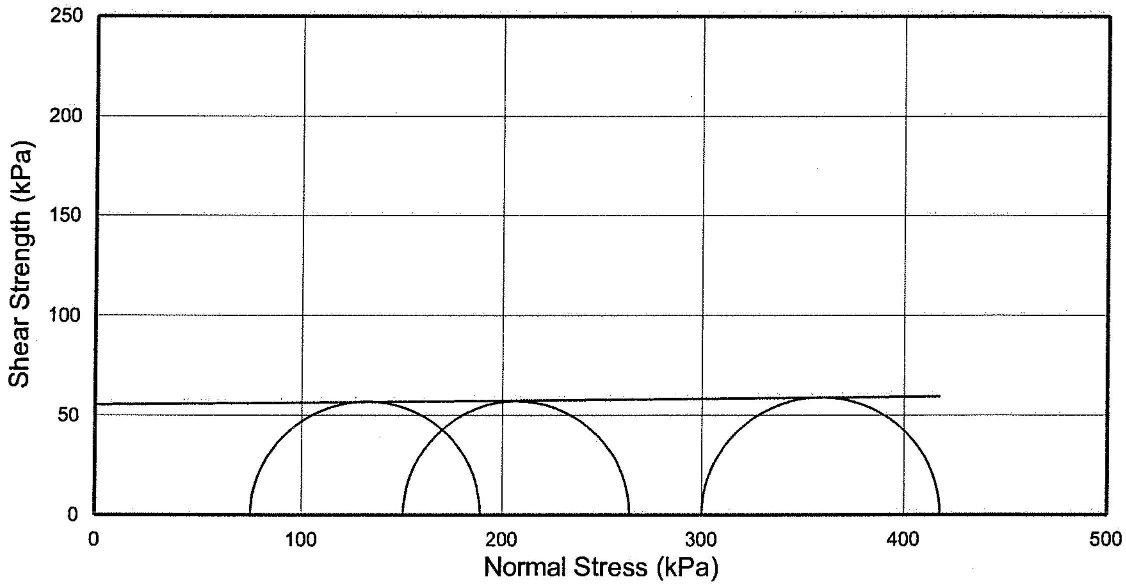

c = 55 kPa Ø = 0.5 °

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Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

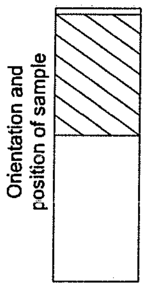
Quick Undrained Triaxial Test

Borehole Number: BH103
Sample Number: 3
Depth (m): 8.70

Description:
Stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.2		
Diameter (mm):	103.0		
Moisture Content (%):	23		
Bulk Density (Mg/m³):	2.06		
Dry Density (Mg/m³):	1.67		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.6	1.9	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	13.4	16.9	19.9
Maximum Deviator Stress (kPa):	263	278	287
Shear Stress Cu (kPa):	132	139	143



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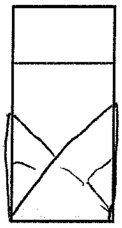

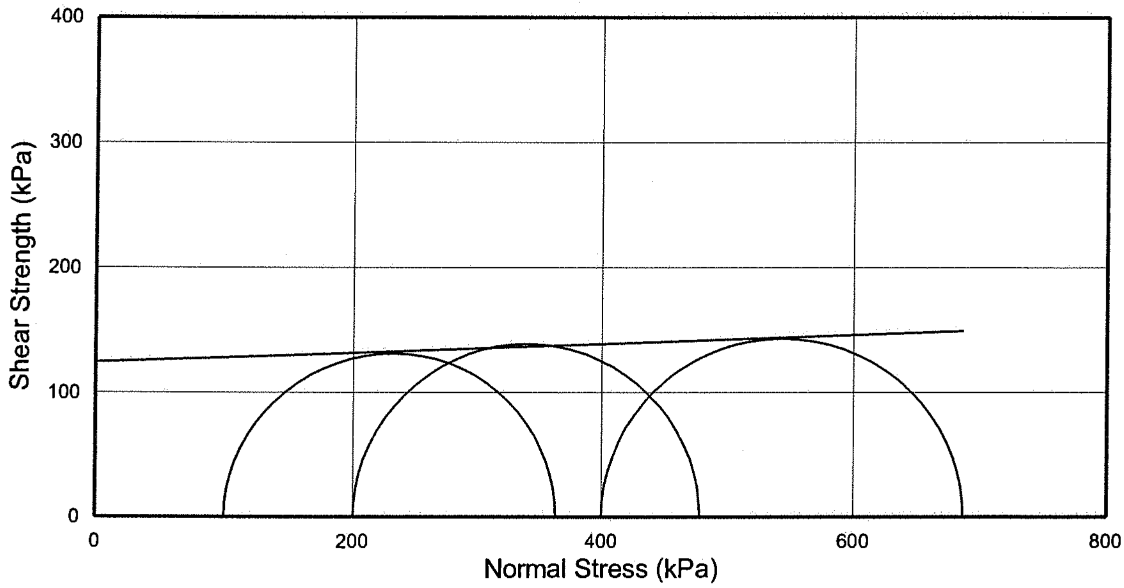

c = 125 kPa Ø = 2 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 8XX

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir)

GEOLABS®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

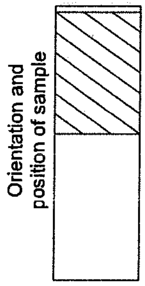
Quick Undrained Triaxial Test

Borehole Number: BH103
Sample Number: 4
Depth (m): 11.50

Description:
Very stiff dark grey silty CLAY with rare pyrite nodules

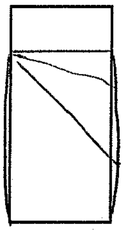
3 Stage Specimen

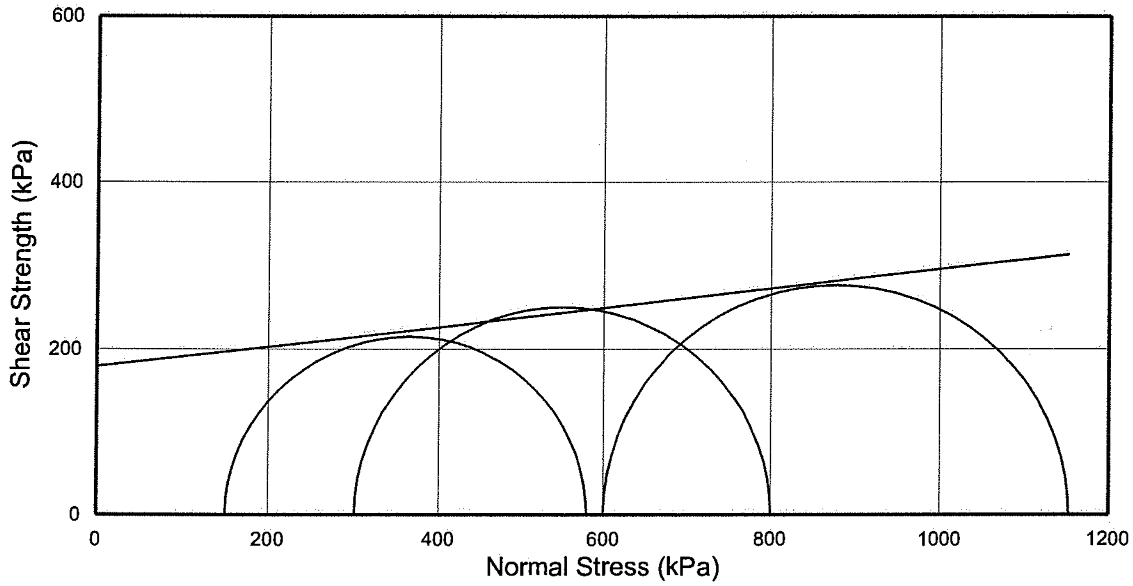
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.6
Diameter (mm):	102.5
Moisture Content (%):	24
Bulk Density (Mg/m³):	2.08
Dry Density (Mg/m³):	1.68



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.3	1.5	1.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	150	300	600
Strain at failure (%):	9.4	11.9	14.4
Maximum Deviator Stress (kPa):	430	500	553
Shear Stress Cu (kPa):	215	250	277

Mode of failure:





c = 179 kPa Ø = 6.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

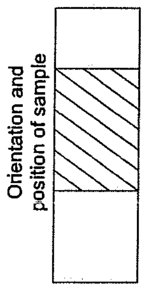
Quick Undrained Triaxial Test

Borehole Number: BH105
Sample Number: 2
Depth (m): 4.00

Description:
Firm dark grey gravelly sandy CLAY

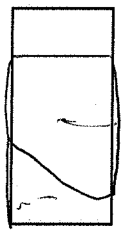
3 Stage Specimen

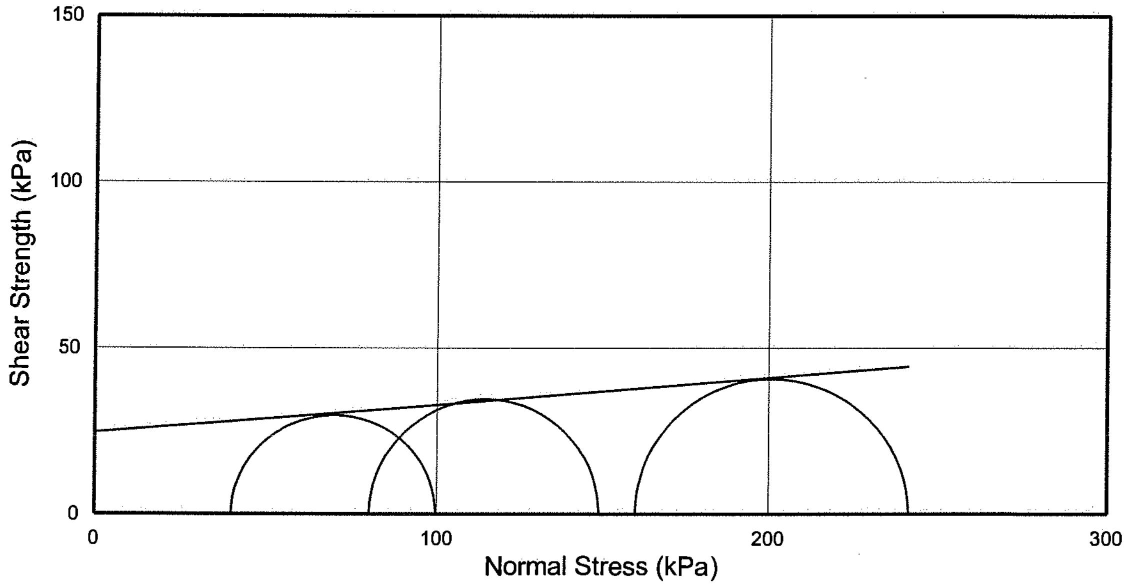
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.4
Diameter (mm):	102.0
Moisture Content (%):	17
Bulk Density (Mg/m³):	1.96
Dry Density (Mg/m³):	1.67



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.7	1.9	2.0
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	40	80	160
Strain at failure (%):	13.9	15.9	17.9
Maximum Deviator Stress (kPa):	60	69	81
Shear Stress Cu (kPa):	30	35	41

Mode of failure:





c = 25 kPa Ø = 4.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

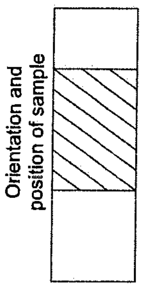
Quick Undrained Triaxial Test

Borehole Number: BH113
Sample Number: 1
Depth (m): 2.00

Description:
Firm dark grey slightly organic CLAY

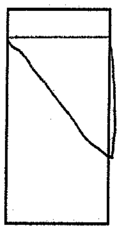
3 Stage Specimen

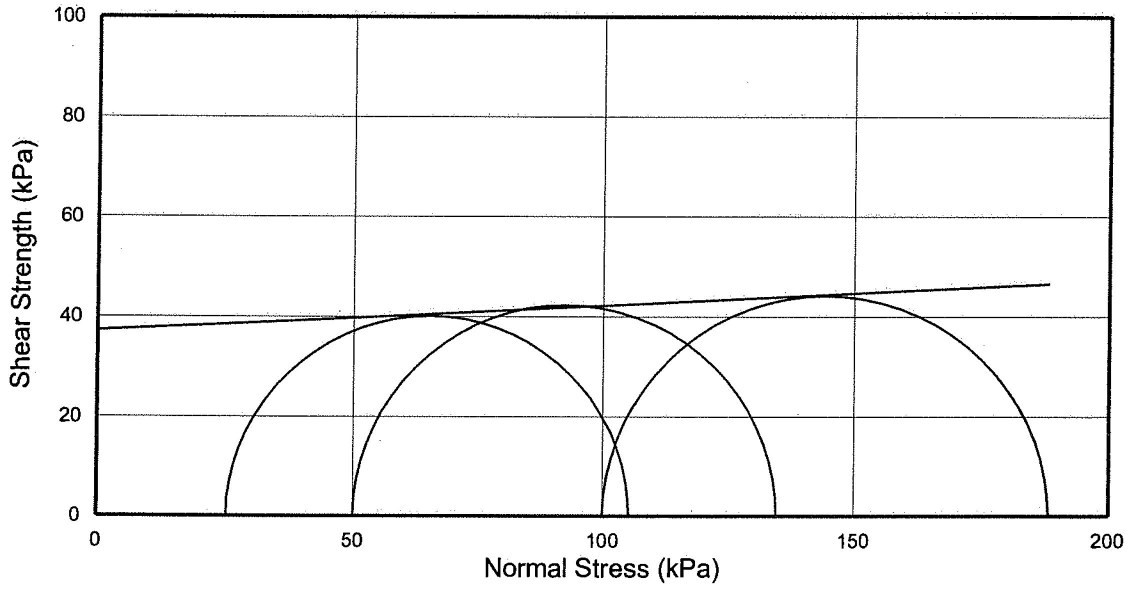
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.3
Diameter (mm):	101.5
Moisture Content (%):	48
Bulk Density (Mg/m³):	1.85
Dry Density (Mg/m³):	1.26



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.8	1.1	1.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	5.5	7.5	8.9
Maximum Deviator Stress (kPa):	80	85	88
Shear Stress Cu (kPa):	40	42	44

Mode of failure:





c = 37 kPa Ø = 3 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

Quick Undrained Triaxial Test

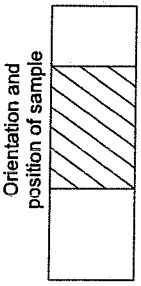
Borehole Number: BH113
Sample Number: 2
Depth (m): 4.00

Description:
Soft sandy gravelly CLAY

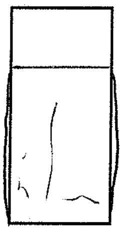
3 Stage Specimen

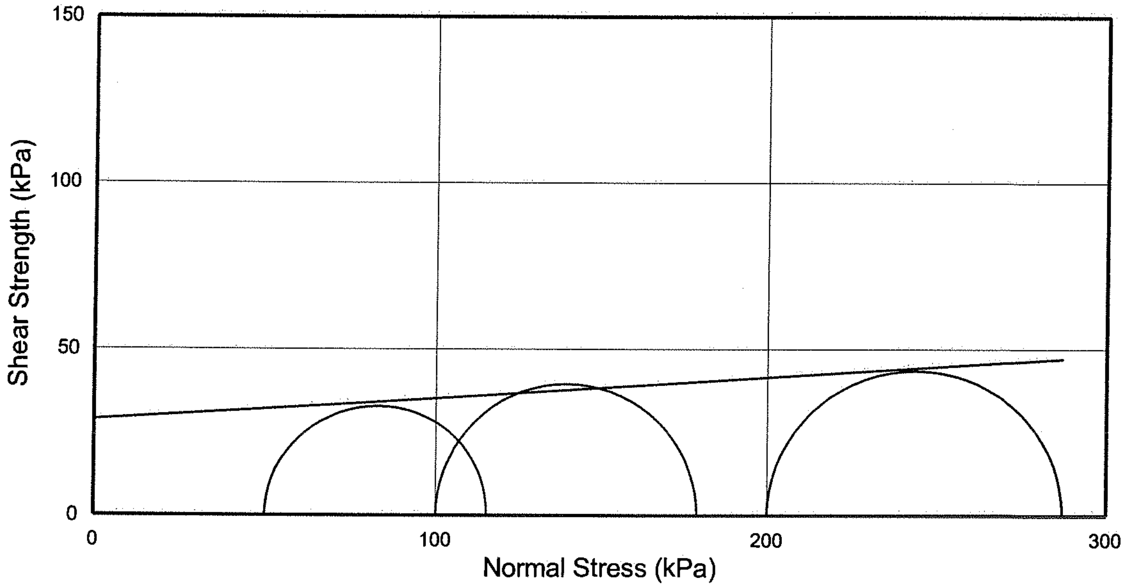
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.8
Diameter (mm):	103.0
Moisture Content (%):	12
Bulk Density (Mg/m³):	2.13
Dry Density (Mg/m³):	1.90

Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.8	2.1	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	14.9	18.8	19.8
Maximum Deviator Stress (kPa):	66	79	87
Shear Stress Cu (kPa):	33	40	44



Mode of failure:





c = 29 kPa Ø = 3.5 °

Checked and Approved
Initials: SB
Date: 19/04/2011

Project Number: **GEO/16786**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

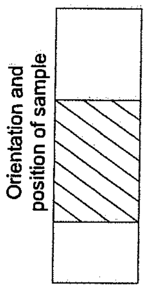
Quick Undrained Triaxial Test

Borehole Number: BH101
Sample Number: 1
Depth (m): 3.00

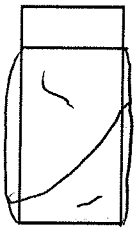
Description:
Soft grey organic silty CLAY with rare plant remains

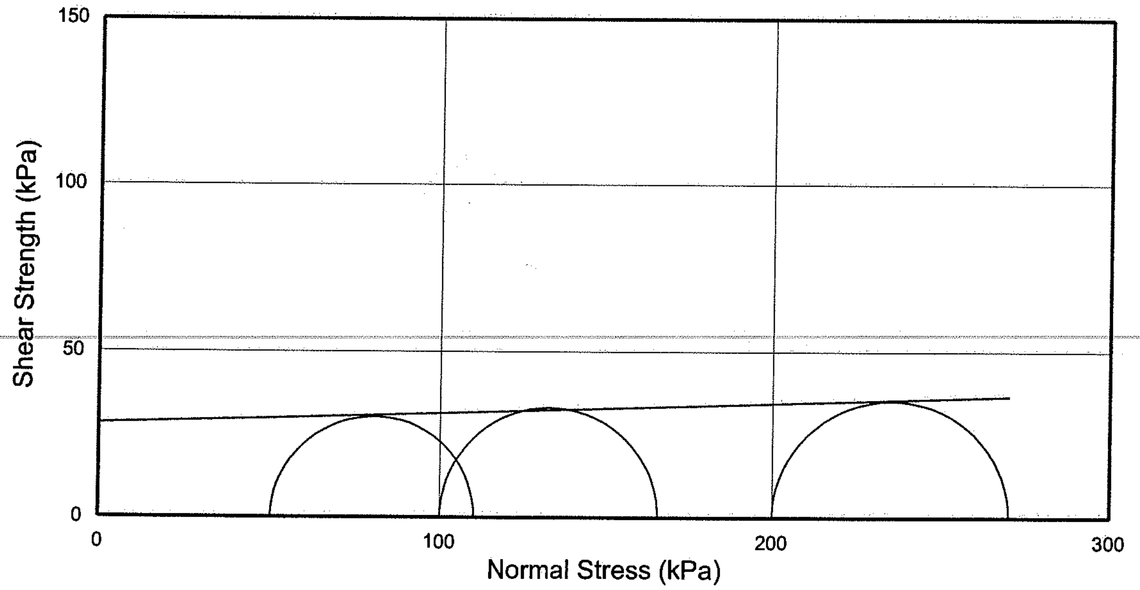
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.3		
Diameter (mm):	103.0		
Moisture Content (%):	80		
Bulk Density (Mg/m³):	1.56		
Dry Density (Mg/m³):	0.87		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.1	1.3	1.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	7.9	10.4	13.8
Maximum Deviator Stress (kPa):	60	66	70
Shear Stress Cu (kPa):	30	33	35



Mode of failure:





c = 28 kPa Ø = 1.5 °

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

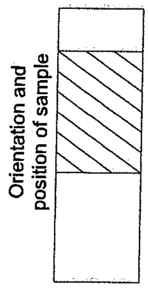
Quick Undrained Triaxial Test

Borehole Number: BH101
Sample Number: 2
Depth (m): 8.00

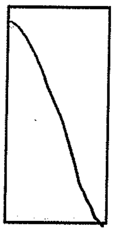
Description:
Firm to stiff fissured grey silty CLAY

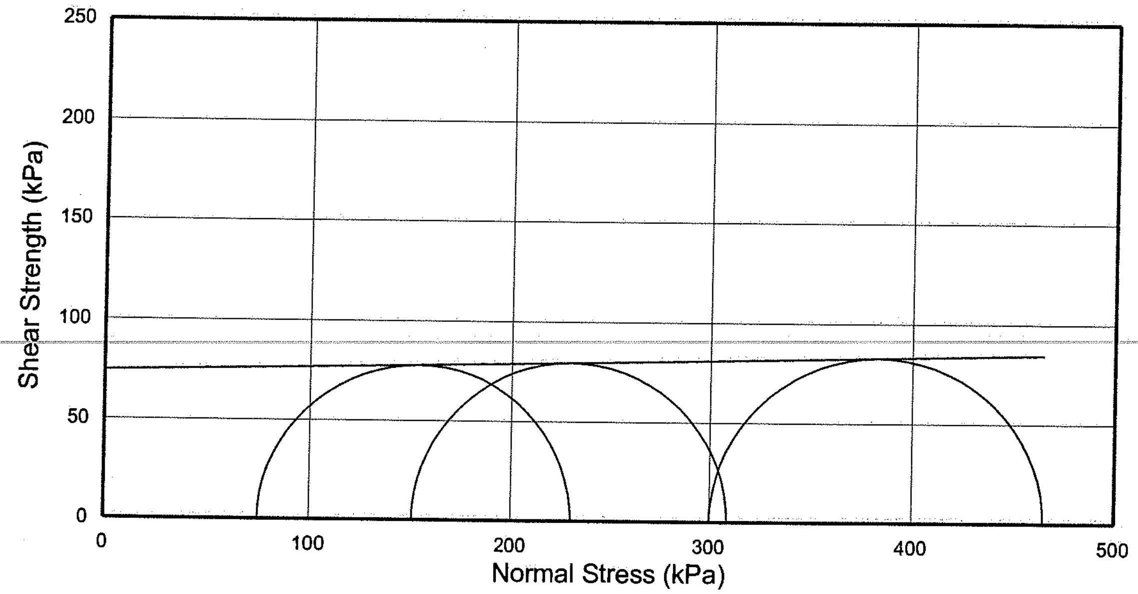
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.9		
Diameter (mm):	103.4		
Moisture Content (%):	31		
Bulk Density (Mg/m³):	1.96		
Dry Density (Mg/m³):	1.50		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.4	0.5	0.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	2.5	3.2	4.5
Maximum Deviator Stress (kPa):	155	159	165
Shear Stress Cu (kPa):	78	79	83



Mode of failure:





c = 74 kPa Ø = 1 °

Checked and Approved

Initials: SB

Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

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BS1377 : Part 7 : Clause 9 : 1990

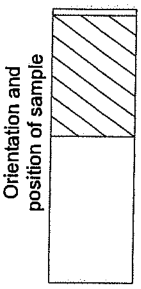
Quick Undrained Triaxial Test

Borehole Number:	BH101
Sample Number:	4
Depth (m):	13.00

Description:
Very stiff dark grey silty CLAY

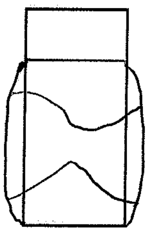
3 Stage Specimen

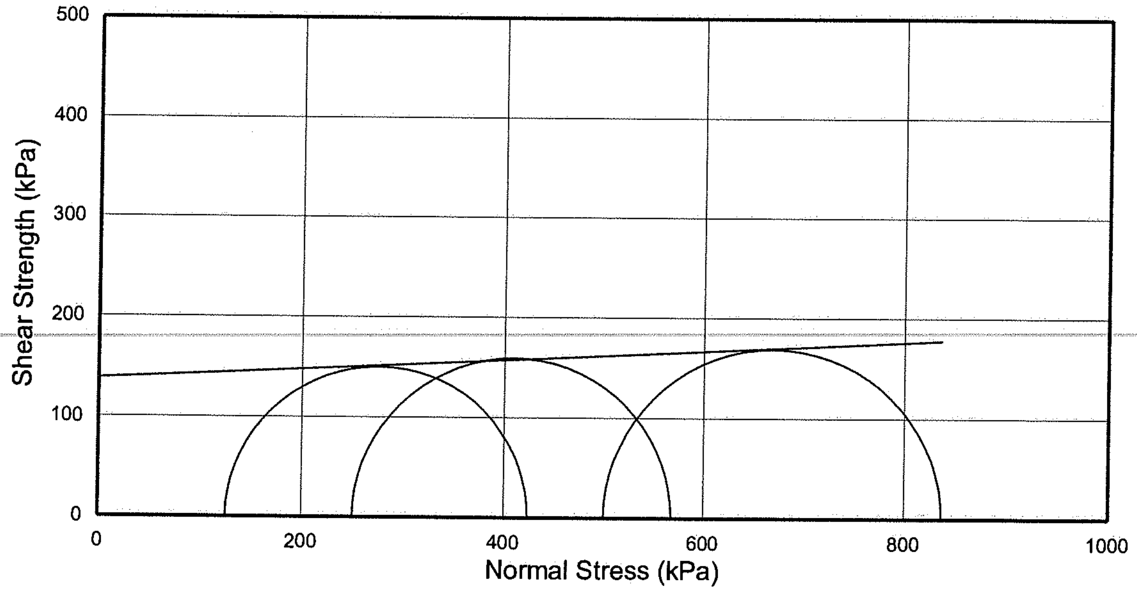
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.8
Diameter (mm):	103.1
Moisture Content (%):	23
Bulk Density (Mg/m³):	2.09
Dry Density (Mg/m³):	1.69



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.6	1.9	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	125	250	500
Strain at failure (%):	13.4	16.4	19.8
Maximum Deviator Stress (kPa):	299	318	337
Shear Stress Cu (kPa):	150	159	169

Mode of failure:





c = 138 kPa Ø = 2.5 °

Checked and Approved Initials: SB Date: 06/05/2011	Project Number: GEO / 16819 Project Name: EDMONTON ECOPARK	**GEOLABS** ®

BS1377 : Part 7 : Clause 8 : 1990

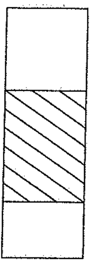
Quick Undrained Triaxial Test

Borehole Number:	BH104
Sample Number:	1
Depth (m):	1.20

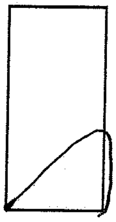
Description:
MADE GROUND: (Firm dark brown silty clay with rare fine to medium gravel, brick and mortar fragments)

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	201.5
Diameter (mm):	102.4
Moisture Content (%):	27
Bulk Density (Mg/m³):	1.99
Dry Density (Mg/m³):	1.57
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	0.8
Axial displacement rate (%/min):	2.0
Cell pressure (kPa):	15
Strain at failure (%):	5.5
Maximum Deviator Stress (kPa):	115
Shear Stress Cu (kPa):	57


Orientation and position of sample

Mode of failure:



Sample failed on first stage of Multistage test

Checked and Approved
Initials:
SB
Date: 06/05/2011

Project Number:
GEO / 16819
Project Name:
EDMONTON ECOPARK

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BS1377 : Part 7 : Clause 9 : 1990

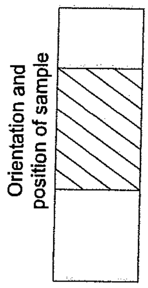
Quick Undrained Triaxial Test

Borehole Number:	BH104
Sample Number:	2
Depth (m):	3.00

Description:
Firm brown and dark grey calcareous CLAY with rare gravel

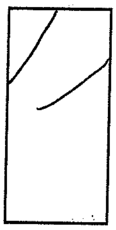
3 Stage Specimen

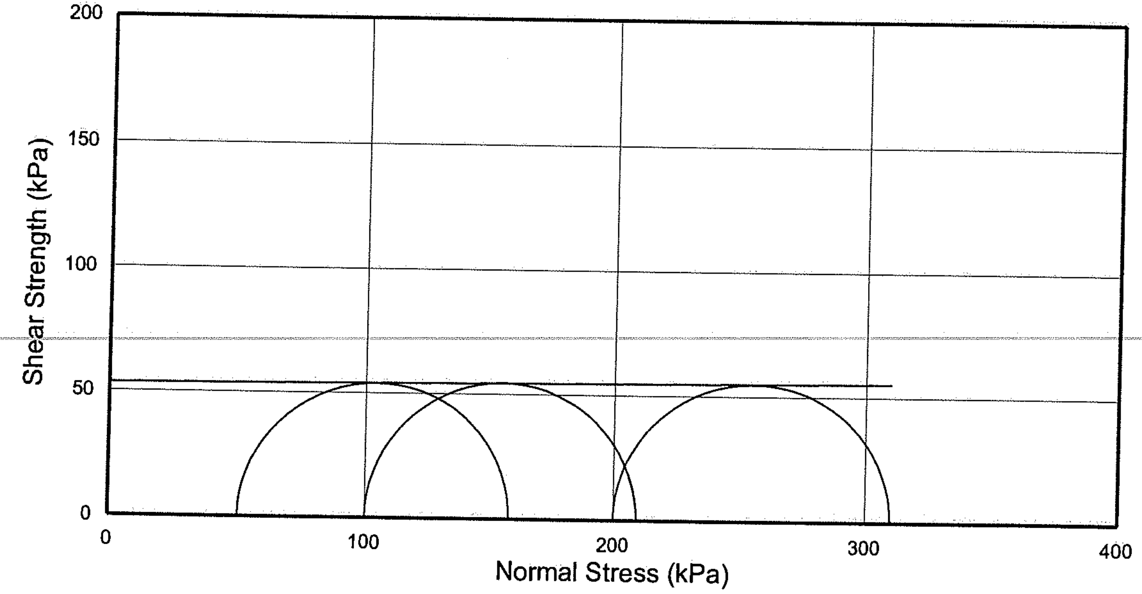
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.4
Diameter (mm):	102.9
Moisture Content (%):	33
Bulk Density (Mg/m³):	1.95
Dry Density (Mg/m³):	1.47



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	1.1	1.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	6.0	7.4	8.9
Maximum Deviator Stress (kPa):	108	109	110
Shear Stress Cu (kPa):	54	55	55

Mode of failure:





c = 53 kPa Ø = 0.5 °

Checked and Approved

Initials: SB

Date: 06/05/2011

Project Number:

GEO / 16819

Project Name:

EDMONTON ECOPARK

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

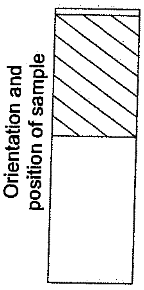
Quick Undrained Triaxial Test

Borehole Number:	BH104
Sample Number:	3
Depth (m):	8.00

Description:
Firm dark grey silty CLAY with rare fine sand

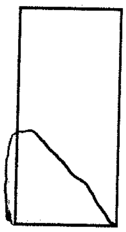
3 Stage Specimen

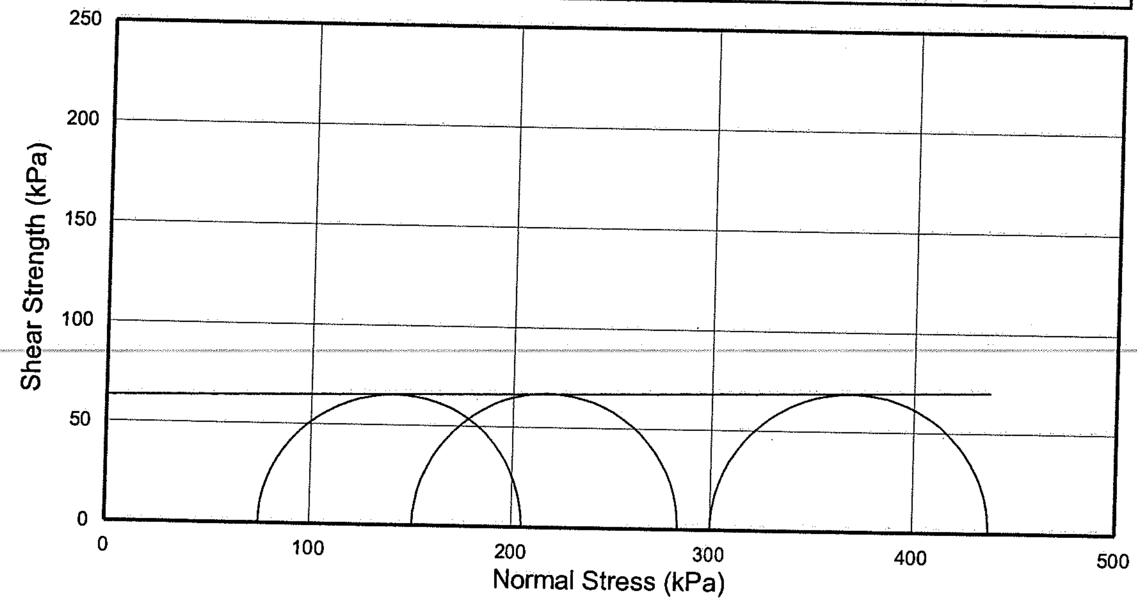
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.3
Diameter (mm):	102.3
Moisture Content (%):	27
Bulk Density (Mg/m³):	2.03
Dry Density (Mg/m³):	1.61



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.7	0.8	0.9
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	4.5	5.5	6.5
Maximum Deviator Stress (kPa):	130	134	138
Shear Stress Cu (kPa):	65	67	69

Mode of failure:





c = 63 kPa   Ø = 1 °

Checked and Approved

Initials: SB

Date: 06/05/2011

Project Number: GEO / 16819

Project Name: EDMONTON ECOPARK

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

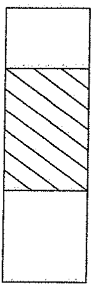
Quick Undrained Triaxial Test

Borehole Number:	BH108
Sample Number:	1
Depth (m):	2.50

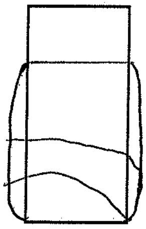
Description:
Soft dark brown clayey PEAT

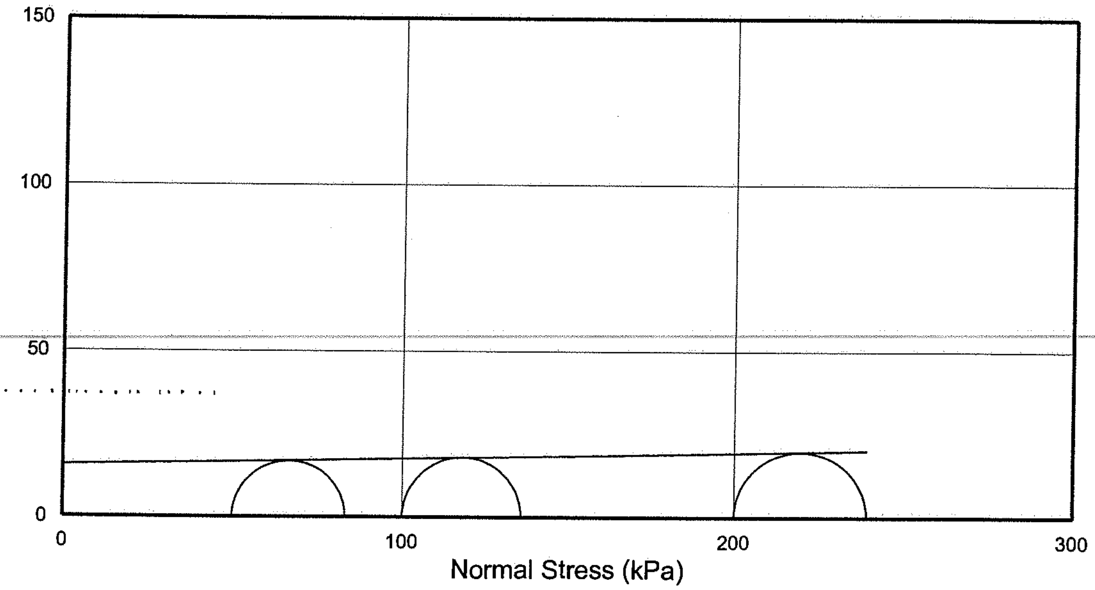
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.8		
Diameter (mm):	102.5		
Moisture Content (%):	67		
Bulk Density (Mg/m³):	1.44		
Dry Density (Mg/m³):	0.87		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.8	2.0	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	50	100	200
Strain at failure (%):	14.9	17.3	19.8
Maximum Deviator Stress (kPa):	33	36	39
Shear Stress Cu (kPa):	17	18	20



Mode of failure:





c = 15 kPa Ø = 1 °

Checked and Approved	
Initials:	SB
Date:	06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

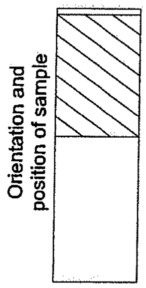
Quick Undrained Triaxial Test

Borehole Number: BH108
Sample Number: 3
Depth (m): 8.50

Description:
Stiff dark grey silty CLAY with rare fine sand

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.8		
Diameter (mm):	102.2		
Moisture Content (%):	25		
Bulk Density (Mg/m³):	2.01		
Dry Density (Mg/m³):	1.61		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.2	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	6.9	8.9	10.9
Maximum Deviator Stress (kPa):	251	260	267
Shear Stress Cu (kPa):	125	130	134



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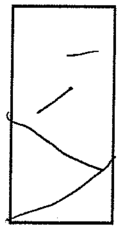

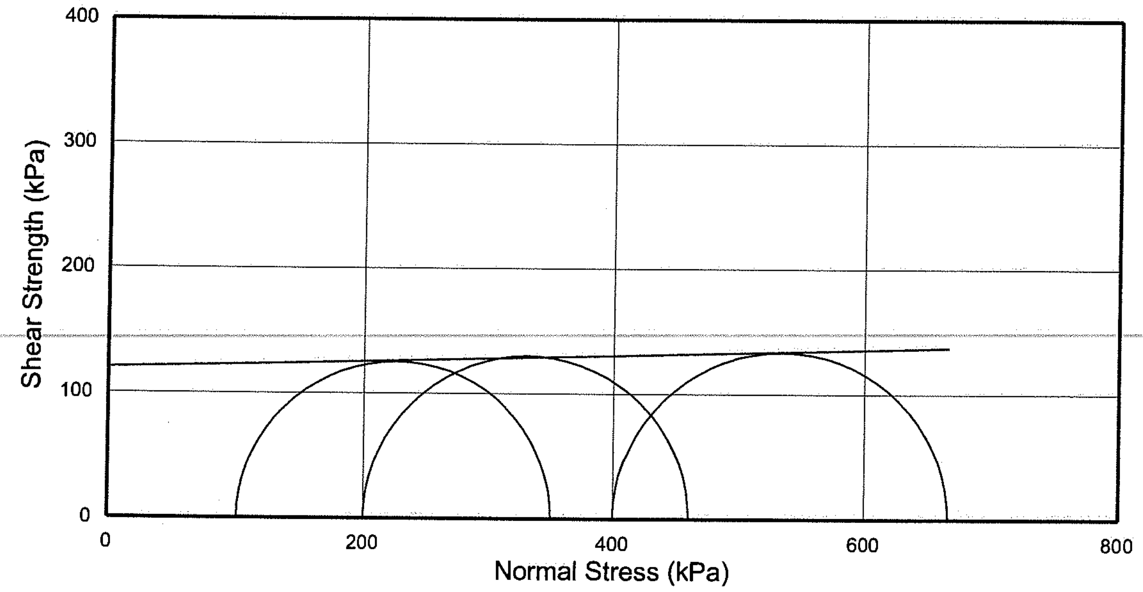

c = 120 kPa Ø = 1.5 °

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

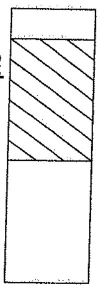
Quick Undrained Triaxial Test

Borehole Number: BH117
Sample Number: 1
Depth (m): 2.50

Description:
Soft grey organic CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.8		
Diameter (mm):	102.9		
Moisture Content (%):	69		
Bulk Density (Mg/m³):	1.54		
Dry Density (Mg/m³):	0.91		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	1.4	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	25	50	100
Strain at failure (%):	6.4	10.9	19.8
Maximum Deviator Stress (kPa):	49	51	55
Shear Stress Cu (kPa):	24	26	28



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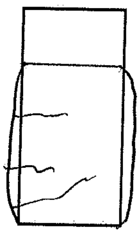

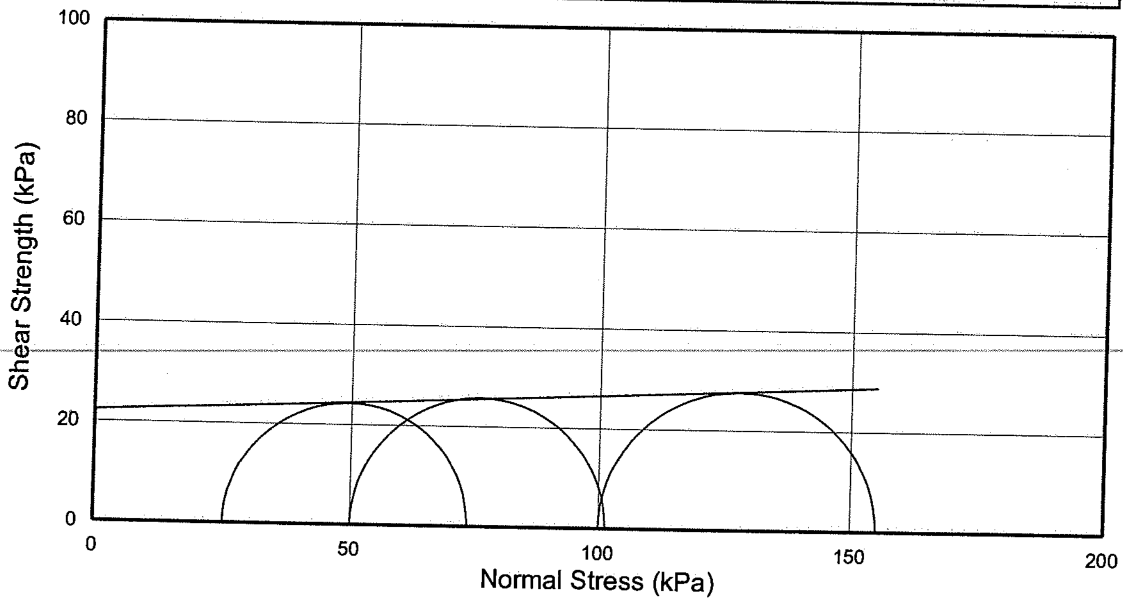

c = 22 kPa Ø = 2.5 °

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: GEO / 16819
Project Name: EDMONTON ECOPARK

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

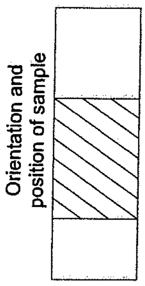
Quick Undrained Triaxial Test

Borehole Number: BH118
Sample Number: 1
Depth (m): 1.50

Description:
Soft to firm dark grey CLAY with rare fine sand and black staining

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	102.1		
Moisture Content (%):	28		
Bulk Density (Mg/m³):	1.96		
Dry Density (Mg/m³):	1.53		
Test details	**Stage 1**	**Stage 2**	**Stage 3**
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.3	1.5	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	15	30	60
Strain at failure (%):	9.4	11.9	19.9
Maximum Deviator Stress (kPa):	82	86	94
Shear Stress Cu (kPa):	41	43	47



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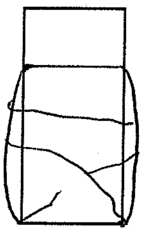
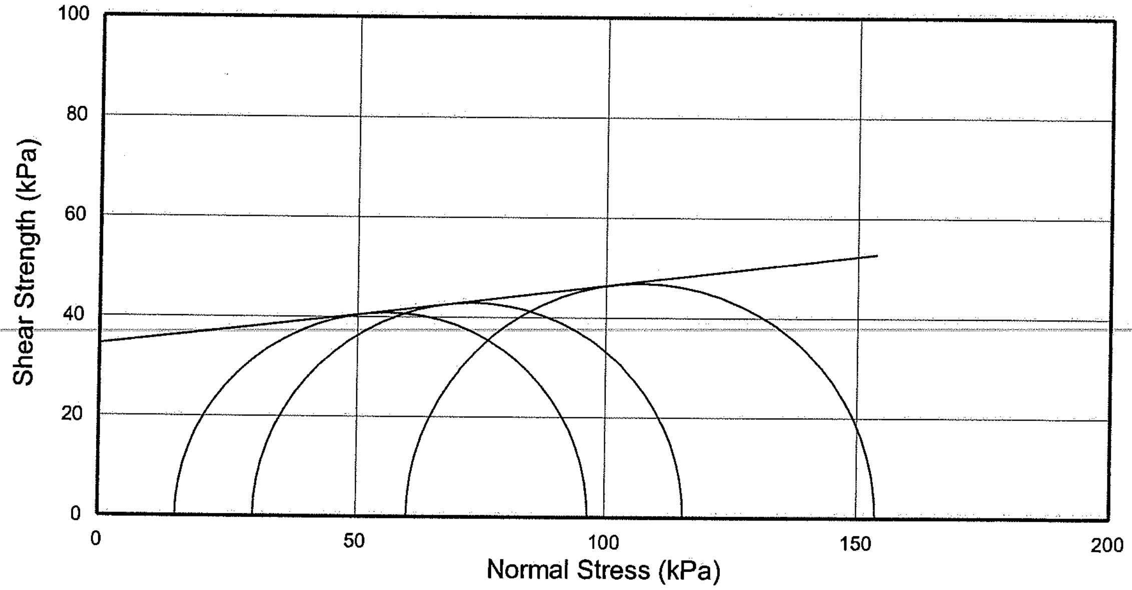




c = 34 kPa Ø = 7 °

Checked and Approved
Initials: SB
Date: 06/05/2011

Project Number: **GEO / 16819**

Project Name: **EDMONTON ECOPARK**

UKAS TESTING 1982

GEOLABS ®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: • J R Masters (Qual Mgr) • C F Wallace (Tech Mgr) • G J Corio (Tech Mgr) • J Sturges (Tech Mgr) [X] Simon Burke (Snr Tech) • J J M Powell (Tech Dir)

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

BS1377 : Part 7 : Clause 9 : 1990

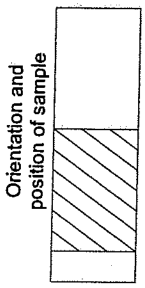
Quick Undrained Triaxial Test

Borehole Number: BH118
Sample Number: 2
Depth (m): 3.00

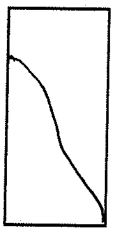
Description:
Soft to firm dark brown clayey PEAT

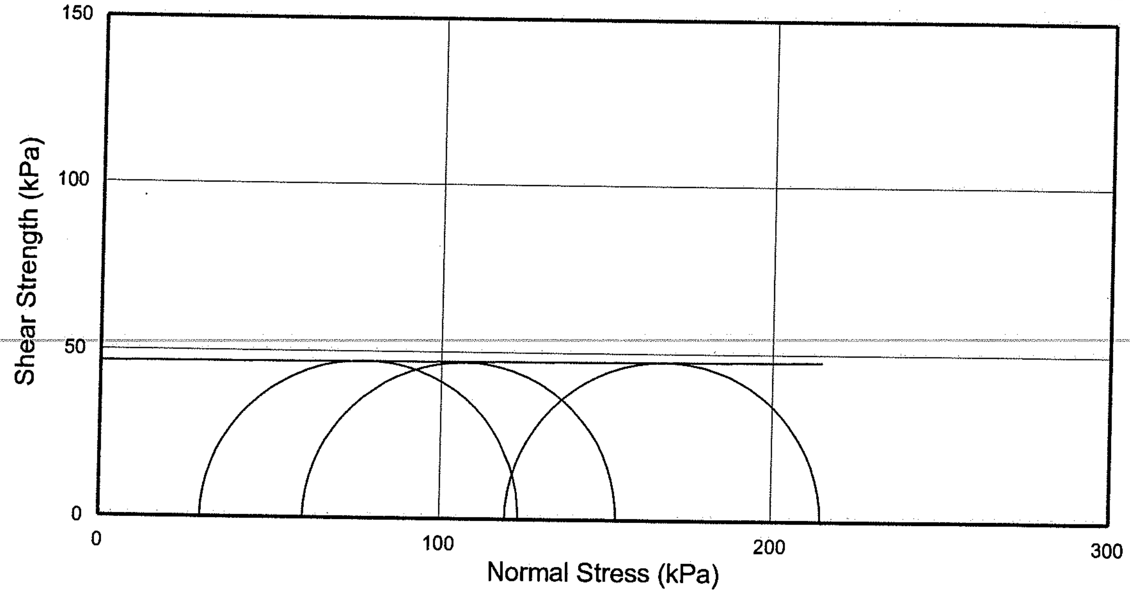
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.4		
Diameter (mm):	101.5		
Moisture Content (%):	180		
Bulk Density (Mg/m³):	1.28		
Dry Density (Mg/m³):	0.46		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.7	0.8	1.0
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	30	60	120
Strain at failure (%):	4.5	5.5	7.0
Maximum Deviator Stress (kPa):	94	94	95
Shear Stress Cu (kPa):	47	47	47



Mode of failure:





c = 46 kPa Ø = 0.5 °

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Project Name: EDMONTON ECOPARK

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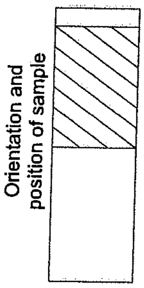
Quick Undrained Triaxial Test

Borehole Number: BH118
Sample Number: 3
Depth (m): 6.50

Description:
Firm to stiff fissured dark grey CLAY with rare fine sand

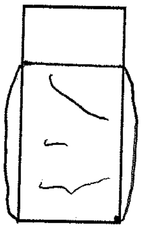
3 Stage Specimen

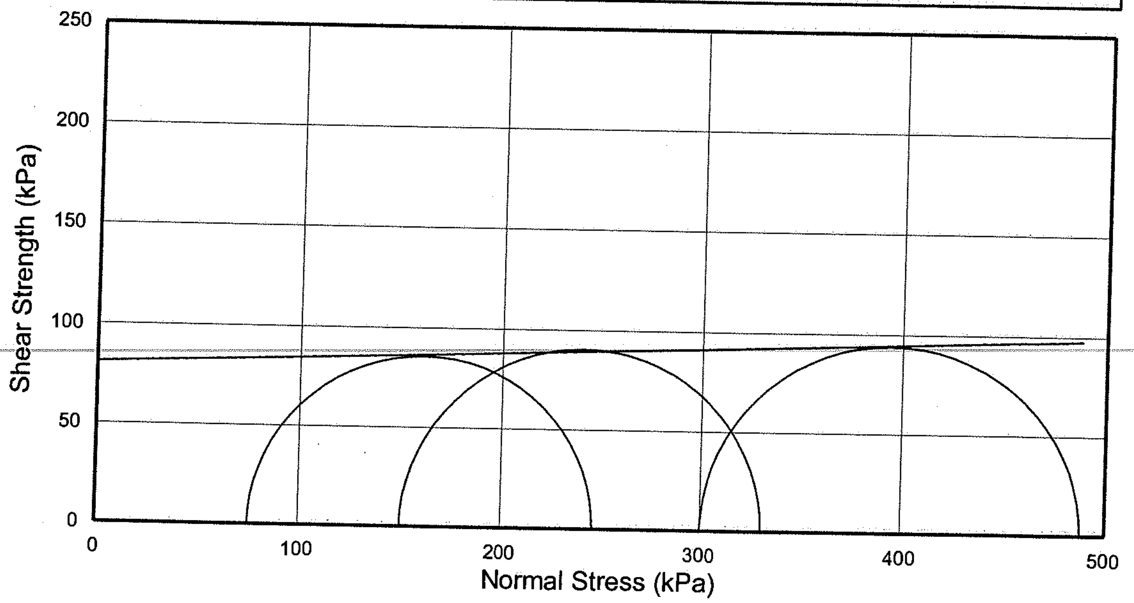
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.0
Diameter (mm):	103.4
Moisture Content (%):	30
Bulk Density (Mg/m³):	2.03
Dry Density (Mg/m³):	1.56



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.9	2.1	2.2
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	16.4	18.9	19.9
Maximum Deviator Stress (kPa):	171	181	188
Shear Stress Cu (kPa):	86	90	94

Mode of failure:





c = 81 kPa Ø = 2 °

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Quick Undrained Triaxial Test

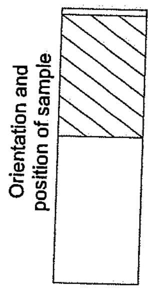
Borehole Number:	BH118
Sample Number:	4
Depth (m):	8.00

Description:
Very stiff dark grey silty CLAY with rare fine sand

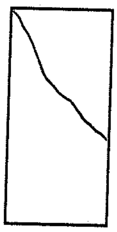
3 Stage Specimen

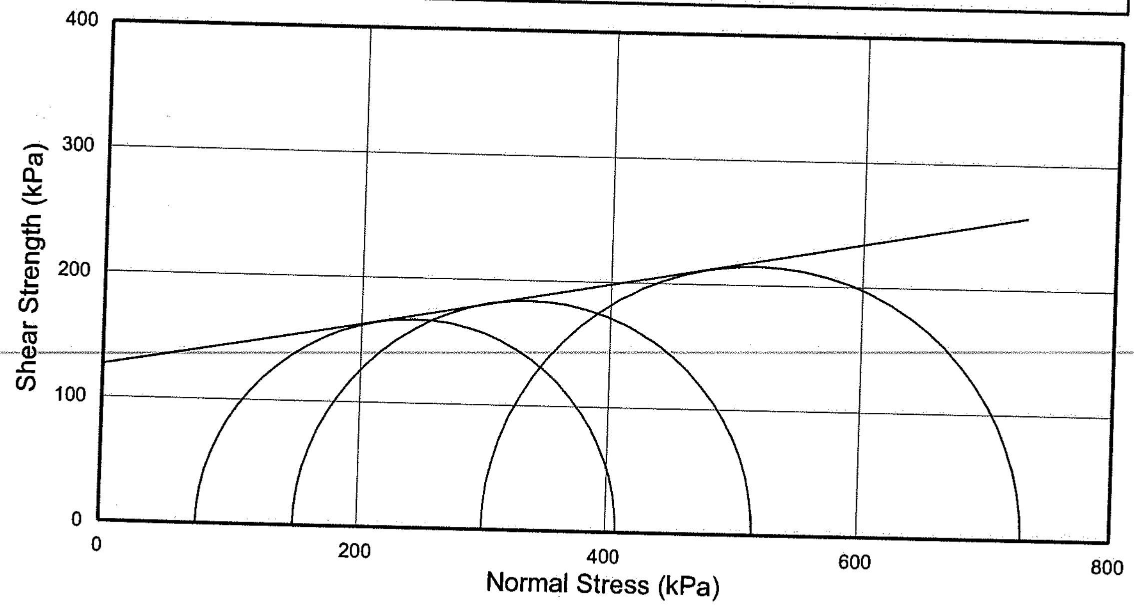
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	201.4
Diameter (mm):	102.0
Moisture Content (%):	23
Bulk Density (Mg/m³):	2.12
Dry Density (Mg/m³):	1.72

Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.9	1.1	1.4
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	6.0	7.9	10.9
Maximum Deviator Stress (kPa):	334	367	430
Shear Stress Cu (kPa):	167	184	215



Mode of failure:





c = 126 kPa   Ø = 10 °

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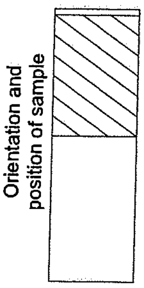
Quick Undrained Triaxial Test

Borehole Number:	BH123
Sample Number:	1
Depth (m):	8.50

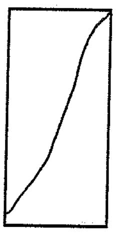
Description:
Firm to stiff dark grey silty CLAY with rare fine sand

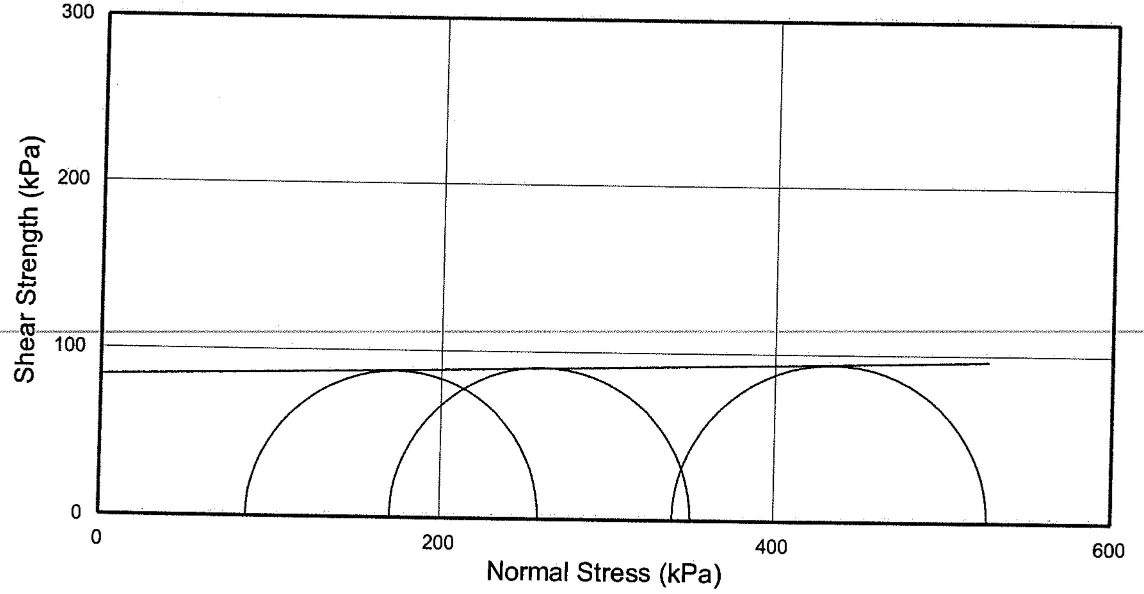
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.5		
Diameter (mm):	103.0		
Moisture Content (%):	22		
Bulk Density (Mg/m³):	2.05		
Dry Density (Mg/m³):	1.68		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	1.0	1.2	1.3
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	85	170	340
Strain at failure (%):	6.9	8.4	9.4
Maximum Deviator Stress (kPa):	175	181	187
Shear Stress Cu (kPa):	87	90	94



Mode of failure:





c = 84 kPa Ø = 1.5 °

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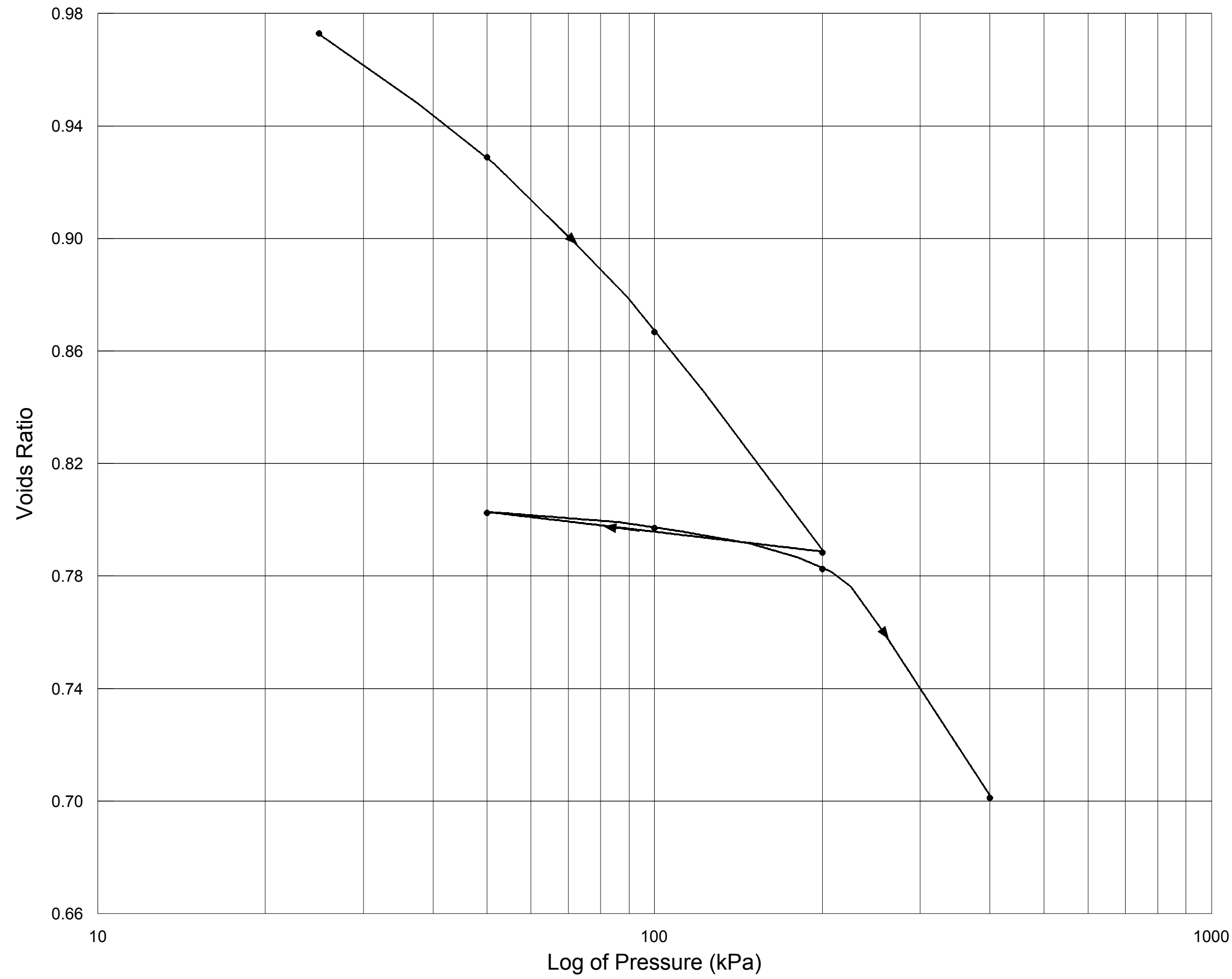
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH106
Sample Ref:	1
Depth (m):	5.10
Depth of test specimen (m):	5.11
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft grey alluvial silty CLAY



Initial Conditions:

Moisture Content (%)	36
Voids Ratio	1.010
Diameter (mm)	76.3
Height (mm)	18.5
Bulk Density (Mg/m³)	1.84
Dry Density (Mg/m³)	1.35

Final Conditions:

Voids Ratio	0.701
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.738	1.22	t50	0.973
25 - 50	0.892	0.926	t50	0.929
50 - 100	0.644	0.783	t50	0.867
100 - 200	0.420	0.859	t50	0.788
200 - 50	- 0.0525	3.19 (Sv)	t50	0.802
50 - 100	0.0589	7.13	t50	0.797
100 - 200	0.0814	6.22	t50	0.782
200 - 400	0.228	0.916	t50	0.701

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Initials: JS

Date: 15/04/2011

Project Number:

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Project Name:

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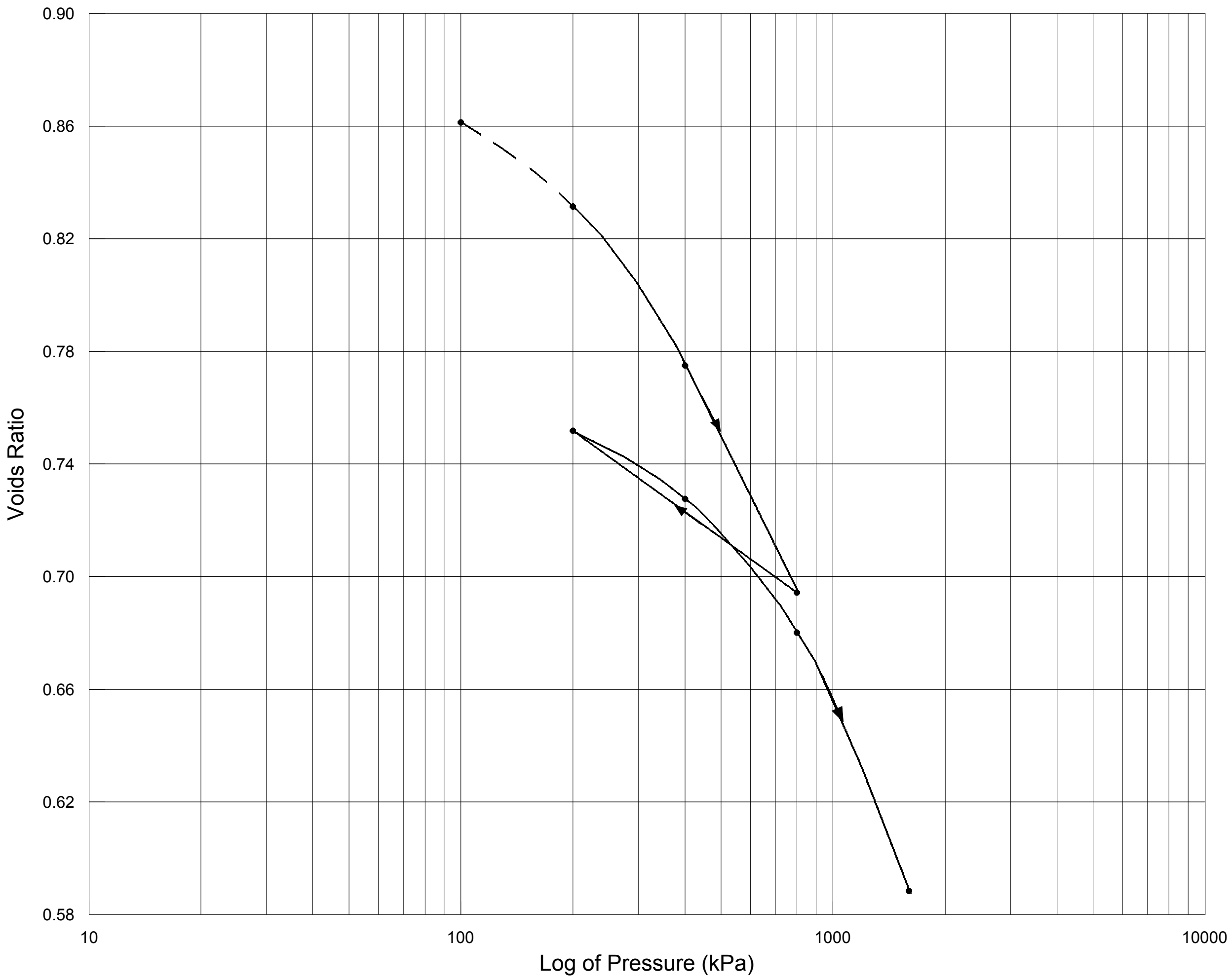
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH106
Sample Ref:	2
Depth (m):	8.50
Depth of test specimen (m):	8.58
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Stiff dark grey silty CLAY



Initial Conditions:

Moisture Content (%)	32
Voids Ratio	0.871
Diameter (mm)	76.4
Height (mm)	18.8
Bulk Density (Mg/m³)	1.92
Dry Density (Mg/m³)	1.45

Final Conditions:

Voids Ratio	0.588
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 100	-	Specimen swelled	-	0.861
100 - 200	0.161	0.710	t50	0.831
200 - 400	0.154	0.475	t50	0.775
400 - 800	0.113	0.529	t50	0.694
800 - 200	- 0.0565	0.458 (Sv)	t50	0.752
200 - 400	0.0690	0.701	t50	0.728
400 - 800	0.0687	0.763	t50	0.680
800 - 1600	0.0683	0.647	t50	0.588

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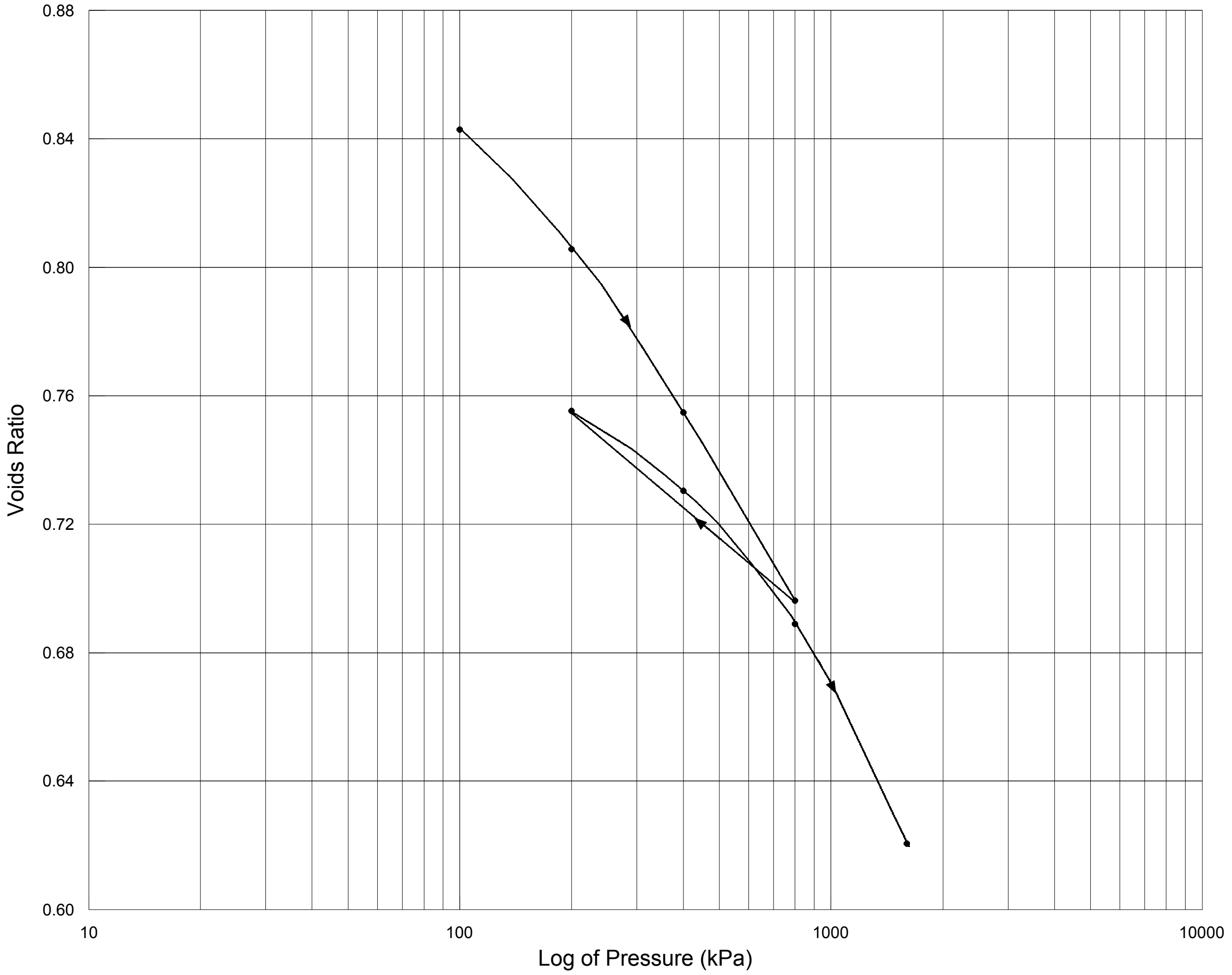
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH107
Sample Ref:	1
Depth (m):	6.50
Depth of test specimen (m):	6.94
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Stiff grey silty CLAY



Initial Conditions:

Moisture Content (%)	31
Voids Ratio	0.864
Diameter (mm)	76.4
Height (mm)	18.7
Bulk Density (Mg/m³)	1.92
Dry Density (Mg/m³)	1.46

Final Conditions:

Voids Ratio	0.621
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 100	0.114	0.575	t50	0.843
100 - 200	0.202	0.247	t50	0.806
200 - 400	0.140	0.280	t50	0.755
400 - 800	0.0836	0.391	t50	0.696
800 - 200	- 0.0581	0.298 (Sv)	t50	0.755
200 - 400	0.0708	0.423	t50	0.730
400 - 800	0.0599	0.488	t50	0.689
800 - 1600	0.0506	0.520	t50	0.621

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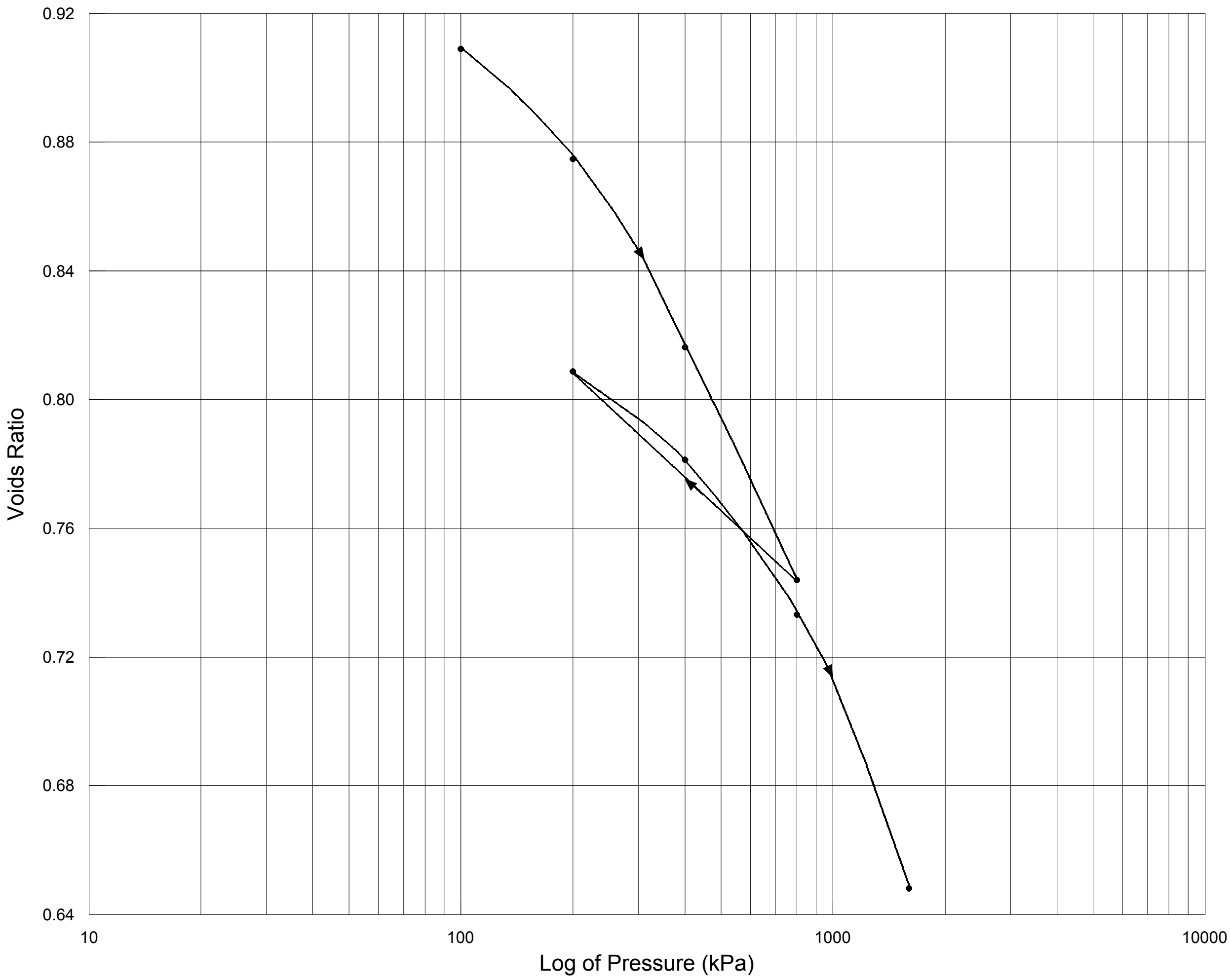
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH107
Sample Ref:	2
Depth (m):	8.50
Depth of test specimen (m):	8.56
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm grey silty CLAY



Initial Conditions:

Moisture Content (%)	34
Voids Ratio	0.920
Diameter (mm)	76.2
Height (mm)	18.6
Bulk Density (Mg/m³)	1.90
Dry Density (Mg/m³)	1.42

Final Conditions:

Voids Ratio	0.648
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 100	0.0592	13.2	t90	0.909
100 - 200	0.179	0.316	t50	0.875
200 - 400	0.156	0.335	t50	0.816
400 - 800	0.0995	0.453	t50	0.744
800 - 200	- 0.0618	0.298 (Sv)	t50	0.809
200 - 400	0.0757	0.440	t50	0.781
400 - 800	0.0674	0.488	t50	0.733
800 - 1600	0.0614	0.585	t50	0.648

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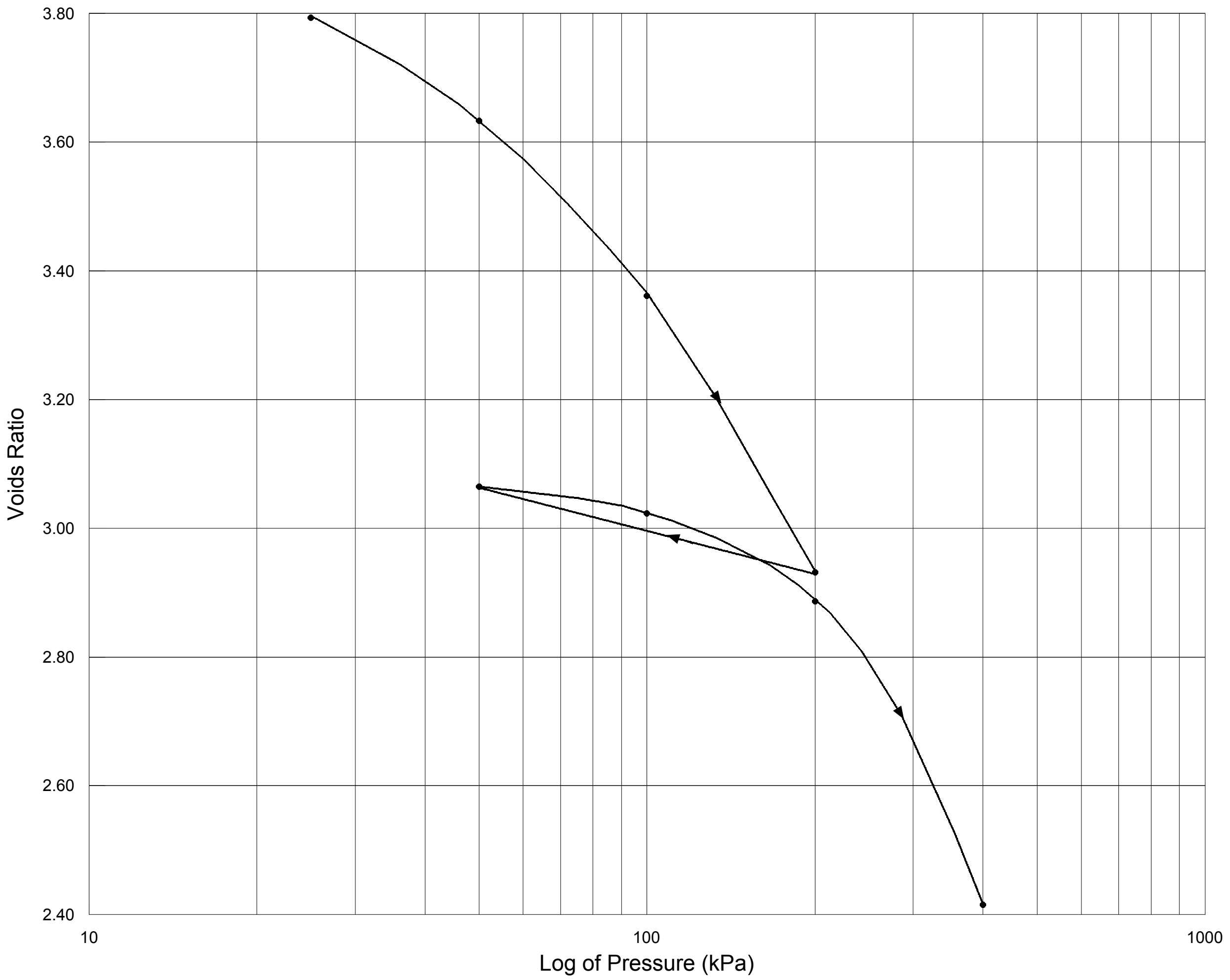
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH110
Sample Ref:	1
Depth (m):	2.50
Depth of test specimen (m):	2.55
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm fibrous very dark brown PEAT



Initial Conditions:

Moisture Content (%)	173
Voids Ratio	3.939
Diameter (mm)	76.3
Height (mm)	18.9
Bulk Density (Mg/m³)	1.09
Dry Density (Mg/m³)	0.40

Final Conditions:

Voids Ratio	2.415
Particle Density (Mg/m³)	1.97 (Measured)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	1.18	9.04	t90	3.793
25 - 50	1.33	7.06	t90	3.633
50 - 100	1.17	5.24	t90	3.361
100 - 200	0.985	3.71	t90	2.931
200 - 50	- 0.226	2.82 (Sv)	t90	3.064
50 - 100	0.204	5.30	t90	3.023
100 - 200	0.339	3.13	t90	2.887
200 - 400	0.606	0.641	t90	2.415

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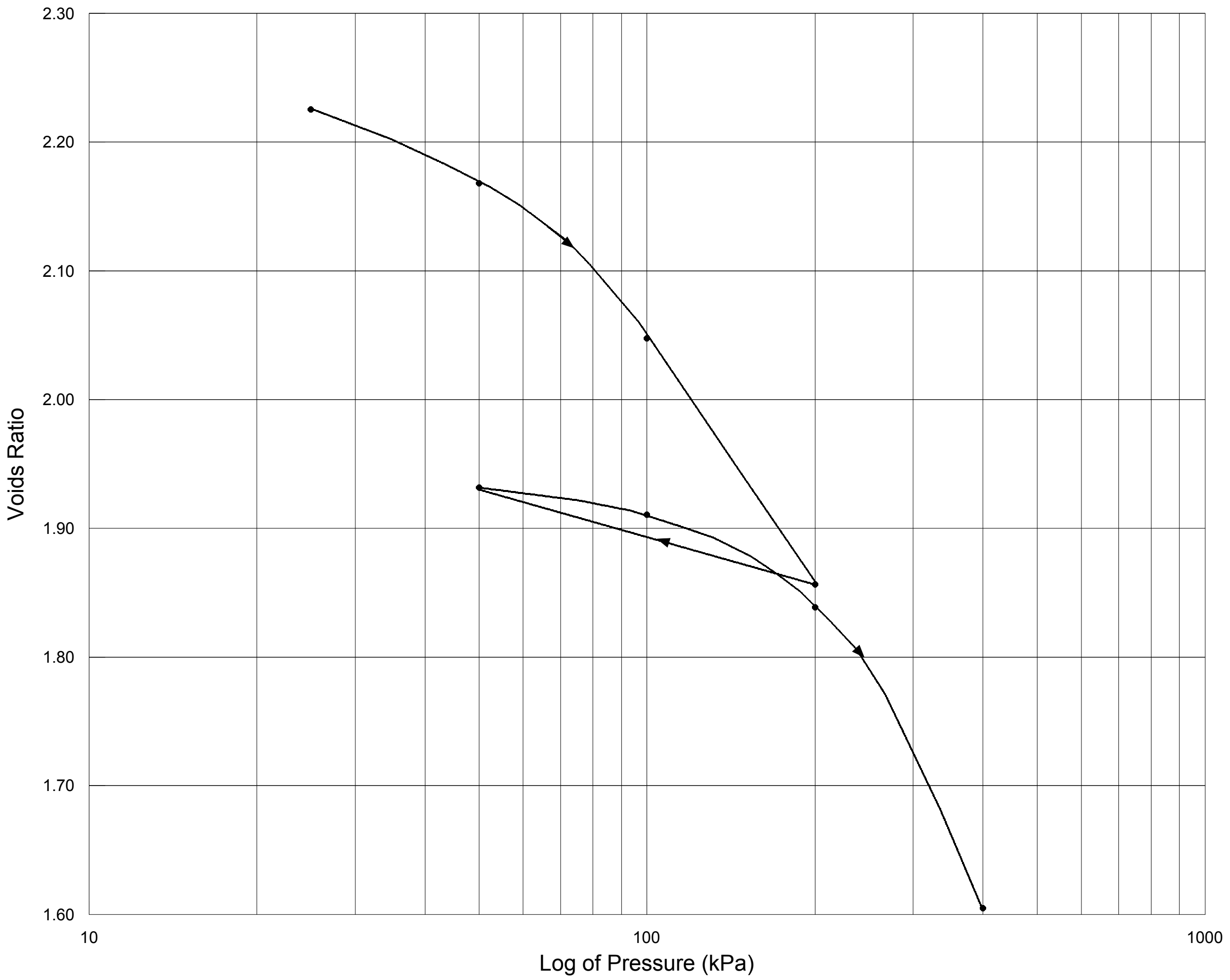
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH116
Sample Ref:	1
Depth (m):	2.50
Depth of test specimen (m):	2.55
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft green grey and orange brown mottled alluvial silty CLAY with pockets of very dark grey organic clay



Initial Conditions:

Moisture Content (%)	81
Voids Ratio	2.252
Diameter (mm)	76.4
Height (mm)	18.8
Bulk Density (Mg/m³)	1.51
Dry Density (Mg/m³)	0.84

Final Conditions:

Voids Ratio	1.605
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.334	1.27	t90	2.225
25 - 50	0.707	0.390	t50	2.168
50 - 100	0.763	0.329	t50	2.047
100 - 200	0.627	0.213	t50	1.856
200 - 50	- 0.175	0.382 (Sv)	t50	1.932
50 - 100	0.144	0.947	t50	1.910
100 - 200	0.248	0.454	t50	1.838
200 - 400	0.411	0.158	t50	1.605

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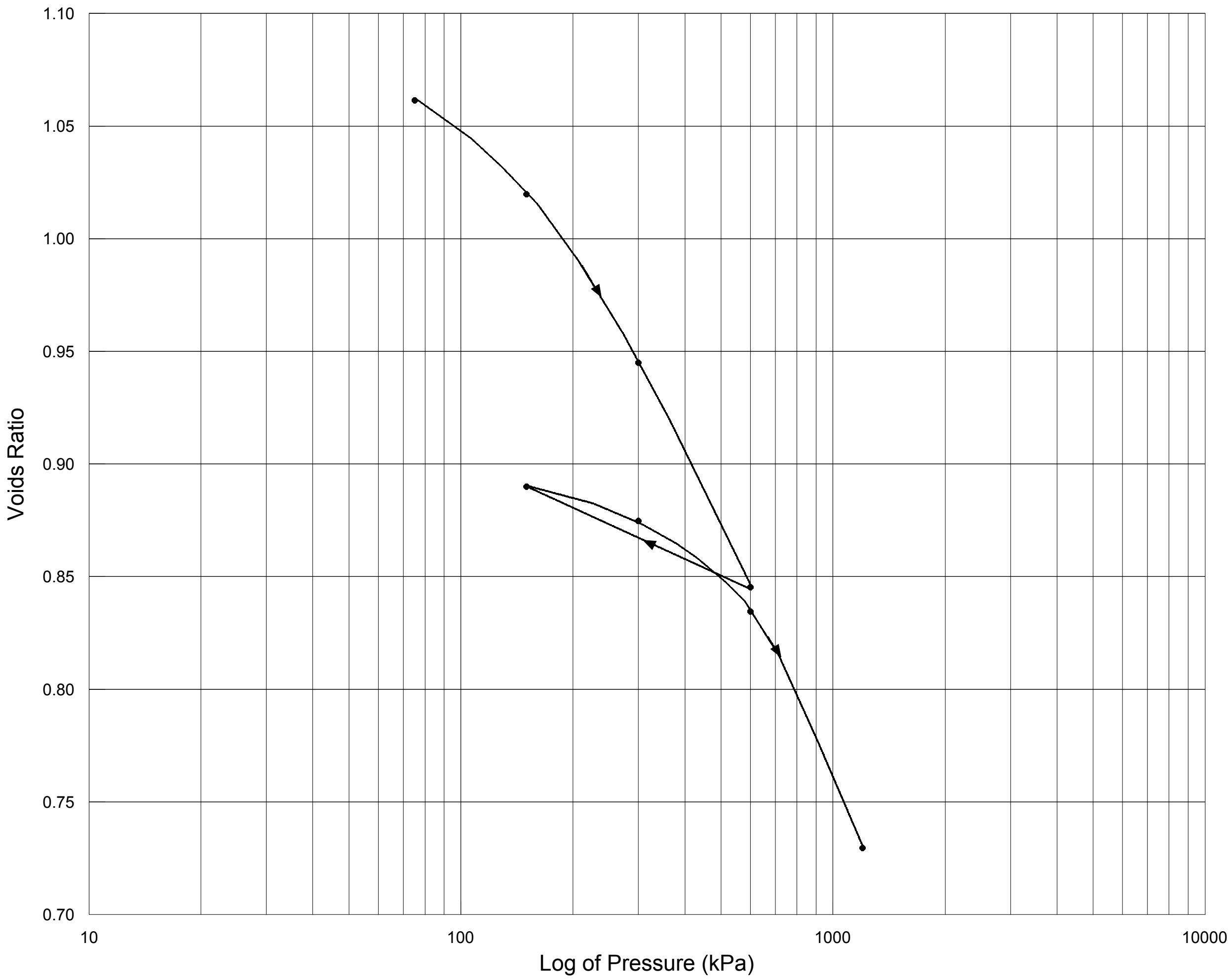
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH116
Sample Ref:	2
Depth (m):	7.50
Depth of test specimen (m):	7.66
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft to firm silty CLAY with traces of fine to medium gravel sized siltstone and pockets of pale grey silt



Initial Conditions:

Moisture Content (%)	42
Voids Ratio	1.098
Diameter (mm)	76.3
Height (mm)	18.7
Bulk Density (Mg/m³)	1.84
Dry Density (Mg/m³)	1.30

Final Conditions:

Voids Ratio	0.729
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 75	0.233	2.13	t50	1.061
75 - 150	0.271	0.788	t50	1.020
150 - 300	0.247	0.617	t50	0.945
300 - 600	0.171	0.666	t50	0.845
600 - 150	- 0.0539	0.777 (Sv)	t50	0.890
150 - 300	0.0538	1.71	t50	0.875
300 - 600	0.0716	1.10	t50	0.834
600 - 1200	0.0954	0.648	t50	0.729

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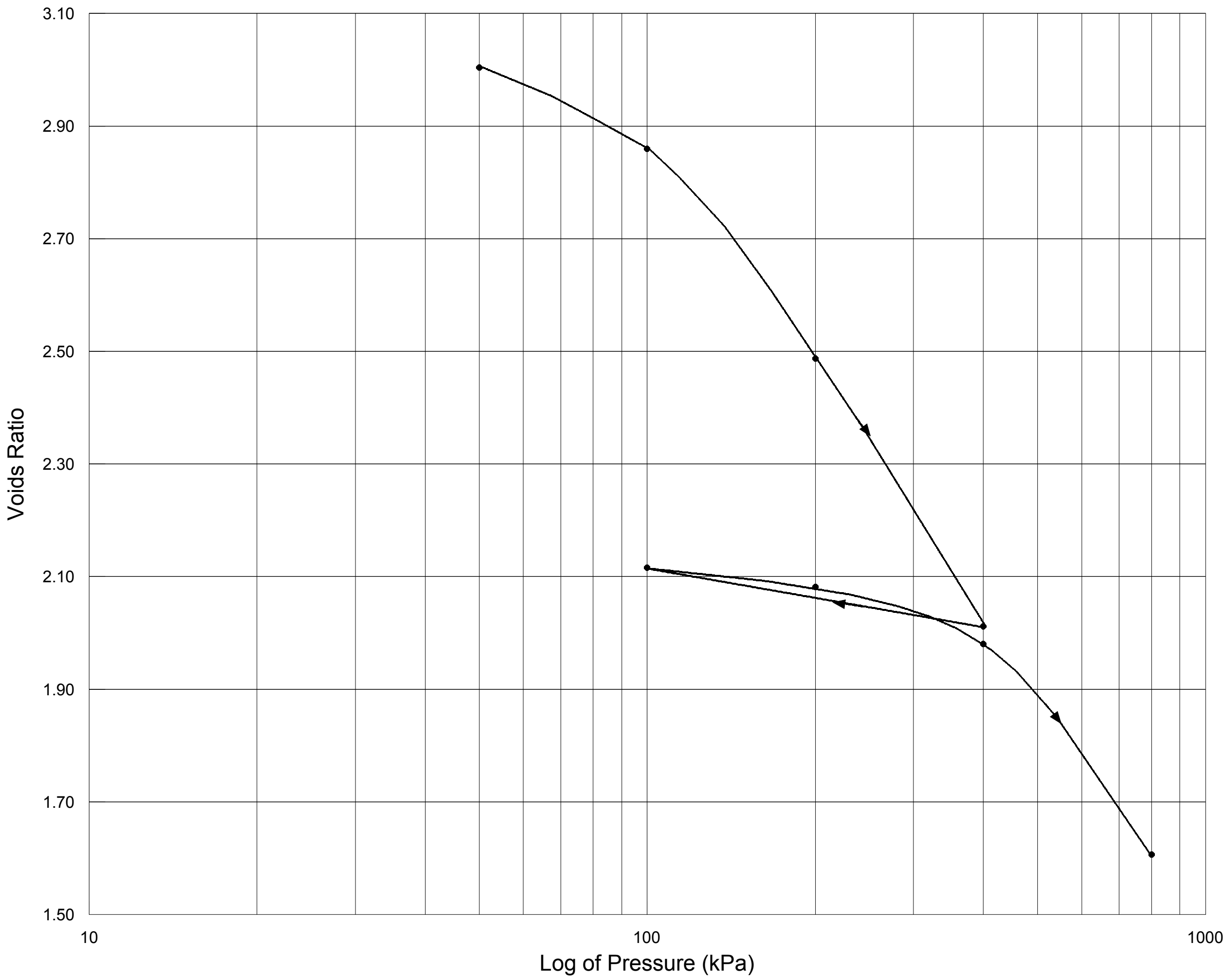
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH119
Sample Ref:	1
Depth (m):	4.00
Depth of test specimen (m):	4.05
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm amorphous very dark brown PEAT



Initial Conditions:

Moisture Content (%)	135
Voids Ratio	3.160
Diameter (mm)	75.2
Height (mm)	19.0
Bulk Density (Mg/m³)	1.28
Dry Density (Mg/m³)	0.54

Final Conditions:

Voids Ratio	1.606
Particle Density (Mg/m³)	2.26 (Measured)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	0.752	17.3	t50	3.004
50 - 100	0.722	16.1	t50	2.859
100 - 200	0.965	2.28	t50	2.487
200 - 400	0.681	1.41	t50	2.012
400 - 100	- 0.115	1.33 (Sv)	t50	2.116
100 - 200	0.110	12.9	t50	2.082
200 - 400	0.165	9.80	t50	1.980
400 - 800	0.314	0.657	t50	1.606

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Date: 15/04/2011

Project Number: **GEO / 16762**

Project Name: **EDMONTON ECOPARK**

Job Number: SI1688

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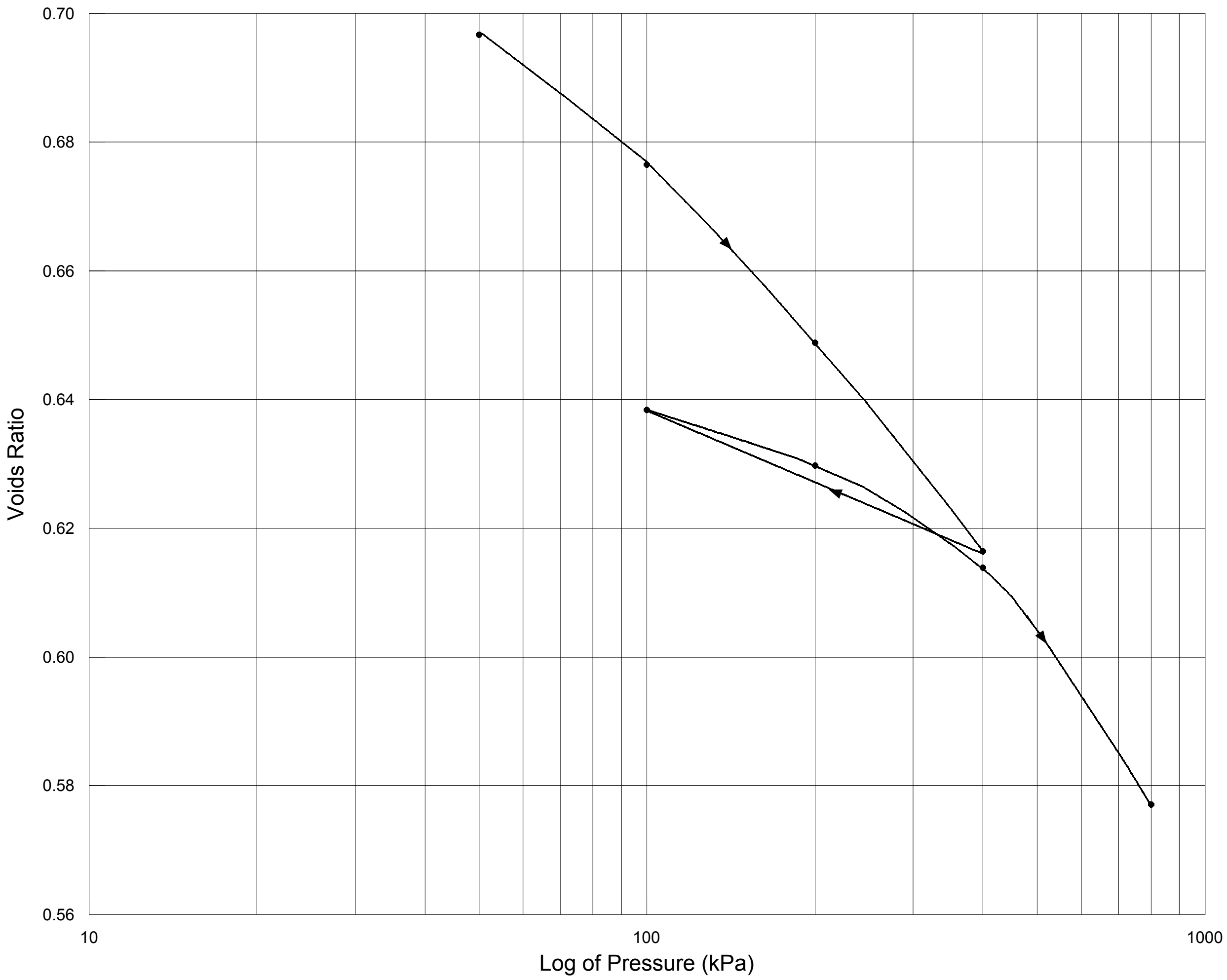
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH119
Sample Ref:	2
Depth (m):	7.00
Depth of test specimen (m):	7.05
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm dark grey silty alluvial CLAY



Initial Conditions:

Moisture Content (%)	25
Voids Ratio	0.716
Diameter (mm)	76.3
Height (mm)	18.5
Bulk Density (Mg/m³)	1.99
Dry Density (Mg/m³)	1.59

Final Conditions:

Voids Ratio	0.577
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	0.226	6.36	t50	0.697
50 - 100	0.238	3.64	t50	0.676
100 - 200	0.165	3.76	t50	0.649
200 - 400	0.0984	4.87	t50	0.616
400 - 100	- 0.0453	5.07 (Sv)	t50	0.638
100 - 200	0.0526	9.64	t50	0.630
200 - 400	0.0486	9.46	t50	0.614
400 - 800	0.0570	5.31	t50	0.577

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Initials: JS

Date: 15/04/2011

Project Number:

GEO / 16762

Project Name:

EDMONTON ECOPARK

Project No: SI1688

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

(Ref4648.726134) Page 1 of 1

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ S Burke (Snr Tech)

GEOLABS LIMITED ®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

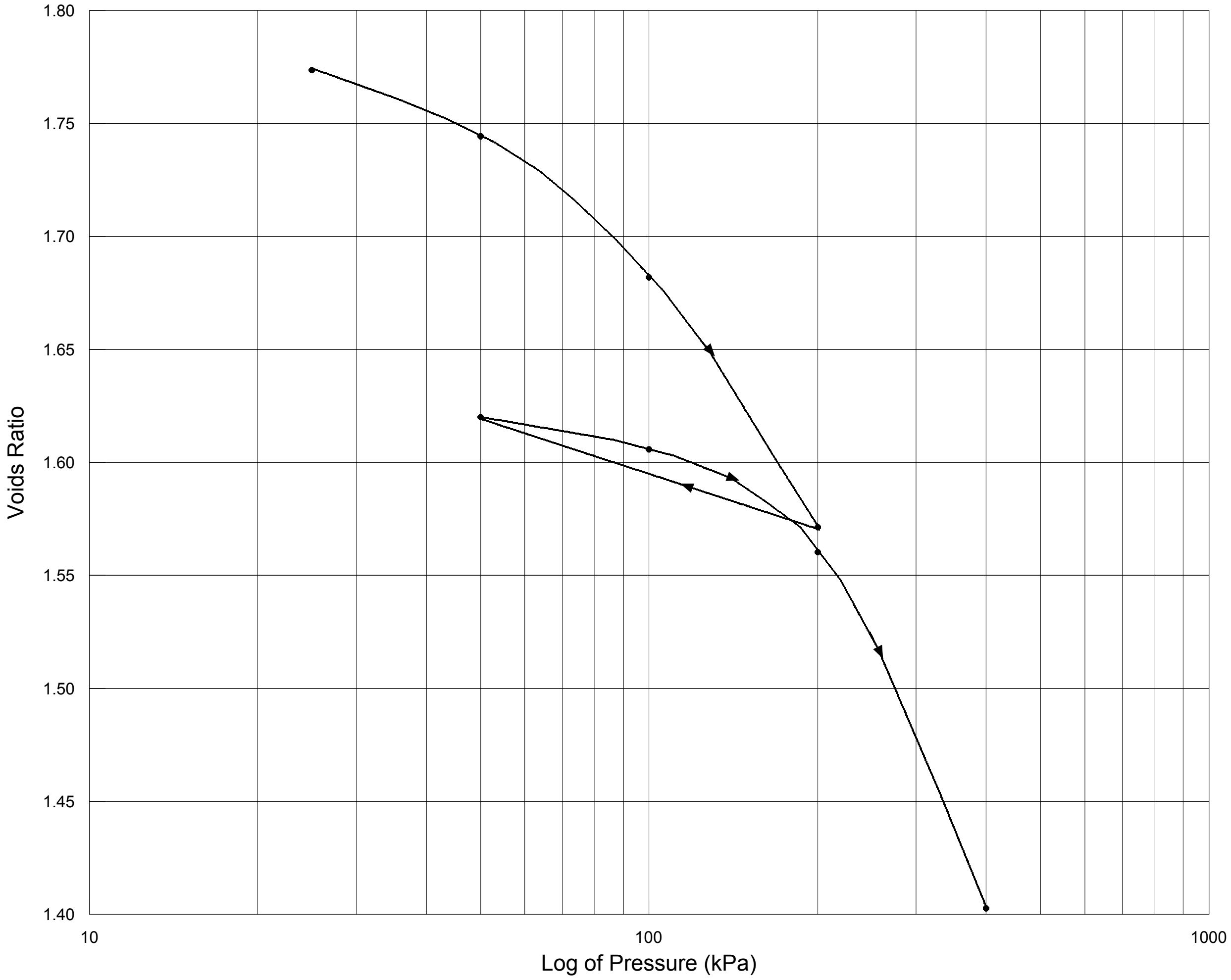
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH121
Sample Ref:	1
Depth (m):	2.00
Depth of test specimen (m):	2.41
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm very dark grey and pale grey marbled alluvial silty CLAY
[2.00 to 2.40 m is MADE GROUND]



Initial Conditions:

Moisture Content (%)	60
Voids Ratio	1.793
Diameter (mm)	76.3
Height (mm)	18.8
Bulk Density (Mg/m³)	1.56
Dry Density (Mg/m³)	0.97

Final Conditions:

Voids Ratio	1.403
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.281	1.58	t90	1.773
25 - 50	0.422	0.608	t50	1.744
50 - 100	0.455	0.529	t50	1.682
100 - 200	0.412	0.359	t50	1.571
200 - 50	- 0.126	0.418 (Sv)	t50	1.620
50 - 100	0.109	1.28	t50	1.606
100 - 200	0.175	0.635	t50	1.560
200 - 400	0.308	0.228	t50	1.403

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Initials: JS

Date: 15/04/2011

Project Number:

GEO / 16762

Project Name:

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Project No: SI1688

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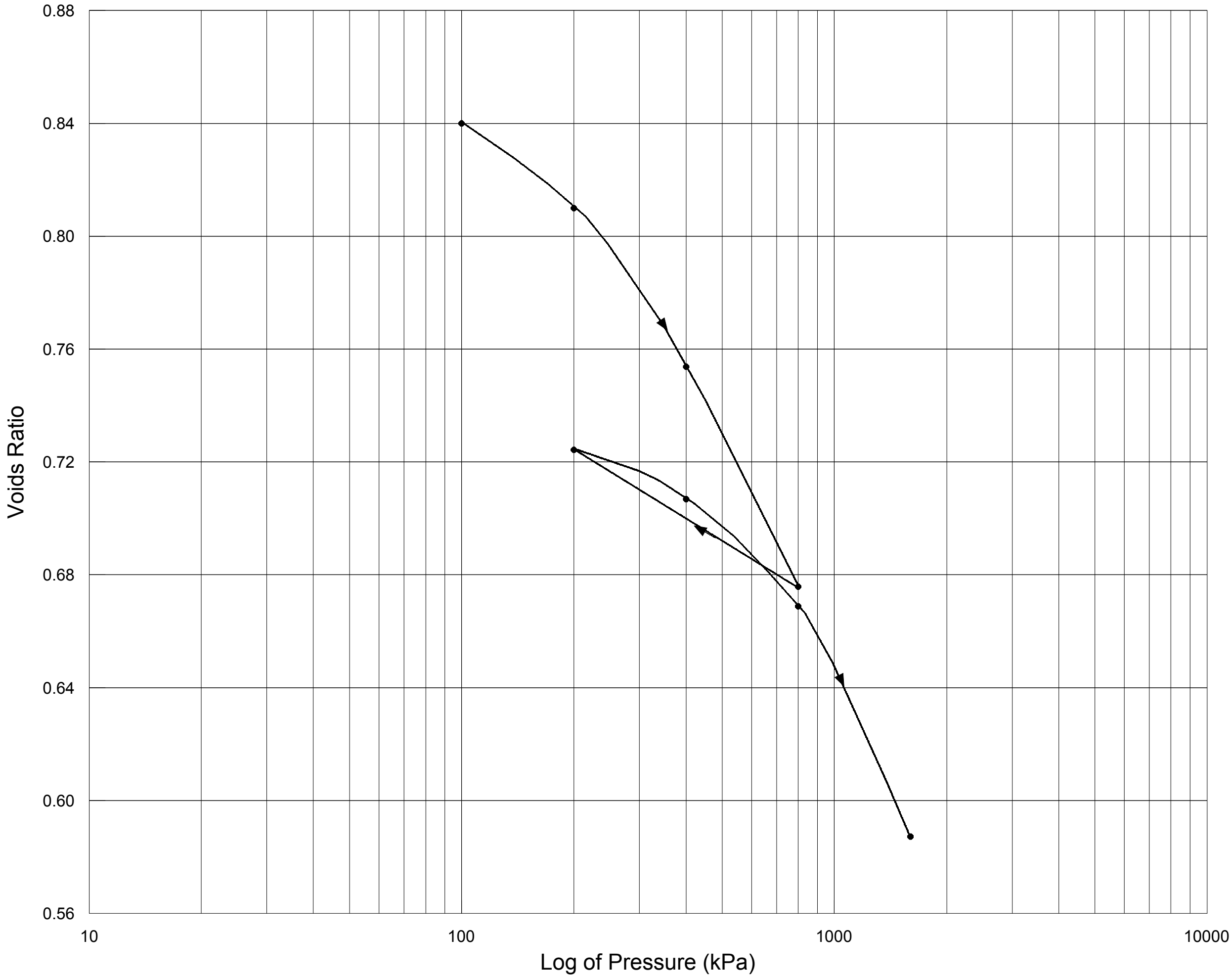
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH122
Sample Ref:	1
Depth (m):	3.00
Depth of test specimen (m):	3.430
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm grey silty CLAY



Initial Conditions:

Moisture Content (%)	31
Voids Ratio	0.862
Diameter (mm)	75.1
Height (mm)	19.0
Bulk Density (Mg/m³)	1.92
Dry Density (Mg/m³)	1.46

Final Conditions:

Voids Ratio	0.587
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 100	0.121	6.79	t90	0.840
100 - 200	0.163	0.727	t50	0.810
200 - 400	0.155	0.448	t50	0.754
400 - 800	0.111	0.344	t50	0.676
800 - 200	- 0.0483	0.390 (Sv)	t50	0.724
200 - 400	0.0509	0.763	t50	0.707
400 - 800	0.0554	0.549	t50	0.669
800 - 1600	0.0612	0.287	t50	0.587

Checked and Approved

Initials: JS

Date: 15/04/2011

Project Number:

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Project Name:

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Project No: SI1688

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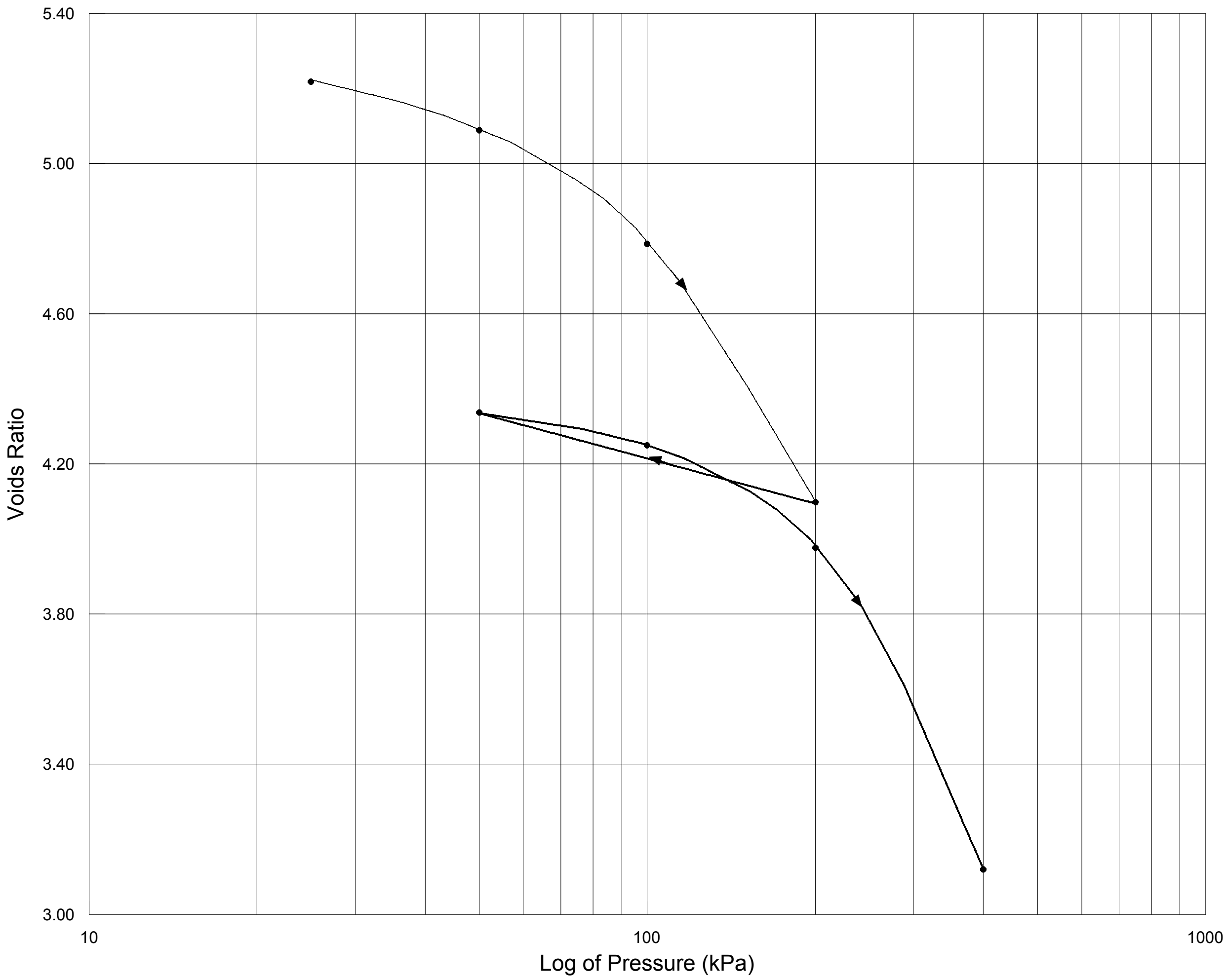
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH124
Sample Ref:	1
Depth (m):	3.00
Depth of test specimen (m):	3.050
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm very dark brown pseudo fibrous PEAT



Initial Conditions:

Moisture Content (%)	245
Voids Ratio	5.308
Diameter (mm)	76.4
Height (mm)	18.7
Bulk Density (Mg/m³)	1.08
Dry Density (Mg/m³)	0.31

Final Conditions:

Voids Ratio	3.120
Particle Density (Mg/m³)	1.97 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.571	6.53	t90	5.218
25 - 50	0.831	9.91	t90	5.088
50 - 100	0.993	6.84	t90	4.786
100 - 200	1.19	1.17	t90	4.099
200 - 50	- 0.312	2.39 (Sv)	t90	4.337
50 - 100	0.327	3.68	t90	4.250
100 - 200	0.521	3.53	t90	3.976
200 - 400	0.860	0.325	t90	3.120

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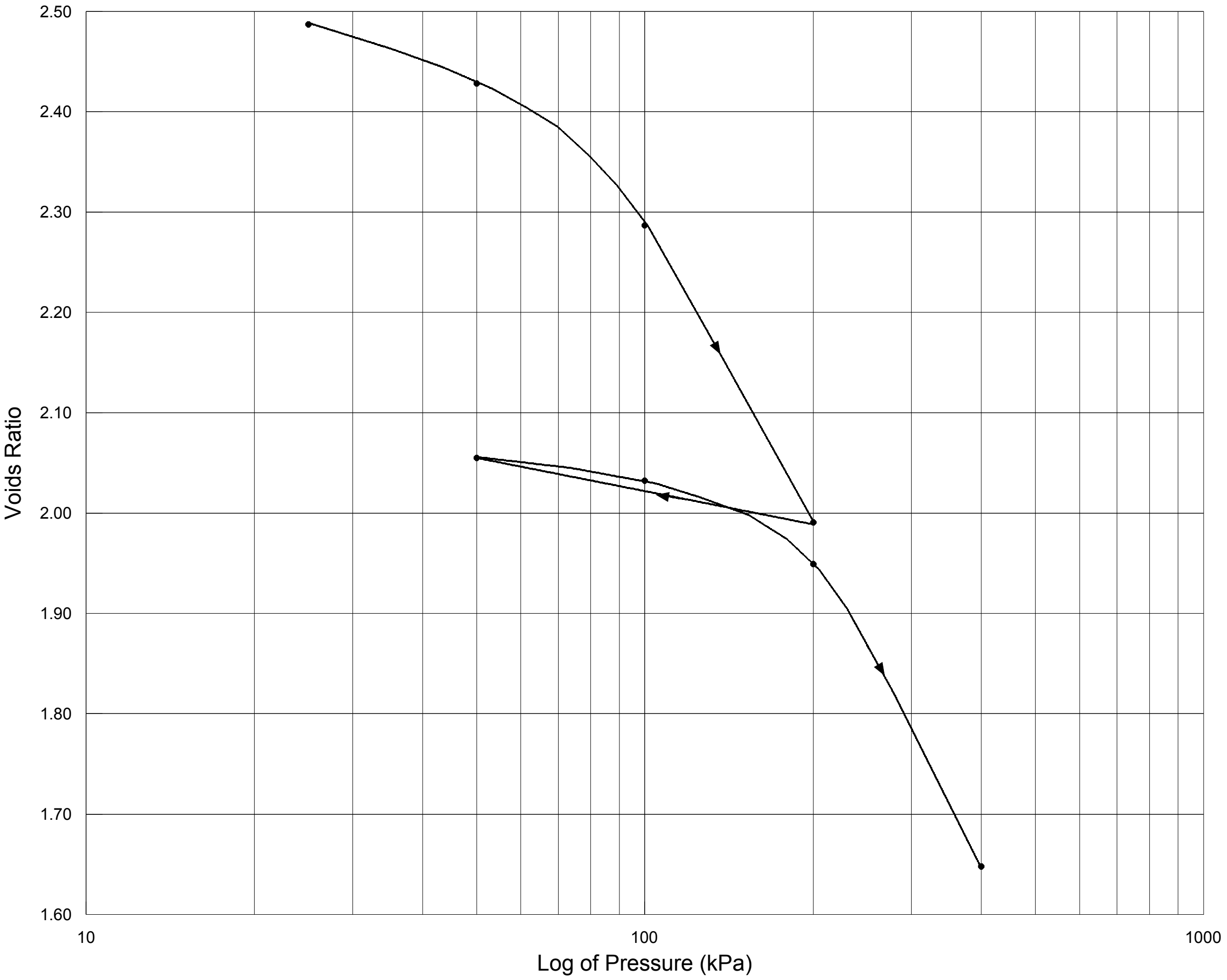
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH101
Sample Ref:	1
Depth (m):	3.00
Depth of test specimen (m):	3.55
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft dark grey organic silty CLAY



Initial Conditions:

Moisture Content (%)	85
Voids Ratio	2.557
Diameter (mm)	76.3
Height (mm)	18.9
Bulk Density (Mg/m³)	1.39
Dry Density (Mg/m³)	0.75

Final Conditions:

Voids Ratio	1.648
Particle Density (Mg/m³)	2.68 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.781	3.91	t50	2.487
25 - 50	0.676	2.93	t50	2.428
50 - 100	0.826	1.36	t50	2.287
100 - 200	0.900	0.367	t50	1.991
200 - 50	- 0.143	0.548 (Sv)	t50	2.055
50 - 100	0.148	2.16	t50	2.032
100 - 200	0.274	1.15	t50	1.949
200 - 400	0.510	0.177	t50	1.648

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Project Number:

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Project Name:

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Job Number: SI688

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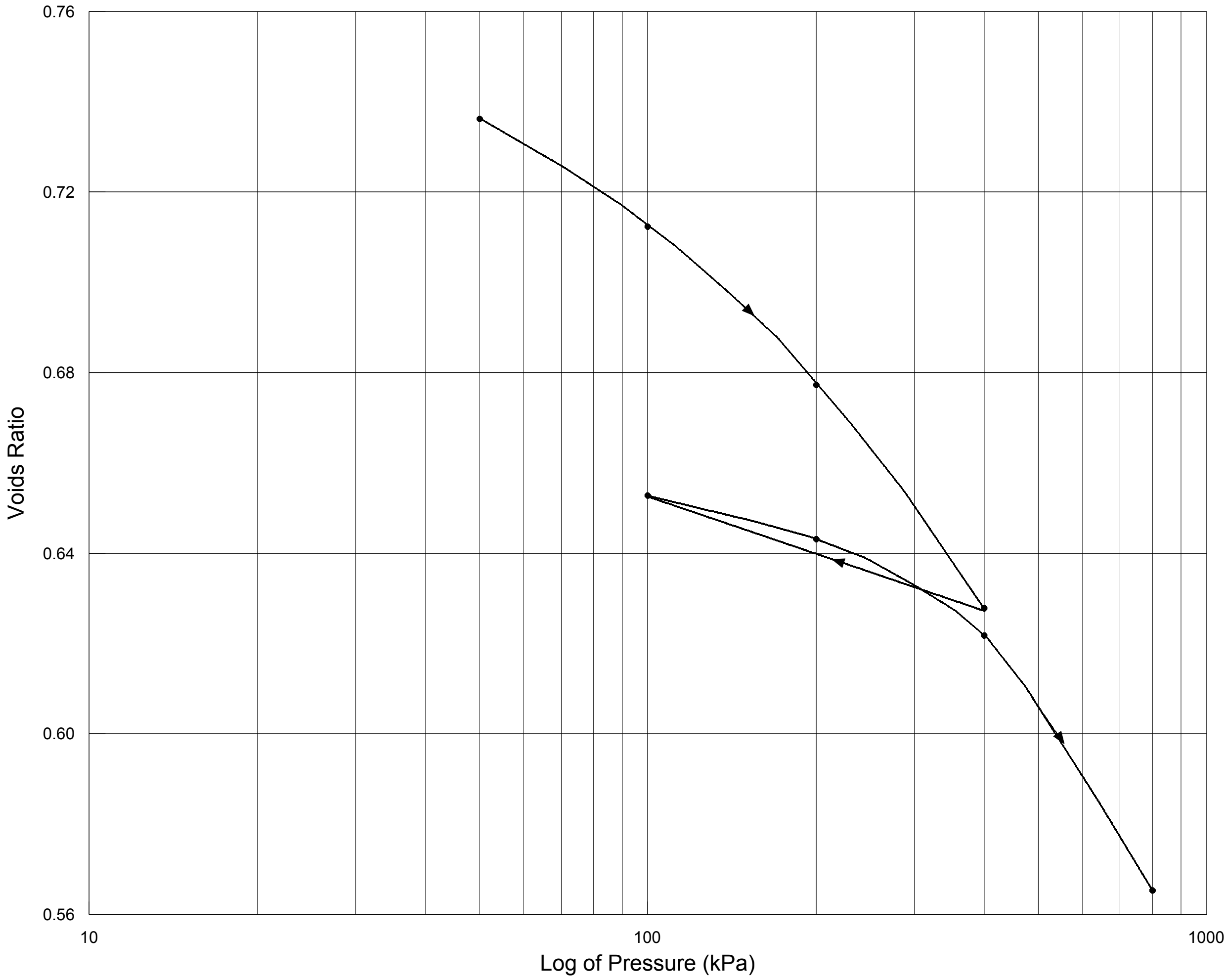
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH104
Sample Ref:	1
Depth (m):	1.20
Depth of test specimen (m):	1.75
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm dark grey silty CLAY with
occasional pockets of silt



Initial Conditions:

Moisture Content (%)	28
Voids Ratio	0.761
Diameter (mm)	76.2
Height (mm)	18.7
Bulk Density (Mg/m³)	1.98
Dry Density (Mg/m³)	1.54

Final Conditions:

Voids Ratio	0.565
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	0.281	8.60	t90	0.736
50 - 100	0.275	5.69	t50	0.712
100 - 200	0.204	3.33	t50	0.677
200 - 400	0.147	2.38	t50	0.628
400 - 100	- 0.0510	2.42 (Sv)	t50	0.653
100 - 200	0.0586	5.36	t50	0.643
200 - 400	0.0647	4.70	t50	0.622
400 - 800	0.0871	1.65	t50	0.565

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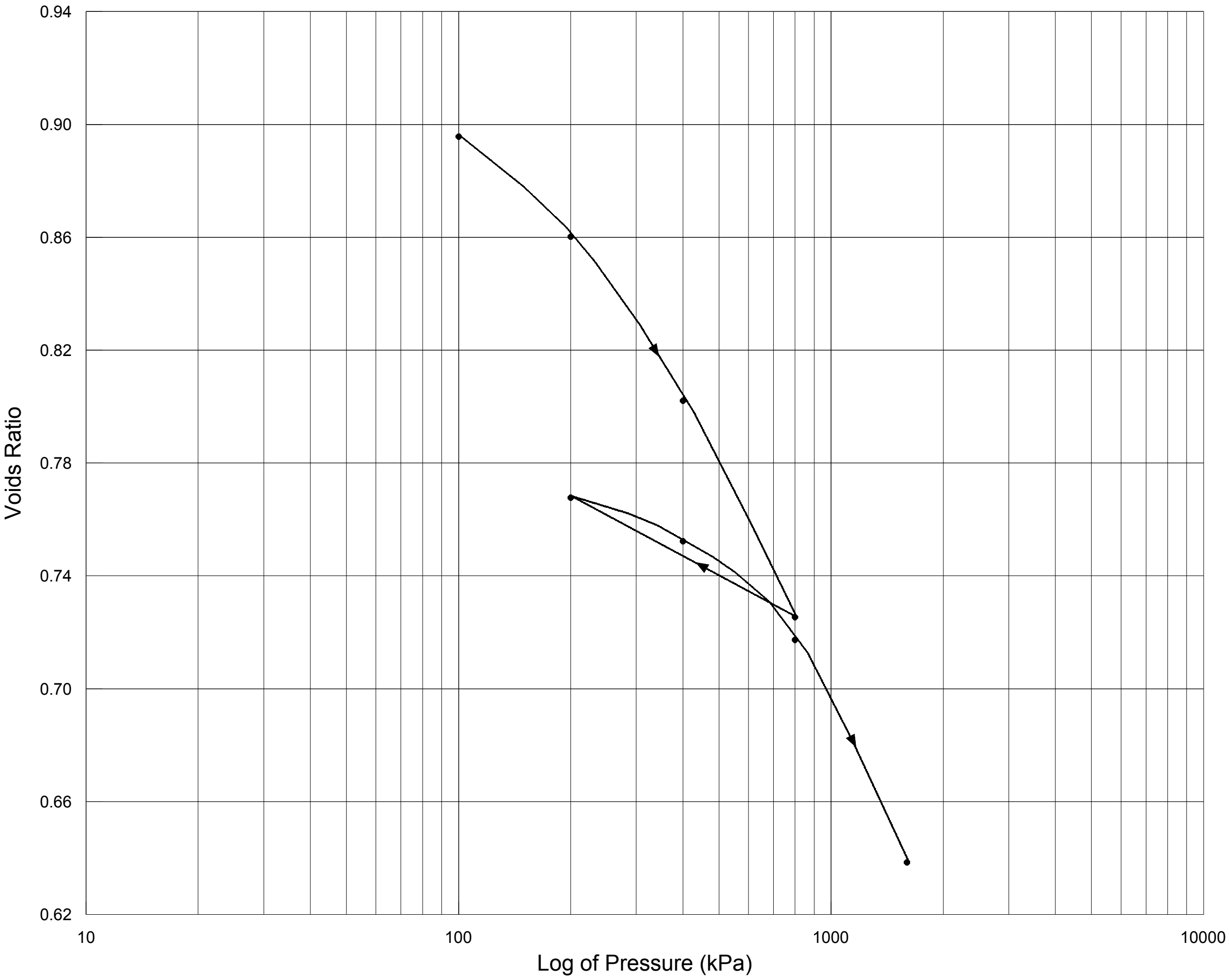
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH104
Sample Ref:	2
Depth (m):	3.00
Depth of test specimen (m):	3.46
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm to stiff brown and dark grey silty CLAY
with occasional fine to medium gravel



Initial Conditions:

Moisture Content (%)	32
Voids Ratio	0.917
Diameter (mm)	75.2
Height (mm)	19.1
Bulk Density (Mg/m³)	1.87
Dry Density (Mg/m³)	1.42

Final Conditions:

Voids Ratio	0.638
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 100	0.111	5.98	t50	0.896
100 - 200	0.187	0.731	t50	0.860
200 - 400	0.156	0.463	t50	0.802
400 - 800	0.106	0.416	t50	0.725
800 - 200	- 0.0408	0.486 (Sv)	t50	0.768
200 - 400	0.0434	1.15	t50	0.752
400 - 800	0.0500	0.769	t50	0.717
800 - 1600	0.0573	0.382	t50	0.638

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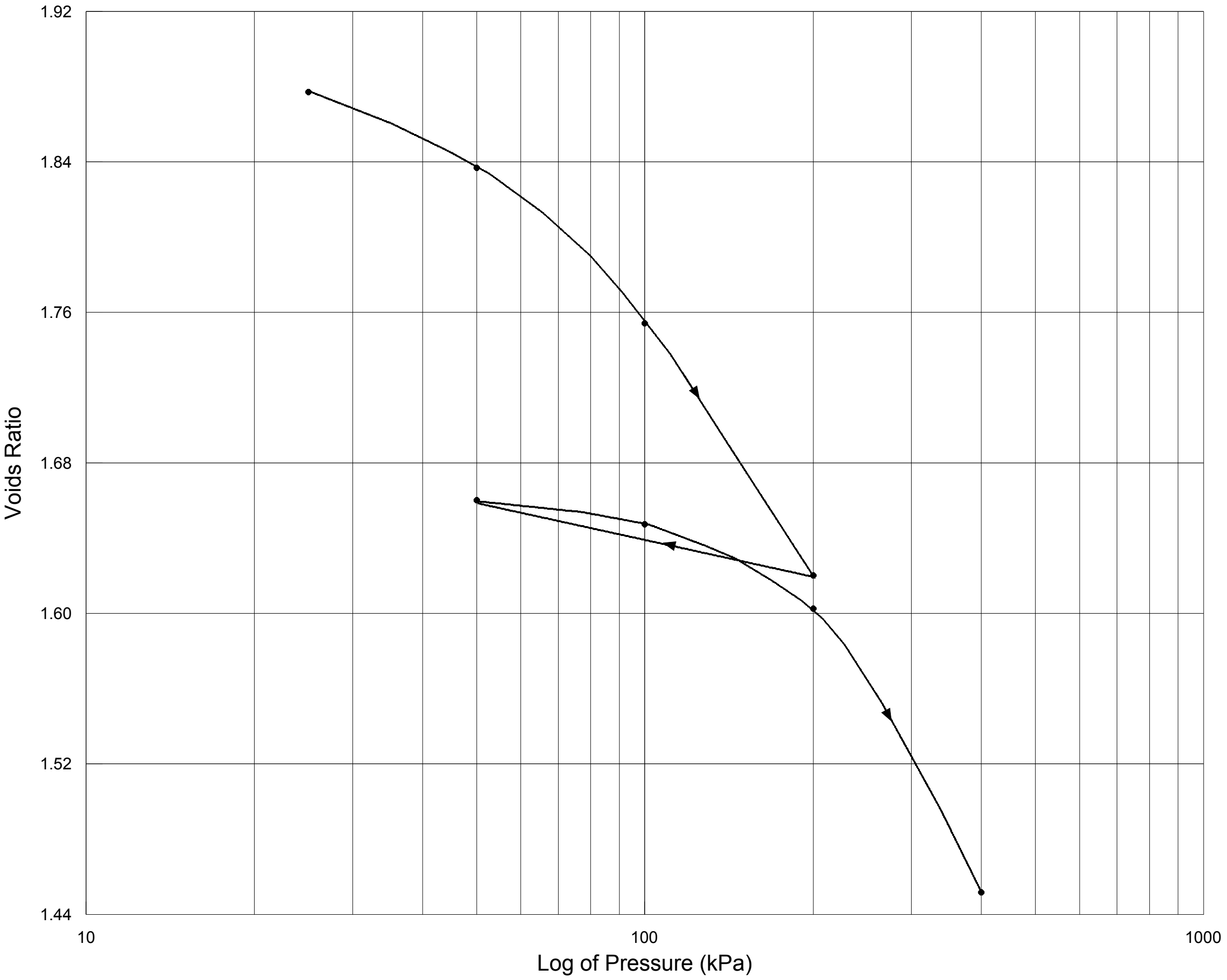
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH117
Sample Ref:	1
Depth (m):	2.50
Depth of test specimen (m):	3.05
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Very soft dark grey and grey mottled organic silty CLAY
with abundant vertically running decomposing roots



Initial Conditions:

Moisture Content (%)	66
Voids Ratio	1.902
Diameter (mm)	76.2
Height (mm)	18.8
Bulk Density (Mg/m³)	1.51
Dry Density (Mg/m³)	0.91

Final Conditions:

Voids Ratio	1.452
Particle Density (Mg/m³)	2.65 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.345	4.09	t50	1.877
25 - 50	0.561	0.883	t50	1.837
50 - 100	0.582	0.640	t50	1.754
100 - 200	0.487	0.399	t50	1.620
200 - 50	- 0.101	0.482 (Sv)	t50	1.660
50 - 100	0.0953	2.59	t50	1.647
100 - 200	0.170	0.785	t50	1.602
200 - 400	0.290	0.238	t50	1.452

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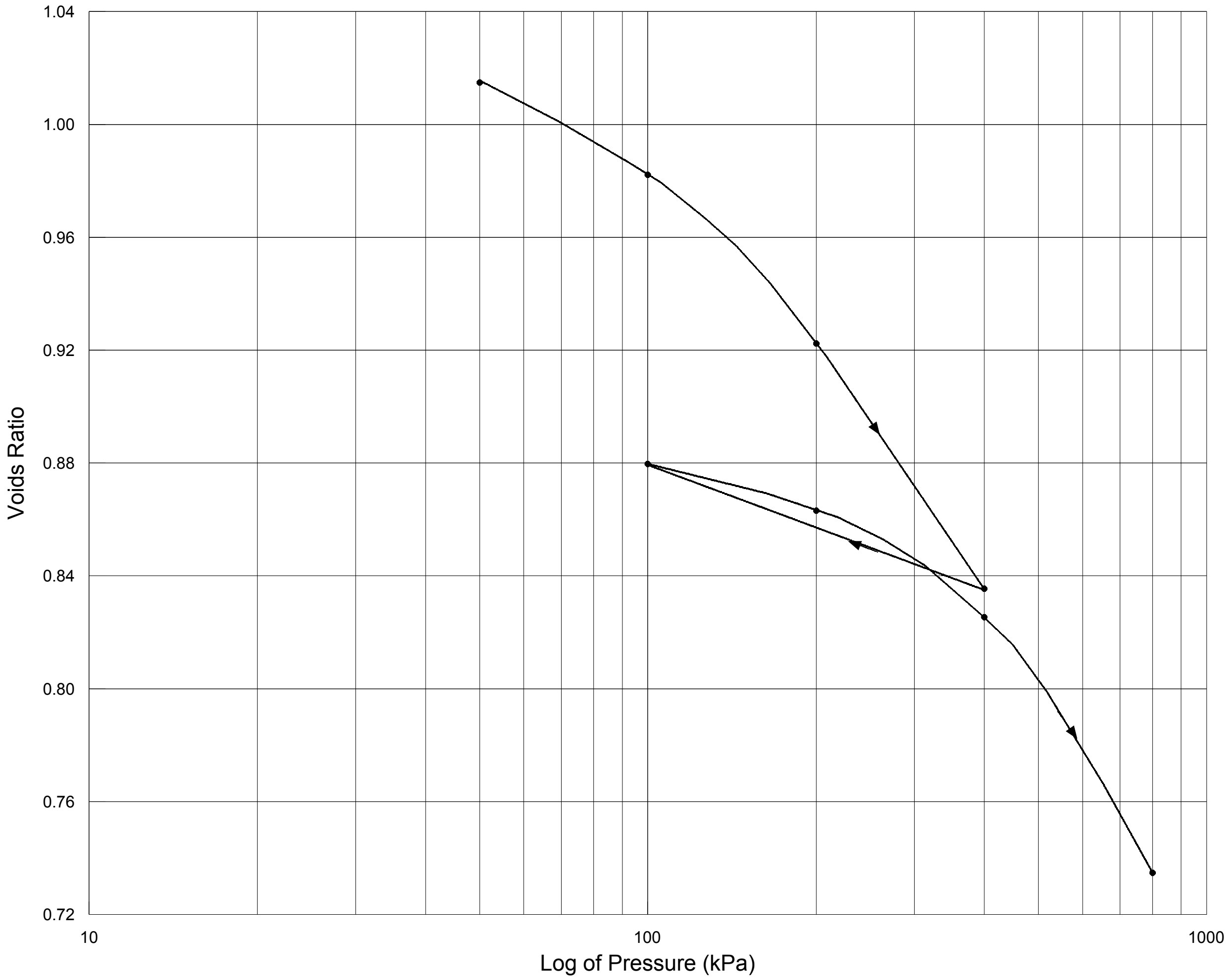
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH118
Sample Ref:	1
Depth (m):	1.50
Depth of test specimen (m):	2.00
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm grey silty CLAY



Initial Conditions:

Moisture Content (%)	36
Voids Ratio	1.033
Diameter (mm)	76.3
Height (mm)	18.7
Bulk Density (Mg/m³)	1.82
Dry Density (Mg/m³)	1.34

Final Conditions:

Voids Ratio	0.735
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	0.180	5.71	t50	1.015
50 - 100	0.324	1.07	t50	0.982
100 - 200	0.302	0.749	t50	0.922
200 - 400	0.226	0.557	t50	0.835
400 - 100	- 0.0803	0.597 (Sv)	t50	0.880
100 - 200	0.0881	1.06	t50	0.863
200 - 400	0.101	0.883	t50	0.825
400 - 800	0.124	0.515	t50	0.735

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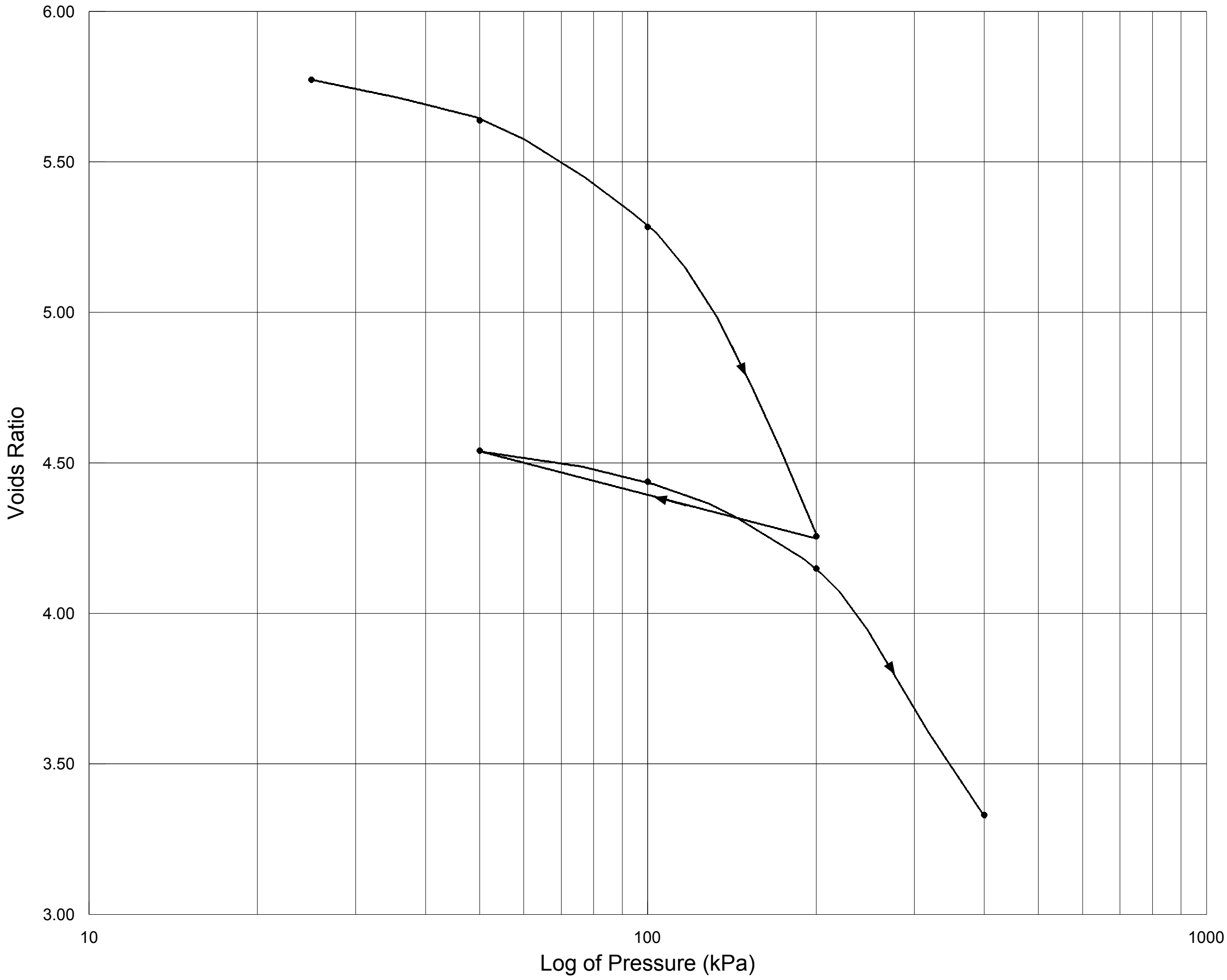
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH118
Sample Ref:	2
Depth (m):	3.00
Depth of test specimen (m):	3.55
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft dark grey organic silty clayey PEAT



Initial Conditions:

Moisture Content (%)	206
Voids Ratio	5.850
Diameter (mm)	76.2
Height (mm)	18.5
Bulk Density (Mg/m³)	1.20
Dry Density (Mg/m³)	0.39

Final Conditions:

Voids Ratio	3.331
Particle Density (Mg/m³)	2.68 (Assumed)
Laboratory Temperature (°C)	19.3

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.453	3.43	t50	5.772
25 - 50	0.798	2.58	t50	5.637
50 - 100	1.06	0.998	t50	5.284
100 - 200	1.64	0.204	t50	4.256
200 - 50	- 0.361	0.254 (Sv)	t50	4.541
50 - 100	0.372	0.669	t50	4.438
100 - 200	0.531	0.528	t50	4.149
200 - 400	0.795	0.0966	t50	3.331

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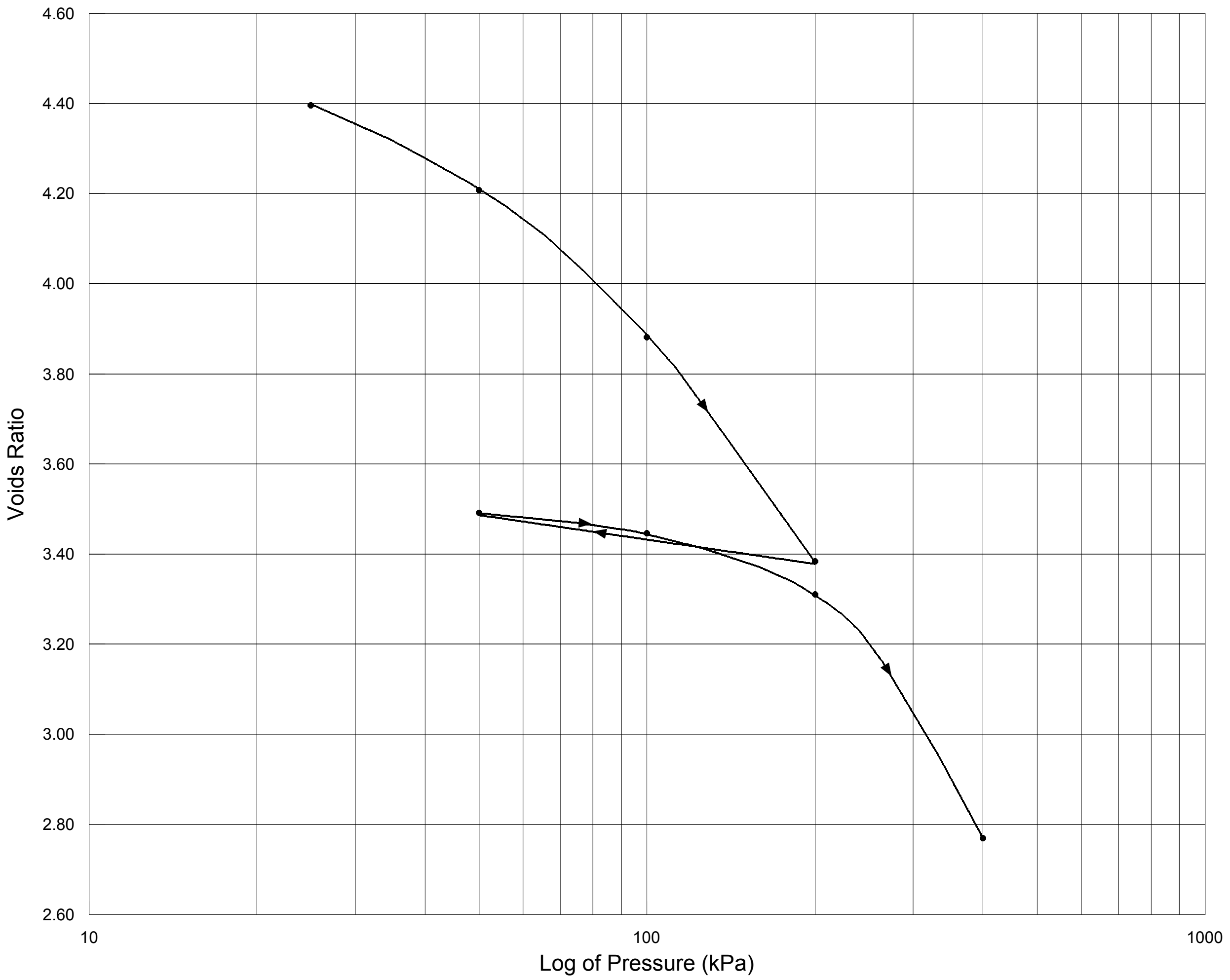
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH103
Sample Ref:	1
Depth (m):	3.00
Depth of test specimen (m):	3.05
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Very dark brown amorphous PEAT



Initial Conditions:

Moisture Content (%)	178
Voids Ratio	4.528
Diameter (mm)	76.4
Height (mm)	18.8
Bulk Density (Mg/m³)	1.14
Dry Density (Mg/m³)	0.41

Final Conditions:

Voids Ratio	2.769
Particle Density (Mg/m³)	2.27 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.958	5.10	t90	4.395
25 - 50	1.39	3.21	t90	4.207
50 - 100	1.25	1.66	t50	3.881
100 - 200	1.02	0.492	t50	3.384
200 - 50	- 0.163	0.641 (Sv)	t50	3.491
50 - 100	0.203	2.36	t50	3.446
100 - 200	0.305	1.53	t50	3.310
200 - 400	0.628	0.209	t50	2.769

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Initials: JS

Date: 27/04/2011

Project Number:

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Project Name:

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Job Number: SI1688

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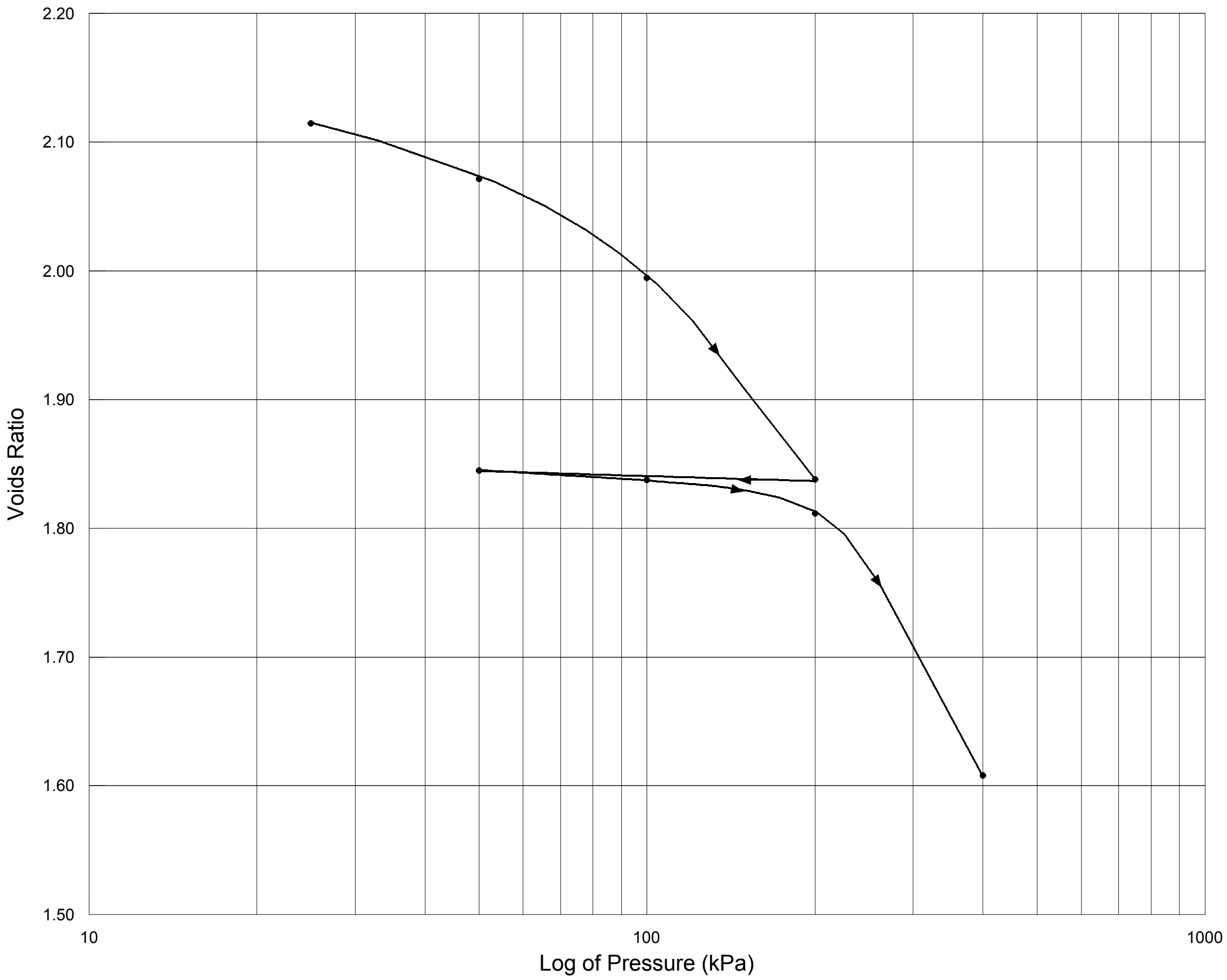
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH105
Sample Ref:	2
Depth (m):	4.00
Depth of test specimen (m):	4.10
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm dark grey alluvial SILT with very thick
very dark grey veins of organic material



Initial Conditions:

Moisture Content (%)	72
Voids Ratio	2.166
Diameter (mm)	75.2
Height (mm)	19.1
Bulk Density (Mg/m³)	1.47
Dry Density (Mg/m³)	0.85

Final Conditions:

Voids Ratio	1.608
Particle Density (Mg/m³)	2.70 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.645	3.74	t90	2.114
25 - 50	0.554	3.71	t90	2.071
50 - 100	0.501	3.53	t90	1.994
100 - 200	0.522	1.03	t90	1.838
200 - 50	- 0.0160	2.54 (Sv)	t90	1.845
50 - 100	0.0525	1.33	t90	1.837
100 - 200	0.0906	1.28	t90	1.812
200 - 400	0.362	2.58	t90	1.608

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Date: 27/04/2011

Project Number:

GEO / 16786

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EDMONTON ECOPARK

Job Number: SI1688

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX (Ref4660.718935)

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ S Burke (Snr Tech) GEOLABS LIMITED ®

Client: May Gurney (Technical Services) Limited, Trowse, Norwich, Norfolk NR14 8SZ

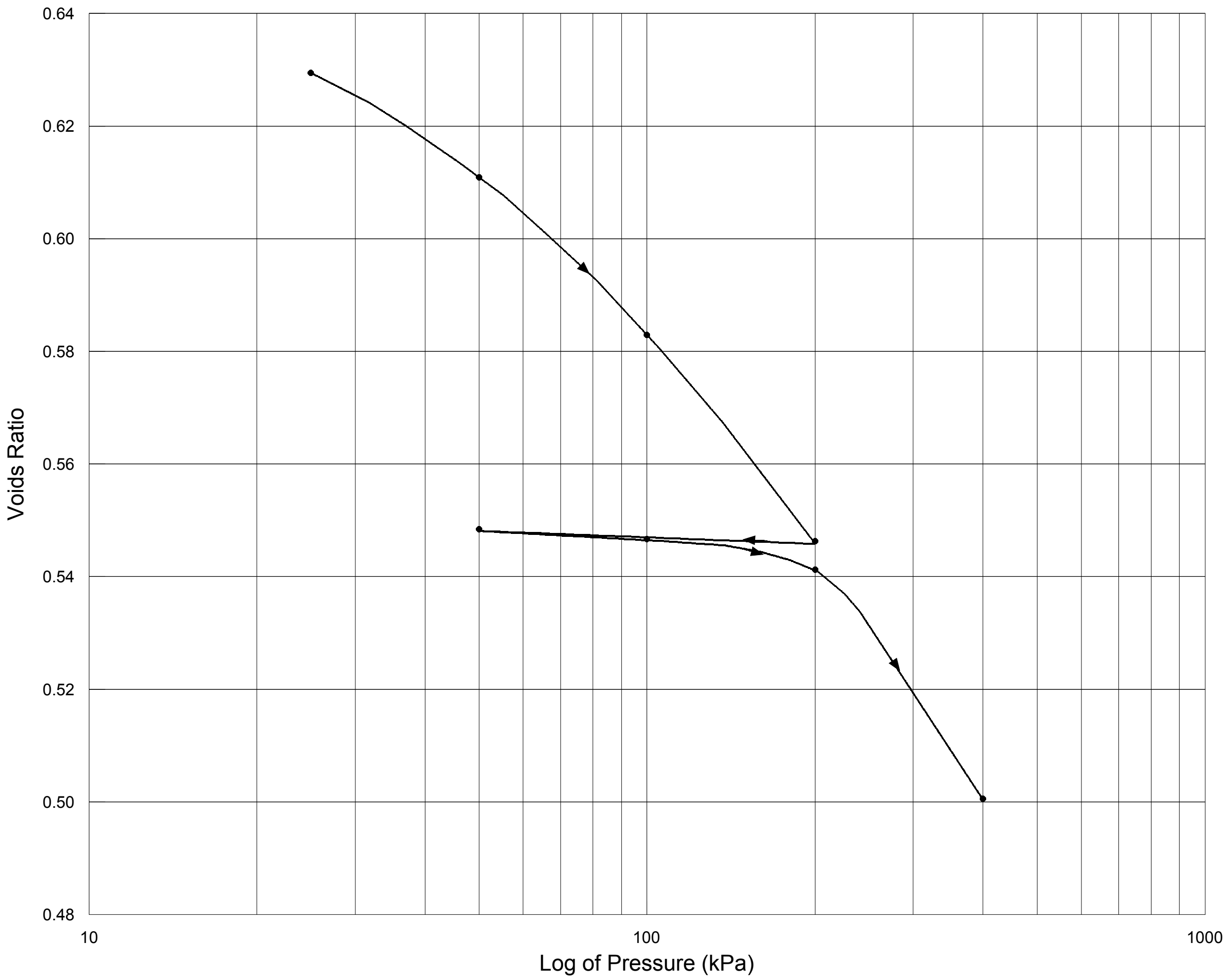
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH113
Sample Ref:	1
Depth (m):	2.00
Depth of test specimen (m):	2.36
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm dark grey very sandy silty alluvial CLAY



Initial Conditions:

Moisture Content (%)	21
Voids Ratio	0.656
Diameter (mm)	75.1
Height (mm)	19.0
Bulk Density (Mg/m³)	1.97
Dry Density (Mg/m³)	1.63

Final Conditions:

Voids Ratio	0.500
Particle Density (Mg/m³)	2.70 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.642	16.4	t90	0.629
25 - 50	0.454	11.3	t90	0.611
50 - 100	0.348	12.4	t90	0.583
100 - 200	0.231	11.6	t90	0.546
200 - 50	- 0.00902	4.23 (Sv)	t90	0.548
50 - 100	0.0225	19.2	t90	0.547
100 - 200	0.0350	11.2	t90	0.541
200 - 400	0.132	11.3	t90	0.500

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Initials: JS

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EDMONTON ECOPARK

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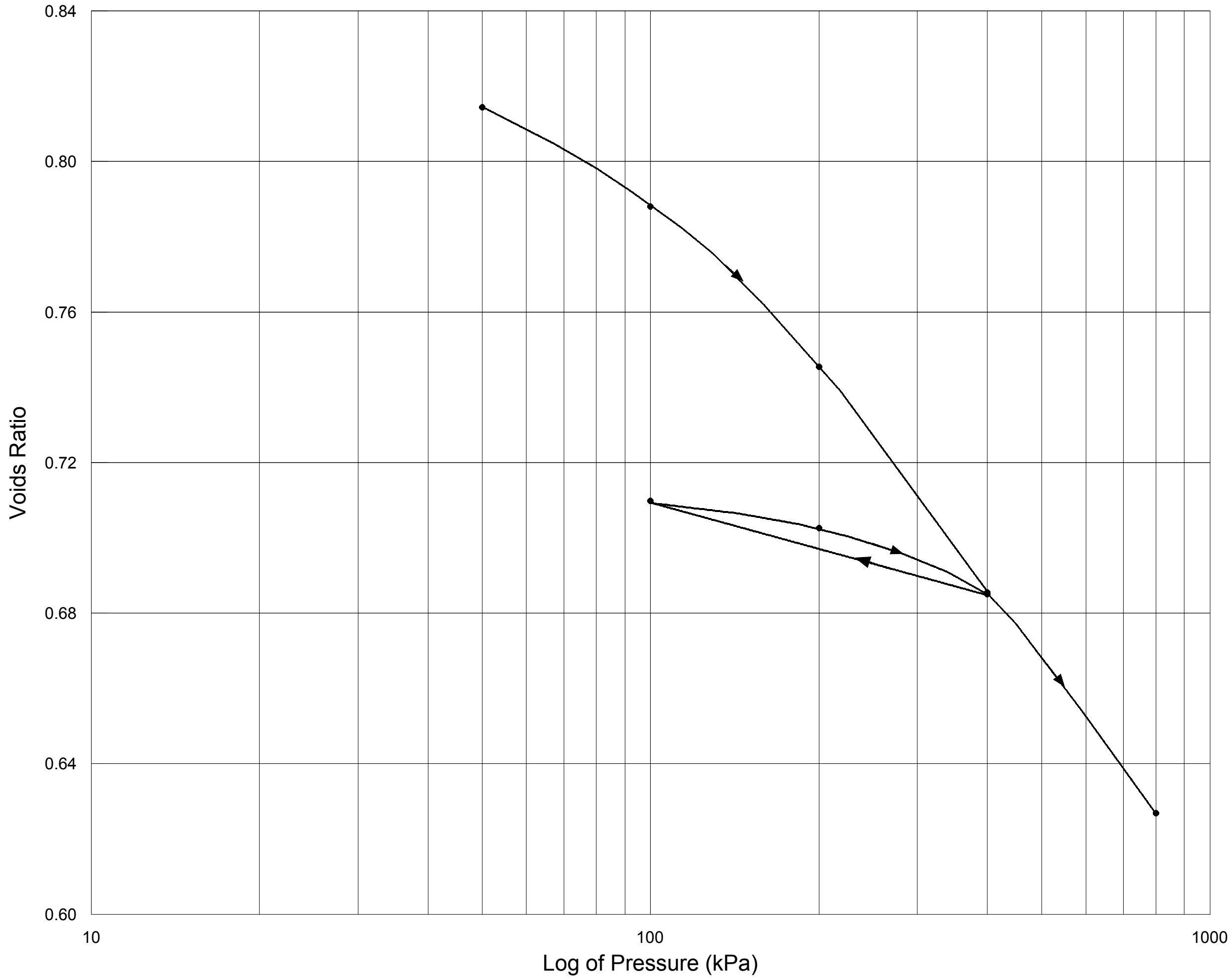
Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH113
Sample Ref:	2
Depth (m):	4.00
Depth of test specimen (m):	4.09
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm dark grey silty alluvial CLAY



Initial Conditions:

Moisture Content (%)	30
Voids Ratio	0.827
Diameter (mm)	75.1
Height (mm)	19.1
Bulk Density (Mg/m³)	1.92
Dry Density (Mg/m³)	1.48

Final Conditions:

Voids Ratio	0.627
Particle Density (Mg/m³)	2.71 (Assumed)
Laboratory Temperature (°C)	18.9

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	0.139	2.35	t50	0.814
50 - 100	0.290	1.42	t50	0.788
100 - 200	0.239	1.03	t50	0.745
200 - 400	0.171	1.07	t50	0.686
400 - 100	- 0.0482	1.32 (Sv)	t50	0.710
100 - 200	0.0426	2.64	t50	0.703
200 - 400	0.0515	2.31	t50	0.685
400 - 800	0.0864	0.762	t50	0.627

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Initials: JS

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Project Number:

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FAO D Dunn / P Lewin
12 April 2011

Dear D Dunn / P Lewin

Test Report Number **135540**
Your Project Reference **SI1688 - Edmonton Ecopark**

Please find enclosed the results of analysis for the samples received 4 April 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

☑ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

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- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
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- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

FAO D Dunn / P Lewin

LABORATORY TEST REPORT

Results of analysis of 21 samples
received 04 April 2011

SI1688 - Edmonton Ecopark

Report Date
12 April 2011

Login Batch No					**135540**							
Chemtest LIMS ID					AF91719	AF91720	AF91721	AF91723	AF91724	AF91725	AF91726	AF91727
Sample ID					BH114	BH116	BH116	BH106	BH106	BH107	BH107	BH110
Sample No					D2	D17	D21	D9	D17	D2	D11	D5
Sampling Date					01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011
Depth					2m - 2.45m	12.45m	16.5m - 16.95m	5.55m	12.5m - 12.95m	1.1m	5.8m	1.9m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2220	Chloride (extractable)	16887006	g l-¹	M	0.085	0.018	0.029	0.021	0.021	0.076	0.021	0.15
	Nitrate (extractable)	14797558	g l-¹	N	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l-¹	M	0.35	0.51	0.64	0.65	0.33	0.55	0.24	0.05
2420	Magnesium (soluble)	7439954	g l-¹	N	<0.01	<0.01	<0.01	0.01	<0.01	0.03	<0.01	<0.01
2010	pH			M	7.6	8.2	8.2	7.9	8.3	7.8	7.8	7.7

All tests undertaken between 06-Apr-2011 and 12-Apr-2011

* Accreditation status

This report should be interpreted in conjunction with the notes on the accompanying cover page

May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

LABORATORY TEST REPORT

Chemtest
The right chemistry to deliver results

Report Date
12 April 2011

Results of analysis of 21 samples
received 04 April 2011

FAO D Dunn / P Lewin

SI1688 - Edmonton Ecopark

Login Batch No					**135540**							
Chemtest LIMS ID					AF91728	AF91729	AF91730	AF91731	AF91733	AF91735	AF91736	AF91737
Sample ID					BH110	BH119	BH119	BH120	BH120	BH121	BH122	BH122
Sample No					D14	D3	D8	D8	D16	D8	D7	D11
Sampling Date					01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011	01/04/2011
Depth					8.5m - 8.95m	3m - 3.45m	8m - 8.45m	2.2m - 2.3m	9m - 9.45m	8m - 8.45m	7m - 7.45m	9.8m - 10.25m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*								
2220	Chloride (extractable)	16887006	g l-^{1}	M	0.018	0.16	0.038	0.077	0.019	0.017	0.021	0.030
	Nitrate (extractable)	14797558	g l-^{1}	N	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l-^{1}	M	0.16	0.44	0.45	0.23	0.26	0.24	0.10	0.35
2420	Magnesium (soluble)	7439954	g l-^{1}	N	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.02
2010	pH			M	8.2	7.5	8.0	6.7	7.9	8.3	8.5	8.0

All tests undertaken between 06-Apr-2011 and 12-Apr-2011

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LABORATORY TEST REPORT

Chemtest
The right chemistry to deliver results

Report Date
12 April 2011

Results of analysis of 21 samples
received 04 April 2011

FAO D Dunn / P Lewin

SI1688 - Edmonton Ecopark

Login Batch No					**135540**
Chemtest LIMS ID					AF91739
Sample ID					BH124
Sample No					D1
Sampling Date					01/04/2011
Depth					1.2m - 1.65m
Matrix					*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*	
2220	Chloride (extractable)	16887006	g l-¹	M	0.016
	Nitrate (extractable)	14797558	g l-¹	N	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l-¹	M	1.3
2420	Magnesium (soluble)	7439954	g l-¹	N	0.06
2010	pH			M	7.7

All tests undertaken between 06-Apr-2011 and 12-Apr-2011

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LABORATORY TEST REPORT

Results of analysis of 21 samples
received 04 April 2011

SI1688 - Edmonton Ecopark

Report Date
12 April 2011

Login Batch No					**135540**			
Chemtest LIMS ID					AF91722	AF91732	AF91734	AF91738
Sample ID					BH116	BH110	BH120	BH122
Sample No					W1	W1	W1	W1
Sampling Date					01/04/2011	01/04/2011	01/04/2011	01/04/2011
Depth					1m	3.6m	4m	5.3m
Matrix					*WATER*	*WATER*	*WATER*	*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*				
1010	pH	PH		U	7.0	7.5	7.0	7.0
1220	Chloride	16887006	mg l-^{1}	U	37	480	300	240
	Nitrate	14797558	mg l-^{1}	U	<0.50	<0.50	<0.50	<0.50
1415	Magnesium	7439954	mg l-^{1}	U	47	9.4	20	29
1220	Sulfate	14808798	mg l-^{1}	U	900	420	170	110

All tests undertaken between 06-Apr-2011 and 12-Apr-2011

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Chemtest
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May Gurney
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Norfolk
NR18 0RH

FAO D Dunn / P Lewin
14 April 2011

Dear D Dunn / P Lewin

Test Report Number	**123204**
Your Project Reference	**SI1688 - Edmonton Ecopark**

Please find enclosed the results of analysis for the samples received 6 April 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

K T Jones

Authorised Signatory

☐ Darrell Hall	Director
☐ Phil Hellier	Director
☑ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

2183

Notes to accompany report:

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May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

FAO D Dunn / P Lewin

LABORATORY TEST REPORT

Results of analysis of 5 samples
received 6 April 2011

Report Date
14 April 2011

SI1688 - Edmonton Ecopark

Login Batch No					**123204**			
Chemtest LIMS ID					AF92462	AF92463	AF92465	AF92466
Sample ID					BH118	BH118	BH123	BH123
Sample No					D3	D9	D1	D9
Sampling Date					05/04/2011	05/04/2011	05/04/2011	05/04/2011
Depth					1.2m	6.95m - 7m	1.2m - 1.65m	10m - 10.15m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*				
2010	pH			M	8.1	8.6	7.9	8.3
2220	Chloride (extractable)	16887006	g l-¹	M	0.024	0.041	0.13	0.020
	Nitrate (extractable)	14797558	g l-¹	N	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l-¹	M	0.65	0.65	1.8	0.33
2420	Magnesium (soluble)	7439954	g l-¹	N	0.03	<0.01	0.01	0.01

All tests undertaken between 07/04/2011 and 13/04/2011

* Accreditation status

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May Gurney
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Norfolk
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FAO D Dunn / P Lewin

LABORATORY TEST REPORT

Results of analysis of 5 samples
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SI1688 - Edmonton Ecopark

Report Date
14 April 2011

Login Batch No					**123204**
Chemtest LIMS ID					AF92464
Sample ID					BH118
Sample No					W2
Sampling Date					05/04/2011
Depth					11.8m
Matrix					*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*	
1010	pH	PH		U	7.9
1220	Chloride	16887006	mg l-¹	U	93
	Nitrate	14797558	mg l-¹	U	<0.50
1415	Magnesium	7439954	mg l-¹	U	20
1220	Sulfate	14808798	mg l-¹	U	90

All tests undertaken between 07/04/2011 and 13/04/2011

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Chemtest
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Depot Road
Newmarket
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Tel: 01638 606070

May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

FAO D Dunn
25 March 2011

Dear D Dunn

Test Report Number	**135066**
Your Project Reference	**SI1688 - Edmonton Ecopark**

Please find enclosed the results of analysis for the samples received 17 March 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

K T Jones

Authorised Signatory

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☐ Phil Hellier	Director
☑ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 sira UKAS ENVIRONMENTAL MANAGEMENT

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NR18 0RH

FAO D Dunn

LABORATORY TEST REPORT

Chemtest
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Results of analysis of 5 samples
received 17 March 2011

Report Date
25 March 2011

SI1688 - Edmonton Ecopark

SOP↓	Determinand↓	CAS No↓	Units↓	*	AF85833	AF85834	AF85835	AF85837
Login Batch No					**135066**			
Chemtest LIMS ID					AF85833	AF85834	AF85835	AF85837
Sample ID					BH103	BH103	BH103	BH113
Sample No					D2	D6	D10	D2
Sampling Date					16/03/2011	16/03/2011	16/03/2011	16/03/2011
Depth					2m - 2.45m	6m - 6.45m	10m - 10.45m	2.45m - 2.85m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*
2010	pH			M	7.4	8.2	8.6	7.9
2220	Chloride (extractable)	16887006	g l^{-1}	M	0.061	0.012	0.017	0.051
	Nitrate (extractable)	14797558	g l^{-1}	N	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.29	0.01	0.35	0.03
2420	Magnesium (soluble)	7439954	g l^{-1}	N	<0.01	<0.01	<0.01	<0.01

All tests undertaken between 18/03/2011 and 25/03/2011

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May Gurney
Ayton Road
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Norfolk
NR18 0RH

FAO D Dunn

LABORATORY TEST REPORT

Results of analysis of 5 samples
received 17 March 2011

SI1688 - Edmonton Ecopark

Report Date
25 March 2011

Login Batch No					**135066**
Chemtest LIMS ID					AF85836
Sample ID					BH105
Sample No					W1
Sampling Date					16/03/2011
Depth					4.3m
Matrix					*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*	
1010	pH	PH		U	7.0
1220	Chloride	16887006	mg l-¹	U	98
	Nitrate	14797558	mg l-¹	U	0.94
1415	Magnesium	7439954	mg l-¹	U	14
1220	Sulfate	14808798	mg l-¹	U	170

All tests undertaken between 18/03/2011 and 25/03/2011

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Chemtest
The right chemistry to deliver results

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Newmarket
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Tel: 01638 606070

May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

FAO D Dunn/P Lewin
05 April 2011

Dear D Dunn/P Lewin

Test Report Number **123071**
Your Project Reference **SI1688 - Edmonton Ecopark**

Please find enclosed the results of analysis for the samples received 28 March 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

☐ Darrell Hall	Director
☑ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

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UKAS ENVIRONMENTAL MANAGEMENT

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- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are outside of the scope of UKAS accreditation*
- *The results relate only to the items tested*
- *Stones represent the quantity of material removed prior to analysis*
- *All results are expressed on a dry weight basis*
- *The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, phenols*
- *For all other tests the samples were dried at < 37°C prior to analysis*
- *Uncertainties of measurement for the determinands tested are available upon request*
- *Soil descriptions, including colour and texture, are beyond the scope of MCertS accreditation*
- *None of the test results included in this report have been recovery corrected*

Test Report 123071 Cover Sheet

May Gurney
Ayton Road
Wymondham
Norfolk
NR18 0RH

FAO D Dunn/P Lewin

LABORATORY TEST REPORT

Results of analysis of 8 samples
received 28 March 2011

SI1688 - Edmonton Ecopark

Chemtest
The right chemistry to deliver results

Report Date
05 April 2011

Login Batch No					**123071**				
Chemtest LIMS ID					AF89383	AF89384	AF89385	AF89387	AF89388
Sample ID					BH101	BH104	BH104	BH108	BH109
Sample No									
					O5	D5	D13	D6	D10
Sampling Date					24/03/2011	24/03/2011	24/03/2011	24/03/2011	24/03/2011
Depth					3.5m - 3.6m	2m - 2.45m	9m - 9.45m	2.1m	5.2m - 5.65m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*					
2010	pH			M	7.1	8.0	8.1	7.7	7.9
2220	Chloride (extractable)	16887006	g l^{-1}	M	0.17	0.048	0.049	0.33	0.026
	Nitrate (extractable)	14797558	g l^{-1}	N	<0.010	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.31	0.46	0.38	0.49	0.22
2420	Magnesium (soluble)	7439954	g l^{-1}	N	<0.01	0.02	<0.01	<0.01	<0.01

All tests undertaken between 29/03/2011 and 05/04/2011

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LABORATORY TEST REPORT

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Results of analysis of 8 samples
received 28 March 2011

Report Date
05 April 2011

SI1688 - Edmonton Ecopark

Login Batch No					**123071**		
Chemtest LIMS ID					AF89386	AF89389	AF89390
Sample ID					BH104	BH115	BH117
Sample No							
					W1	W1	W1
Sampling Date					24/03/2011	24/03/2011	24/03/2011
Depth					3.9m	1.9m	2.9m
Matrix					*WATER*	*WATER*	*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*			
1010	pH	PH		U	6.9	7.5	7.0
1220	Chloride	16887006	mg l-¹	U	180	170	160
	Nitrate	14797558	mg l-¹	U	<0.5	<0.5	<0.5
1415	Magnesium	7439954	mg l-¹	U	24	15	26
1220	Sulfate	14808798	mg l-¹	U	240	220	310

All tests undertaken between 29/03/2011 and 05/04/2011

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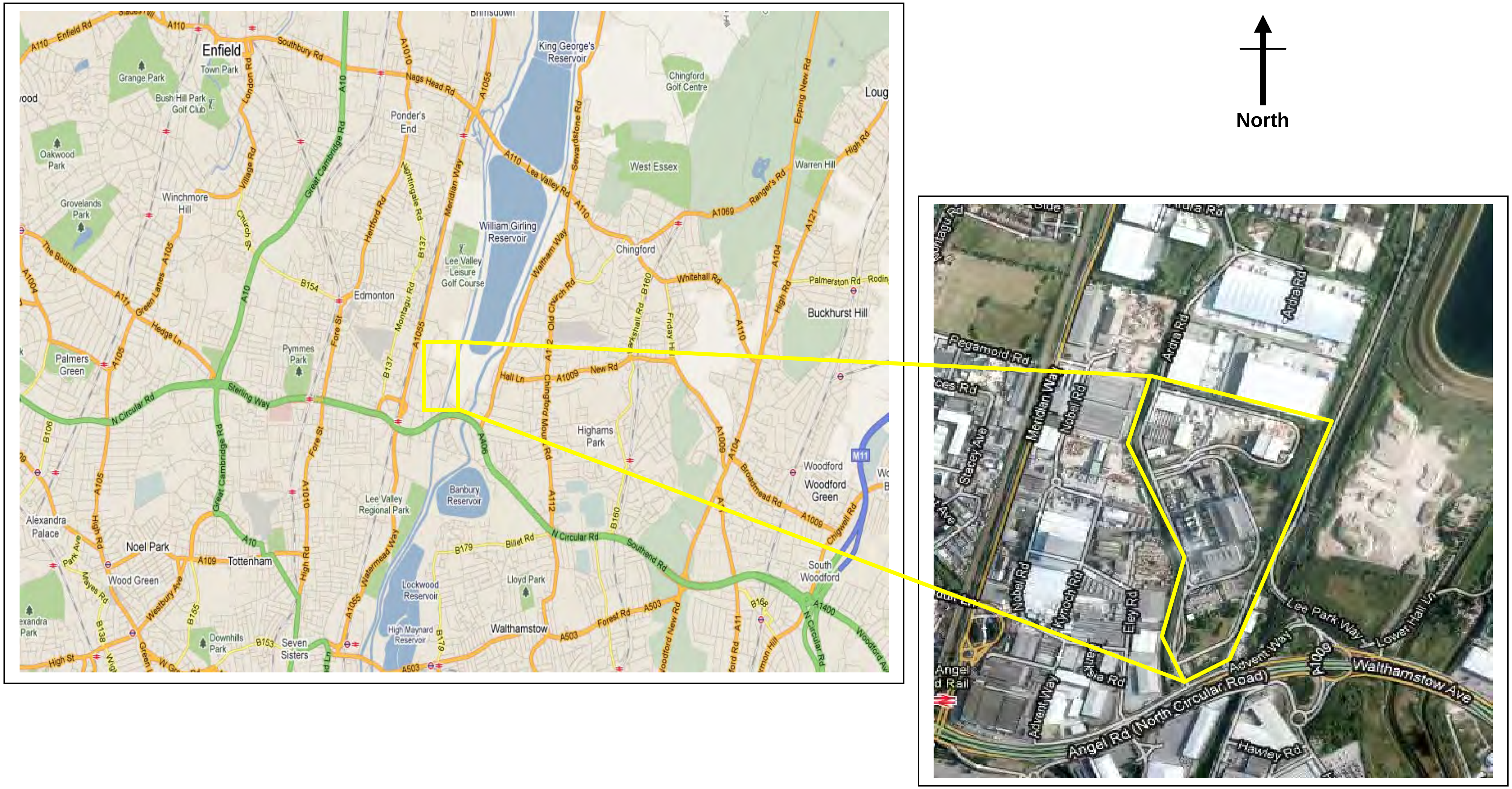
APPENDIX D

SITE PLANS



TITLE: SITE LOCATION PLAN

SCALE: NTS

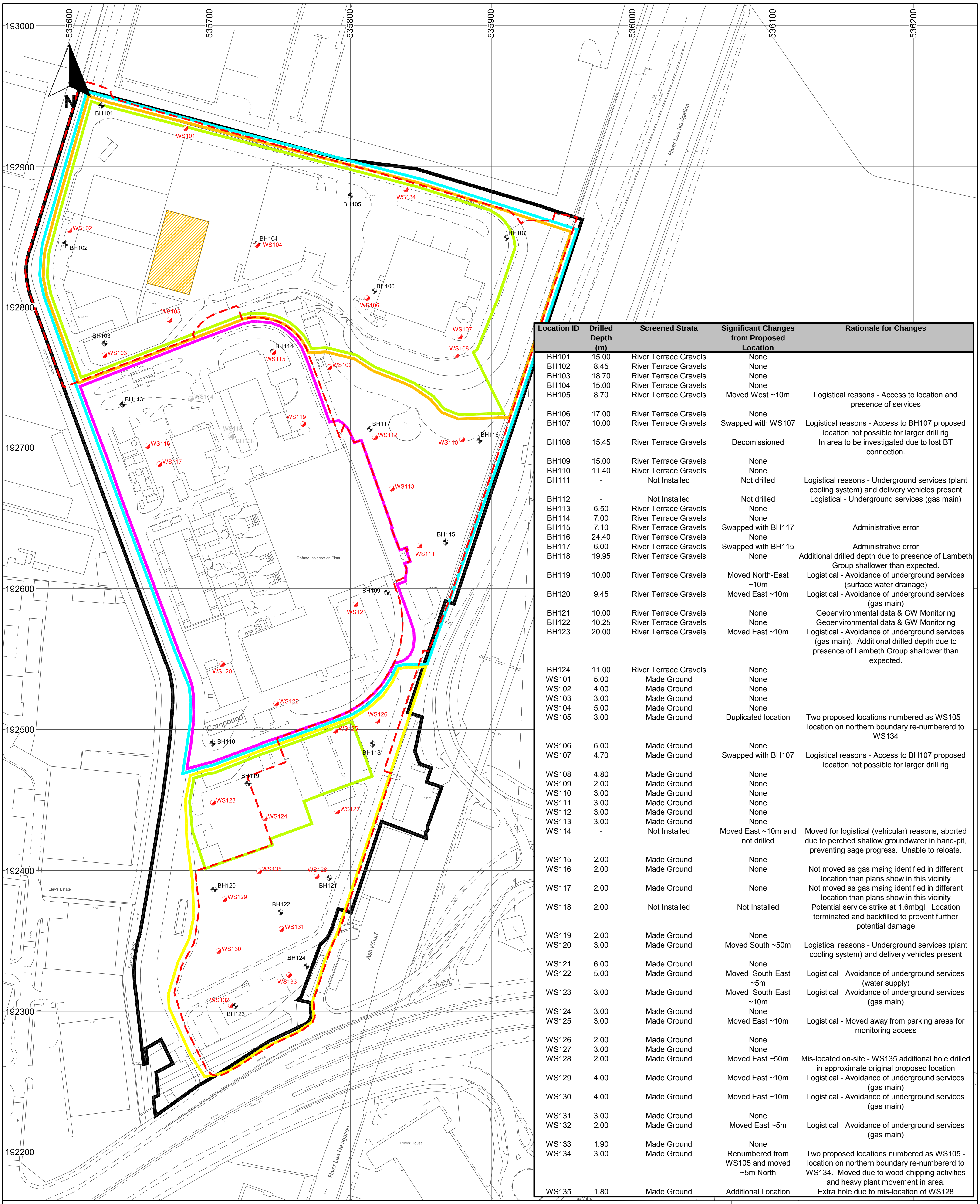
SITE: LONDON WASTE ECOPARK, EDMONTON

SI REF: SI1688

CLIENT: ENTEC UK LIMITED

MAY GURNEY

Geotechnical - Site Investigation, Ayton Road, Wymondham,
Norfolk, NR18 0RH. Tel: 01953 609844 Fax: 01953 609819



Location ID	Drilled Depth (m)	Screened Strata	Significant Changes from Proposed Location	Rationale for Changes
BH101	15.00	River Terrace Gravels	None	
BH102	8.45	River Terrace Gravels	None	
BH103	18.70	River Terrace Gravels	None	
BH104	15.00	River Terrace Gravels	None	
BH105	8.70	River Terrace Gravels	Moved West ~10m	Logistical reasons - Access to location and presence of services
BH106	17.00	River Terrace Gravels	None	
BH107	10.00	River Terrace Gravels	Swapped with WS107	Logistical reasons - Access to BH107 proposed location not possible for larger drill rig
BH108	15.45	River Terrace Gravels	Decomissioned	In area to be investigated due to lost BT connection.
BH109	15.00	River Terrace Gravels	None	
BH110	11.40	River Terrace Gravels	None	
BH111	-	Not Installed	Not drilled	Logistical reasons - Underground services (plant cooling system) and delivery vehicles present
BH112	-	Not Installed	Not drilled	Logistical - Underground services (gas main)
BH113	6.50	River Terrace Gravels	None	
BH114	7.00	River Terrace Gravels	None	
BH115	7.10	River Terrace Gravels	Swapped with BH117	Administrative error
BH116	24.40	River Terrace Gravels	None	
BH117	6.00	River Terrace Gravels	Swapped with BH115	Administrative error
BH118	19.95	River Terrace Gravels	None	Additional drilled depth due to presence of Lambeth Group shallower than expected.
BH119	10.00	River Terrace Gravels	Moved North-East ~10m	Logistical - Avoidance of underground services (surface water drainage)
BH120	9.45	River Terrace Gravels	Moved East ~10m	Logistical - Avoidance of underground services (gas main)
BH121	10.00	River Terrace Gravels	None	Geoenvironmental data & GW Monitoring
BH122	10.25	River Terrace Gravels	None	Geoenvironmental data & GW Monitoring
BH123	20.00	River Terrace Gravels	Moved East ~10m	Logistical - Avoidance of underground services (gas main). Additional drilled depth due to presence of Lambeth Group shallower than expected.
BH124	11.00	River Terrace Gravels	None	
WS101	5.00	Made Ground	None	
WS102	4.00	Made Ground	None	
WS103	3.00	Made Ground	None	
WS104	5.00	Made Ground	None	
WS105	3.00	Made Ground	Duplicated location	Two proposed locations numbered as WS105 - location on northern boundary re-numbererd to WS134
WS106	6.00	Made Ground	None	
WS107	4.70	Made Ground	Swapped with BH107	Logistical reasons - Access to BH107 proposed location not possible for larger drill rig
WS108	4.80	Made Ground	None	
WS109	2.00	Made Ground	None	
WS110	3.00	Made Ground	None	
WS111	3.00	Made Ground	None	
WS112	3.00	Made Ground	None	
WS113	3.00	Made Ground	None	
WS114	-	Not Installed	Moved East ~10m and not drilled	Moved for logistical (vehicular) reasons, aborted due to perched shallow groundwater in hand-pit, preventing sage progress. Unable to reloate.
WS115	2.00	Made Ground	None	
WS116	2.00	Made Ground	None	Not moved as gas maing identified in different location than plans show in this vicinity
WS117	2.00	Made Ground	None	Not moved as gas maing identified in different location than plans show in this vicinity
WS118	2.00	Not Installed	Not Installed	Potential service strike at 1.6mbgl. Location terminated and backfilled to prevent further potential damage
WS119	2.00	Made Ground	None	
WS120	3.00	Made Ground	Moved South ~50m	Logistical reasons - Underground services (plant cooling system) and delivery vehicles present
WS121	6.00	Made Ground	None	
WS122	5.00	Made Ground	Moved South-East ~5m	Logistical - Avoidance of underground services (water supply)
WS123	3.00	Made Ground	Moved South-East ~10m	Logistical - Avoidance of underground services (gas main)
WS124	3.00	Made Ground	None	
WS125	3.00	Made Ground	Moved East ~10m	Logistical - Moved away from parking areas for monitoring access
WS126	2.00	Made Ground	None	
WS127	3.00	Made Ground	None	
WS128	2.00	Made Ground	Moved East ~50m	Mis-located on-site - WS135 additional hole drilled in approximate original proposed location
WS129	4.00	Made Ground	Moved East ~10m	Logistical - Avoidance of underground services (gas main)
WS130	4.00	Made Ground	Moved East ~10m	Logistical - Avoidance of underground services (gas main)
WS131	3.00	Made Ground	None	
WS132	2.00	Made Ground	Moved East ~5m	Logistical - Avoidance of underground services (gas main)
WS133	1.90	Made Ground	None	
WS134	3.00	Made Ground	Renumbered from WS105 and moved ~5m North	Two proposed locations numbered as WS105 - location on northern boundary re-numbererd to WS134. Moved due to wood-chipping activities and heavy plant movement in area.
WS135	1.80	Made Ground	Additional Location	Extra hole due to mis-location of WS128

Key

▬	Site boundary
- - -	Boundary of proposed development
⊕	Borehole
◐	Window sample
⊕ ◐	Locations not installed
▨	Area with an underlying protective membrane
▬	Potential for infilled land
▬	Former sewage works sludge beds c1971-c1999
▬	Historical landfill (according to council records)*
▬	Incinerator and associated activities c1971-present
▬	Current activities

0 m 150 m

Scale 1:2500 @ A3

NLWA
Edmonton Site Investigation

Figure 5
Borehole Location Plan

April 2011
29541-A04.dwg squij

Entec

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client: AMEC Environment and Infrastructure UK Limited

SITE INVESTIGATION

Ground Technology Services

GROUND INVESTIGATION REPORT

Report Reference GTS-11-055

Date: January 2012

Site:
Phase 2 - Edmonton Ecopark
LondonWaste EcoPark
Edmonton

Client:

AMEC Environment & Infrastructure UK Limited
17 Angel Gate
City Road
London

GROUND TECHNOLOGY

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Kings Lynn
Norfolk
PE34 3AF
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www.groundtechnology.co.uk

GTS-11-055 - Phase 2, Edmondton Ecopark

Contents

Appendices

Appendix A	Exploratory Hole Records
Appendix B	In-situ Test Results
Appendix C	Installation
Appendix D	Geotechnical Laboratory Results
Appendix E	Exploratory Hole Location Plan
Appendix F	Calibration Certificates

Section 1: Introduction

1.1 General Introduction

Ground Technology Services (GTS)were instructed by AMEC Environment and Infrastructure Limited (AMEC), to carry out a site investigation in order to obtain information on the geotechnical and chemical composition of the underlying soils at LondonWaste Ecopark, Edmonton, North London. An initial phase of site investigation was completed by May Gurney Limited (Report Ref: SI1688_Rev01). This second phase of intrusive works is to provided supplementary information and further information on the Lambeth Group below the site.

The specification for the site investigation was completed by AMEC and details the full scope of works. GTS were appointed as Ground Investigation Contractor for the intrusive investigation.

The site investigation comprised four cable percussion boreholes with gas and groundwater monitoring standpipes. In addition, geotechnical laboratory testing was also completed on recovered samples. The fieldwork was carried out between the 5th and 13th December 2011.

This report contains a record of the fieldwork conducted, strata encountered and laboratory test results.

1.2 Objectives

The objectives of the ground investigation are to provide an assessment of the geological, hydrological and chemical condition underlying the site.

1.3 Scope

The scope of works for this ground investigation comprises:

- An supplementary ground investigation comprising cable percussion boreholes and monitoring standpipes.
- A series of geotechnical laboratory testing.
- A factual report detailing the site works undertaken, findings of the ground investigation and geotechnical laboratory test results.

Section 2: Site Details

2.1 Location and Description

The site is situated west of the River Lee Navigation and bordered to the south by the North Circular Road, in Edmonton within the London Borough of Enfield.

At the time of the intrusive investigation the site comprised a municipal waste incinerator and waste-to-energy power station which burns London's waste to provide electricity for the National Grid. The site was divided into various waste sorting locations, with numerous associated buildings to sort and contain waste. A composting facility was also present within the waste facility.

The site is centred on National Grid Reference 535750 192650, as shown on the site location plan presented within Appendix D.

2.2 Geology

The available information[1] indicates the solid geology underlying the site is the London Clay Formation, of the Eocene period. The London Clay Formation comprises grey, weathering to brown fine sandy silty CLAY and clayey SILT. The sequence becomes increasingly sandy towards the base, with occasional glauconitic sands.

Underlying the London Clay Formation is the Lambeth Group, which is made up of the Reading, Woolwich and Upnor Formations. The Reading Formation includes the Upper Mottled Clay and the Lower Mottled Clay; the Woolwich Formation includes the Upper Shelly Clay, the Laminated Beds, the ‘Striped Loams’ and the Lower Shelly Clay; the Upnor Formation includes the Pebble Bed.

This solid geology is masked by drift deposits of the Kempton Park Gravels which generally comprise sand and gravel, locally with lenses of clay, silt and peat. The post diversionary Thames deposit is generally 5-6m thick, however locally can be encountered deeper due to infilling of deep hollows.

Overlying the Kempton Park Gravels at the site, Alluvium is indicated associated with the River Lea and small tributaries of the River Lea.

2.3 Hydrology

The River Lea Navigation, which is canalised, forms part of the eastern boundary of the site flowing southwards. Within this area the River Lea is extensively managed and consequently the river does not follow its natural course. This main River Lea is tidal however due to canalisation in this area the River Lea Navigation is not influenced by tidal water fluctuations.

A tributary of the River Lea, identified as Salmons Brook, forms part of the western boundary of the site.

2.4 Hydrogeology

The Hydrogeology of the site is likely to be characterised by the Kempton Park Gravels, which is a Secondary A Aquifer. A secondary A Aquifer contains permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The underlying solid geology of the London Clay Formation is designated as unproductive strata and acts as an aquiclude to the underlying Lambeth Group.

The hydrology of the Lambeth Group is dependant on the substrata but is also classified as a Secondary A Aquifer.

At depth below the site, the Upper Chalk Formation is designated a principle aquifer. A principle aquifer has high intergranular and/or fracture permeability - meaning that they usually provide a high level of water storage. These may support water supply and/or river base flow on a strategic scale.

The site is also situated within a Source Protection Zone One (SPZ1), inner zone protection defined as a 50 day travel time from any point below the water table to the source.

Section 3: Fieldwork

3.1 Scope of Works

The scope of the field work was specified by AMEC and was undertaken in general accordance with Eurocode 7 Part 2[2], The Steering Group Specification (1993)[6] and where there is no conflict BS 5930:1999[7]. The soil descriptions used in the exploratory hole records are in broad accordance with the relevant European Standards[3&4] and Section Six of BS 5930: 1999[7].

The prevailing ground conditions were determined by:

Hole Type	Quantity
Cable Percussion Borehole	4

The exploratory hole locations were set out by AMEC as indicated on the exploratory hole location plan presented in Appendix E.

Before commencement of drilling and excavation all the exploratory hole positions were scanned using a cable avoidance tool (CAT). Within all exploratory hole locations a 1.20m deep hand excavated trail pit was completed to check for the presence of any near surface services that may have been damaged by the investigation.

3.2 Environmental Sampling

A selection of environmental samples were taken from the exploratory holes to allow chemical testing to be completed. All environmental samples were obtained by an experienced environmental engineer form AMEC. The environmental samples were placed in both plastic and glass containers and stored in cool boxes for transit.

Samples were collected from site on a daily basis and placed into laboratory storage. Prior to scheduling, all samples were maintained at temperatures below 5 degrees Celsius within a refrigerator.

The sample frequencies and depths were determined by AMEC.

3.3 Geotechnical Sampling

Geotechnical samples were obtained from the boreholes and trial pits. The following sample classes and categories were obtained in accordance with BS EN 1997-2[2].

Sample Type	Category	Class
Disturbed (D)	C	5
Bulk (B)	C	5
Disturbed (D) Split Spoon	B	3-5
Undisturbed Thin wall (UT)	A	1-2
Undisturbed (U)	B	3-5

3.3 Cable Percussion Boreholes

Four cable percussion boreholes (BH201 to BH204) were sunk to depths of up to 26.55mbgl, utilising a Dando 2000 Rig.

The bores were supported, where necessary, by the use of 250mm, 200mm and 150mm diameter temporary steel casing. The boreholes were drilled between the 5th and 13th December 2011.

The recovered strata were recorded by and disturbed samples taken during boring, as an aid to the production of borehole logs. The engineer verified logs are contained within Appendix A, and are based upon the results of in-situ testing, laboratory test results and the descriptions of recovered samples. All onsite logging was completed by AMEC.

In-situ standard penetration tests (SPTs) were carried out at regular intervals as a guide to the relative density/consistency of the soils encountered. The trip hammers utilised is calibrated in accordance with BS EN ISO 22476-3 (2005). The calibration certificates are presented in Appendix F and a graphic presentation of obtained SPT N values vs. depth is presented in Appendix B.

Section 3: Fieldwork

Following completion of logging and sampling, all boreholes were installed with gas and groundwater monitoring standpipes.

3.4 Instrumentation and Monitoring

Full details of the instrumentation installed is presented in Appendix C and also on the exploratory hole records within Appendix A. The purpose of the instrumentations was to establish ground gas concentrations and groundwater levels.

All gas and groundwater monitoring was completed by AMEC and is not included as part of this report.

Section 4: Laboratory Testing

4.1 Geotechnical Testing

A schedule of geotechnical laboratory testing, prepared by GTS and completed by AMEC, was carried out in accordance with BS1377:1990[8] as noted below.

Test Type	Part	Method	No. of Tests
Moisture Content	2	3	24
Liquid Limit	2	4	11
Plastic Limit and Plasticity Index	2	5	11
Particle Size Distribution (Dry Sieve)	2	9.3	3
Particle Size Distribution (Wet Sieve)	2	9.2	5
Particle Size Distribution (Sedimentation)	2	9.4	3
Multi Stage Unconsolidated Undrained Triaxial	7	9	13
Triaxial Permeability	6	6	4

Seven soil and three water samples were also tested for pH, Water Soluble Sulphate, Magnesium, Chloride and Nitrate to aid concrete design.

The geotechnical laboratory results are presented in Appendix E.

At the time of writing this report the four Triaxial Permeability tests are not completed. The permeability results will be issued as an addendum once testing is complete.

4.2 Chemical Testing

A detailed chemical testing regime was completed by AMEC on the environmental samples obtained during the investigation. The results from the chemical testing are not presented within this report.

Section 5: Ground Conditions

5.1 Summary of Ground Conditions

Reference should be made to the Appended exploratory hole records for full details of the strata encountered by this investigation. However, this supplementary site investigation has generally confirmed ground conditions encountered in the initial phase of works. A brief summary of the ground conditions from this supplementary phase of works is discussed below.

Made Ground was encountered at all exploratory hole locations to depths between 2.00m and 2.60mbgl. The Made Ground comprised mixed granular and cohesive layers and contained brick, concrete, flint, pottery, wood, metal, ash, quartzite, clinker. Occasional brick and concrete cobbles were noted.

Underlying the Made Ground, a thin layer of Alluvium was encountered in the vast majority of locations, which was subsequently underlain by the Kempton Park Gravel.

The Kempton Park Gravel was encountered from depths of between 2.80m and 4.40mbgl to a maximum depth of 7.30mbgl. This stratum comprised various layers of silty gravelly SAND, silty SAND and GRAVEL and silty sandy GRAVEL.

The solid geology of the London Clay Formation was encountered underlying the Kempton Park Gravel and was proven to a maximum depth of 23.10mbgl. The London Clay Formation comprised firm to very stiff, medium to very hight strength CLAY, locally silty and with occasional fine sand partings.

Below the London Clay Formation the Lambeth Group was encountered from depths of between 11.30m and 23.10mbgl to a maximum depth of 26.55mbgl. The Lambeth Group comprised various layer of dense silty fine and medium SAND and silty sandy CLAY. Occasional shell fragments and black pebbles were encountered locally.

5.2 *Groundwater Conditions*

Reference should be made to the appended exploratory hole records for details of the groundwater encountered during the investigation.

Equilibrium groundwater levels are rarely obtained during drilling, therefore reference should be made to AMEC's monitoring results (not presented within this report) to obtain full information on the groundwater conditions.

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Section 7: References

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30. Butcher A.P et al (1996) Dynamic Probing and its uses in clay soils. Advances in site investigation practices.
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Document Control

Project ID: GTS-11-055
Site: Phase 2 - Edmonton Ecopark
Client: AMEC Environment and Infrastructure UK Limited.
Date: January 2012

Report Written by:
P LEWIN BSc
Geotechnical Engineer

Checked and Authorised for issue:
B ARMSTRONG BSc MSc FGS
Site Investigation Manager

BArmstrong

GENERAL CONDITIONS / LIMITATIONS RELATING TO SITE INVESTIGATIONS

The recommendations of this report are based on the findings of a series of exploratory carried out at specified locations across the site. It is possible that conditions exist other than those encountered and therefore no guarantee can be given as to the extent to which the findings are representative.

It should be noted that groundwater conditions fluctuate according to seasonal and other factors, which cannot be predicted with certainty. In low permeability soils equilibrium ground water levels are rarely established during the period of fieldwork.

All recommendations made are subject to any relevant statutory regulations in force concerning design methods and safe construction practice. In addition unless specifically stated no account has been taken of possible subsidence due to mineral extraction.

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GTS-11-055

Phase 2
Edmonton Ecopark

Appendix A
Exploratory Hole Records

Ground Technology Services

Summary of Exporatory Holes

Site:	Phase 2 - Edmonton Ecopark	Job No:	GTS-11-055
Client	AMEC Environment and Infrastructure UK Limited		
Engineer	n/a		

Hole ID	Hole Type*	Ground Level (mAOD)	Eastings	Northings	Completion Depth of Hole (m)	Completion Depth of Hole (mAOD)
BH201	CP	11.56	535623.42	192943.24	22.95	-11.39
BH202	CP	11.30	535910.87	192847.27	20.95	-9.65
BH203	CP	11.63	535866.22	192635.63	26.55	-14.92
BH204	CP	12.11	535775.06	192398.46	14.95	-2.84

*CP=Cable Percussion, TP=Trial Pit, WS=Window Sample Borehole

Key to Site Investigation Records

Project: Phase 2 – Edmonton Ecopark

Project I.D.: GTS-11-055

Client: AMEC Environment and Infrastructure UK Limited

In Situ Testing & Observations

PID	Photo Ionisation Detection test, reported in ppm.
S or C	Standard Penetration Test as BS EN 1997-2 (2007) . Uncorrected test result shown on the log at the relevant depth. S – split spoon or C – solid cone.
HV	Hand vane test, shear strength reported in kPa.
PP	Pocket penetrometer test, shear strength reported in kPa.
▽	Groundwater strike
▼	Level to which groundwater has risen after the specified time. (Nominal 20 minutes).

Sampling

D	Small disturbed sample, around 1kg.
B	Bulk disturbed sample, around 5kg.
C	Core undisturbed sample.
W	Water sample.
ES	Environmental soil sample, in more than one container if appropriate.
U	Undisturbed driven thinwall tube sample. Nominal 100mm diameter and 450mm length in CP boreholes. The number of blows taken to drive the sample tube the full length is reported on the log sheet at the appropriate depth along with the percentage recovery. The U100 thinwall has an edge taper angle of 5 degrees, area ratio of 14.97 and an internal diameter of 104mm, which complies with BS EN ISO 22475-1 (2006), for a thin wall open drive sampler.

Geological Abbreviations

Dm	Structureless CHALK. Matrix supported.
Dc	Structureless CHALK. Clast supported.

General Comments

1. Soil samples have been described in accordance with BS EN ISO 14688-2(2002), BS EN ISO 14688-2(2004) and BS5930:2007 ‘Code of practice for site investigation’ – Section 6.

2. Electronic data provided in relation to this project has been produced using the Association of Geotechnical & Geoenvironmental Specialists (AGS) data transfer format, with specific reference to their publication ‘Electronic Transfer of Geotechnical and Geoenvironmental Data Edition 3.1, 2004 including addendum May 2005’. All legend and backfill codes are as per this document.

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Borehole Record

BH201

Sheet 1 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.560mAOD
Coordinates: 535623.42E
192943.24N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: MACADAM	0.15	11.41
MADE GROUND: CONCRETE	0.35	11.21
MADE GROUND: Red-brown sandy angular to sub-angular fine to coarse GRAVEL of granite and limestone.	0.50	11.06
MADE GROUND: Soft-firm grey-brown sandy gravelly CLAY. Gravel is sub-angular to rounded fine to coarse of flint, concrete, brick and mixed lithologies.	0.70	10.86
MADE GROUND: Medium dense orange/brown silty very sandy GRAVEL. Gravel is sub-angular to sub-rounded fine to coarse of flint and mixed lithologies . Occasional brick and concrete fragments.	1.90	9.66
MADE GROUND: Very soft brown/green gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of mixed lithologies with brick and concrete.	2.40	9.16
Very soft grey/green gravelly CLAY with occasional silt pockets. Gravel is sub-angular to sub-rounded fine to coarse of mixed lithologies. [ALLUVIUM]	2.70	8.86
Very soft low strength blue/brown mottled silty CLAY with rootlets. [ALLUVIUM]	4.00	7.56
Grey slightly silty slightly gravelly fine to coarse SAND. Gravel is angular to sub-angular fine and medium flint. [KEMPTON PARK GRAVEL]	4.30	7.26
Loose grey slightly silty very sandy angular to sub-rounded fine to coarse flint GRAVEL. [KEMPTON PARK GRAVEL]	6.40	5.16
Soft grey sandy gravelly CLAY. Gravel is sub-angular to sub-rounded fine to coarse of flint. [KEMPTON PARK GRAVEL]	6.50	5.06
Medium dense grey slightly silty sandy sub-angular to sub-rounded GRAVEL of flint. Becoming less sandy below 7.30m. [KEMPTON PARK GRAVEL]	7.30	4.26
Firm high strength grey CLAY. [LONDON CLAY FORMATION]		

Borehole continued...

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
D1	0.10-0.20				
D2	0.35-0.45				
ES1	0.50-2.60				
D3	0.50-0.60				
B4	0.50-0.70				
D5	0.70-0.80				
B6	0.70-1.20				
S	1.50-1.95	0.00		N=28 (2,4/6,6,6,10)	
D7	1.50-1.95				
B8	1.50-1.90				
B9	1.90-2.40				
S	2.50-2.95	2.50	(2.30)	N=4 (1,1/1,1,1,1)	
D10	2.50-2.95				
B11	2.50-3.00				
U12	3.50-3.95			8 blows	
ES2	3.70-3.80				
W22	3.70				
D13	3.95-4.00				
D14	4.00-4.10				
C	4.50-4.95	4.50	(3.70)	N=4 (2,4/1,1,1,1)	
B15	4.50-5.00				
C	5.50-5.95	5.50	(3.80)	N=9 (2,2/2,2,3,2)	
B16	5.50-6.00				
D17	6.40-6.50				
S	6.50-6.95	6.50	(3.60)	N=22 (2,2/5,5,5,7)	
B18	6.50-7.00				
D21	7.30-7.40				
U19	7.50-7.95			40 blows	
D20	7.95-8.00				
D23	8.50-8.95				
B24	8.50-9.00				
U25	9.50				
D26	9.95-10.00				

Installations

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.50	2.50			
200	8.00	7.50			
150	22.50	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/12/11	4.00	10	3.85	3.00	
07/12/11	4.00	20	3.70	3.00	
12/12/11	19.50	10	19.20	9.00	
12/12/11	19.50	20	19.00	9.00	

Dates:	07/12/2011-12/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 8.00mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

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Borehole Record

BH201

Sheet 2 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.560mAOD
Coordinates: 535623.42E
192943.24N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Firm high strength grey CLAY. [LONDON CLAY FORMATION]			D27 B28	11.00-11.45 11.00-11.50				
			U29	12.50				
			W35 D30	12.80 12.95-13.00				
			D31 B32	14.00-14.45 14.00-14.50				
			U33	15.50				
			D34	15.95-16.00				
Stiff grey/brown slightly silty CLAY. [LONDON CLAY FORMATION]	16.00	-4.44						
			S B36 D37	17.00-17.45 17.00-17.50 17.00-17.45	9.00		N=31 (3,4/6,7,9,9)	
			U38	18.50-18.95			36 blows	
			D39	18.95-19.00				
Very stiff dark green/brown sandy SILT with occasional shell fragments. [LAMBETH GROUP]	19.20	-7.64	D40	19.20-19.30				

Borehole continued...

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.50	2.50
200	8.00	7.50
150	22.50	9.00

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/12/11	4.00	10	3.85	3.00	
07/12/11	4.00	20	3.70	3.00	
12/12/11	19.50	10	19.20	9.00	
12/12/11	19.50	20	19.00	9.00	

Dates: 07/12/2011-12/12/2011
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: AMEC (E&I) UK LIMITED
Checked By: P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 8.00mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

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Borehole Record

Sheet 3 of 3

BH201

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.560mAOD
Coordinates: 535623.42E
192943.24N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff dark green/brown sandy SILT with occasional shell fragments. [LAMBETH GROUP]				S B41 D42	20.00-20.39 20.00-20.50 20.00-20.39	9.00	(19.90)	50 (4,7/10,11,17,12 for 15mm)		
Stiff medium strength dark grey sandy gravelly CLAY with occasional shell fragments. Gravel is sub-rounded fine to medium black pebbles. [LAMBETH GROUP]		20.70	-9.14	D43 B44 U45	20.70-20.80 21.00-21.50 21.50-21.95			100 blows		
Very stiff red/grey mottled sandy SILT. [LAMBETH GROUP]		21.80	-10.24	D46 B47	21.95-22.00 22.00-22.50					
Borehole Complete at 22.95 m		22.50	-10.94	S D78	22.50-22.95 22.50-22.95	9.00	(12.80)	N=46 (3,5/8,9,12,17)		

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.50	2.50			
200	8.00	7.50			
150	22.50	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
07/12/11	4.00	10	3.85	3.00	
07/12/11	4.00	20	3.70	3.00	
12/12/11	19.50	10	19.20	9.00	
12/12/11	19.50	20	19.00	9.00	

Dates:	07/12/2011-12/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 8.00mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

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Borehole Record

BH202

Sheet 1 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.300mAOD
Coordinates: 535910.87E
192847.27N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: MACADAM		0.25	11.05	B1	0.25-0.50					
MADE GROUND: Grey/pink very sandy, angular, coarse GRAVEL of limestone. (HARDCORE)		0.50	10.80	D2	0.30-0.40					
				ES1	0.50-0.60					
				D3	0.50-0.60					
				B4	0.50-1.00					
MADE GROUND: Dense yellow/brown very sandy sub-rounded medium GRAVEL. (HARDCORE)				S	1.20-1.65	0.00		N=52 (3,4/4,16,12,20)		
				B5	1.20-1.65					
Soft brown/grey slightly sandy silty organic CLAY. [ALLUVIUM]		2.00	9.30	S	2.00-2.45	1.80	(1.90)	N=6 (5,8/2,1,1,2)		
				D6	2.00-2.45					
				B7	2.00-2.45					
Medium dense grey slightly silty very gravelly fine to coarse SAND. Gravel is sub-rounded to angular fine to coarse of flint. [KEMPTON PARK GRAVEL]		2.80	8.50	B8	2.80-3.45					
				S	3.00-3.45	3.00		N=15 (3,3/3,3,4,5)		
				D9	3.00-3.45					
				ES2	3.80-4.00					
				S	4.00-4.45	4.00	(3.60)	N=15 (2,3/3,4,4,4)		
				D10	4.00-4.45					
				B11	4.00-4.45					
From 5.00m loose.				S	5.00-5.45	5.00	(3.60)	N=9 (1,2/2,3,2,2)		
				D12	5.00-5.45					
				B13	5.00-5.45					
Firm to stiff medium strength grey CLAY with local laminations. [LONDON CLAY FORMATION]		5.80	5.50	U14	5.90-6.35			26 blows		
				D15	6.35-6.50					
				S	7.00-7.45	7.00		N=18 (3,4/5,4,4,5)		
				B16	7.00-7.45					
				D17	7.00-7.45					
				U18	8.00			36 blows		
				D19	8.45-8.55					
				S	9.00-9.45	7.30		N=20 (2,3/4,5,5,6)		
				D20	9.00-9.45					
				B21	9.00-9.45					
Borehole continued...										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.00	2.00
200	6.50	7.50
150	20.50	

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/12/11	3.20	10	2.90	3.20	6.00
08/12/11	3.20	20	2.60	3.20	6.00
12/12/11	17.50	20	17.20	-	

Dates:	08/12/2011-12/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.00mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 6.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG2

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Borehole Record

BH202

Sheet 2 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.300mAOD
Coordinates: 535910.87E
192847.27N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Firm to stiff high strength grey CLAY with local laminations. [LONDON CLAY FORMATION]		10.00	1.30	U22	10.00			29 blows		
				D23	10.45-10.55					
				S D24 B25	11.50-11.95 11.50-11.95 11.50-11.95	7.30		N=23 (2,4/5,6,6,6)		
				U26	13.00			42 blows		
				D27	13.45-13.55					
				S D28 B29	14.50-14.95 14.50-14.95 14.50-14.95	7.30		N=25 (3,5/6,5,7,7)		
From 16.00mbgl rare fine and medium sand lenses.				U30	16.00-16.45			36 blows		
				D31	16.45-16.55					
Stiff grey/brown silty CLAY with occasional shells. [LAMBETH GROUP]		16.50	-5.20							
				S D32 B33	17.50-17.95 17.50-17.95 17.50-17.95	7.50	(17.20)	N=21 (3,4/5,5,5,6)		
Stiff grey sandy SILT. [LAMBETH GROUP]		17.90	-6.60							
Stiff grey finely laminated silty CLAY. [LAMBETH GROUP]		18.60	-7.30							
				U34	19.00			21 blows		
Borehole continued...										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.00	2.00			
200	6.50	7.50			
150	20.50				

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/12/11	3.20	10	2.90	3.20	6.00
08/12/11	3.20	20	2.60	3.20	6.00
12/12/11	17.50	20	17.20	-	

Dates:	08/12/2011-12/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.00mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 6.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG2

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Borehole Record

BH202

Sheet 3 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.300mAOD
Coordinates: 535910.87E
192847.27N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff grey finely laminated silty CLAY. [LAMBETH GROUP]		20.95	-9.65	S D35	20.50-20.95 20.50-20.95	7.50	(18.50)	N=46 (7,8/9,10,13,14)		
Borehole Complete at 20.95 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.00	2.00			
200	6.50	7.50			
150	20.50				

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
08/12/11	3.20	10	2.90	3.20	6.00
08/12/11	3.20	20	2.60	3.20	6.00
12/12/11	17.50	20	17.20	-	

Dates: 08/12/2011-12/12/2011
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: AMEC (E&I) UK LIMITED
Checked By: P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.00mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 6.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG2

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Borehole Record

BH203

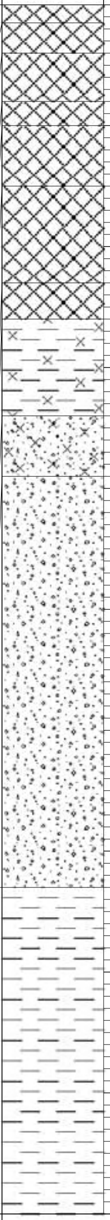
Project: Phase 2 - Edmonton Ecopark

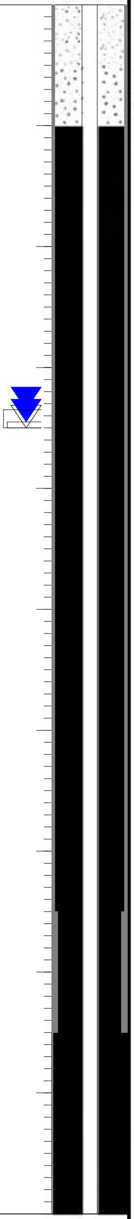
Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.630mAOD
Coordinates: 535866.22E
192635.63N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Soft brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is sub-angular to rounded fine to medium of mixed lithologies.	0.15	11.48	D1	0.00-0.10				
			B2	0.00-0.15				
MADE GROUND: Brown gravelly SAND. Gravel is sub-angular to sub-rounded fine to coarse of brick, concrete and mixed lithologies.	0.40	11.23	D3	0.15-0.20				
			B4	0.15-0.40				
MADE GROUND: Stiff brown sandy, gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse of brick, concrete and mixed lithologies.	0.80	10.83	D5	0.40-0.50				
			B6	0.40-0.80				
MADE GROUND: Dark brown slightly clayey gravelly SAND. Gravel is sub-angular to sub-rounded, fine to coarse of brick, concrete and mixed lithologies.	1.00	10.63	ES1	0.80-1.00				
			D7	0.80-0.90				
			B8	0.80-1.00				
			D9	0.80-0.90				
MADE GROUND: Dark brown slightly sandy gravelly CLAY. Gravel is sub-angular to sub-rounded, fine to coarse of brick and mixed lithologies with some wood.	1.50	10.13	B10	1.00-1.20				
MADE GROUND: Very soft black slightly sandy slightly gravelly CLAY with many large wood fragments and strong hydrocarbon odour. Gravel is sub-angular to sub-rounded fine to coarse of mixed lithologies with rare brick. Occasional lenses of grey/orange finely laminated clay.	2.30	9.33	S	1.50-1.95	0.00		N=23 (1,2/9,8,4,2)	
			D11	1.50-1.55				
			D12	1.50-1.95				
			B13	1.50-2.20				
			ES2	1.70-1.80				
MADE GROUND: Very soft black silty CLAY with rootlets and some brick.	2.60	9.03	D14	2.30-2.40				
			S	2.50-2.95	0.00		N=4 (1,1/1,1,1,1)	
			D15	2.50-2.95				
			B17	2.50-3.00				
Very soft brown/grey mottled slightly sandy silty CLAY. [ALLUVIUM]	3.40	8.23						
Grey slightly clayey slightly gravelly very silty SAND. Gravel is angular to sub-angular of shells. [KEMPTON PARK GRAVEL]	3.90	7.73	D16	3.40-3.50				
			S	3.50-3.95	3.00	(3.40)	N=23 (2,2/3,6,6,8)	
			D18	3.50-3.95				
			B19	3.50-3.80				
Medium dense grey/brown silty very sandy sub-angular to rounded GRAVEL of flint. [KEMPTON PARK GRAVEL]	7.30	4.33	B20	3.90-4.30				
			C	4.50-4.95	4.50	(4.30)	N=16 (2,3/3,4,4,5)	
			B21	4.50-5.00				
			C	5.50-5.95	5.50	(2.80)	N=10 (2,2/2,2,3,3)	
			B22	5.50-6.00				
			C	6.50-6.95	6.50	(4.40)	N=14 (2,3/3,3,4,4)	
			B23	6.50-7.00				
Firm to stiff medium strength grey CLAY. [LONDON CLAY FORMATION]			D24	7.30-7.40				
			U25	7.50-7.95			50 blows	
			D26	7.95-8.00				
			S	8.50-8.95	8.50	(8.30)	N=14 (3,7/3,3,4,4)	
			D28	8.50-8.95				
			B29	8.50-9.00				
From 9.50mbgl high strength.			U30	9.50-9.95			27 blows	
Borehole continued...			D31	9.95-10.00				

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	3.00	0.00			
200	7.50	7.50			
150	26.10	8.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/12/11	3.50	10	3.45	3.00	
05/12/11	3.50	20	3.35	3.00	
08/12/11	19.10	20	19.10	8.50	
08/12/11	23.10	10	22.90	8.50	

Dates:	05/12/2011-09/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 7.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

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Borehole Record

BH203

Sheet 2 of 3

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.630mAOD
Coordinates: 535866.22E
192635.63N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Firm to stiff medium strength grey CLAY. [LONDON CLAY FORMATION]										
				ES3	10.80-11.00					
				S	11.00-11.45	8.50		N=23 (2,4/4,5,7,7)		
				D33	11.00-11.45					
				B34	11.00-11.50					
				U35	12.50-12.95			22 blows		
				D36	12.95-13.00					
				S	14.00-14.45	8.50		N=26 (3,4/5,6,7,8)		
				D38	14.00-14.45					
				B39	14.00-14.50					
				U40	15.50-15.95			28 blows		
				D41	15.95-16.00					
				S	17.00-17.45	8.50		N=28 (2,4/5,7,8,8)		
				D43	17.00-17.45					
				B44	17.00-17.50					
				W61	17.00					
Firm to stiff high strength brown/grey slightly sandy CLAY with rare lenses of white sand. [LONDON CLAY FORMATION]		17.40	-5.77							
				U45	18.50-18.95			25 blows		
				D46	18.95-19.00					
Borehole continued...										

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	3.00	0.00			
200	7.50	7.50			
150	26.10	8.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/12/11	3.50	10	3.45	3.00	
05/12/11	3.50	20	3.35	3.00	
08/12/11	19.10	20	19.10	8.50	
08/12/11	23.10	10	22.90	8.50	

Dates: 05/12/2011-09/12/2011
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: AMEC (E&I) UK LIMITED
Checked By: P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 7.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

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Borehole Record

BH203

Sheet 3 of 3

Project: Phase 2 - Edmonton Ecopark

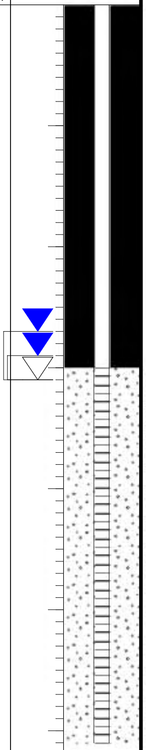
Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 11.630mAOD
Coordinates: 535866.22E
192635.63N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Firm to stiff high strength brown/grey slightly sandy CLAY with rare lenses of white sand. [LONDON CLAY FORMATION]				S	20.00-20.45	8.50		N=28 (3,4/5,7,8,8)		
				D48	20.00-20.45					
				B49	20.00-20.50					
				U50	21.50-21.95			52 blows		
				D51	21.95-22.00					
				S	23.00-23.47	8.50		50 (4,8/11,17,22)		
Stiff dark grey/brown sandy CLAY with shell fragments. [LAMBETH GROUP]		23.10	-11.47	D53	23.00-23.47					
				B54	23.00-23.50					
				S	24.50-24.80	8.50	(17.00)	50 (6,8/17,33 for 70mm)		
				D56	24.50-24.80					
				B57	24.50-25.00					
Very stiff dark grey/green sandy, gravelly CLAY. Gravel is sub-rounded, fine to medium black pebbles. Becoming hard below 26.00m. [LAMBETH GROUP]		25.60	-13.97	B58	25.60-26.10					
				S	26.10-26.55	8.50	(14.30)	N=47 (5,8/9,11,12,15)		
				D60	26.10-26.55					
Borehole Complete at 26.55 m		26.55	-14.92							



Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	3.00	0.00			
200	7.50	7.50			
150	26.10	8.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/12/11	3.50	10	3.45	3.00	
05/12/11	3.50	20	3.35	3.00	
08/12/11	19.10	20	19.10	8.50	
08/12/11	23.10	10	22.90	8.50	

Dates:	05/12/2011-09/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 20.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 7.50mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Trip Hammer ID=MG1

GROUND TECHNOLOGY
Maple Road, Kings Lynn
Norfolk, PE34 3AF
Tel: 01553 817657
www.groundtechnology.co.uk

Borehole Record

BH204

Sheet 1 of 2

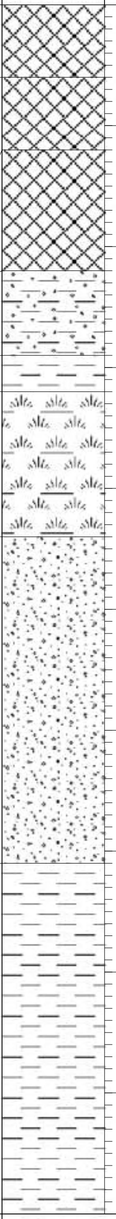
Project: Phase 2 - Edmonton Ecopark

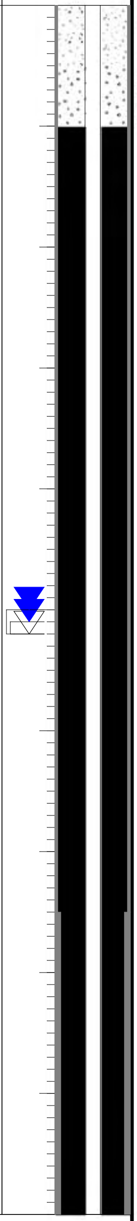
Project ID: GTS-11-055

Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 12.110mAOD
Coordinates: 535775.06E
192398.46N





Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Soft brown sandy gravelly CLAY with rootlets. Gravel is sub-angular to sub-rounded fine to coarse of brick, concrete and mixed lithologies			D1	0.10-0.20				
			B2	0.10-0.40				
MADE GROUND: Brown slightly clayey gravelly SAND with occasional part bricks. Gravel is sub-angular to sub-rounded fine to medium of brick, concrete, flint and mixed lithologies with rare ceramics.	0.60	11.51	ES1	0.60-0.70				
			D3	0.60-0.70				
			B4	0.60-1.00				
MADE GROUND: Firm dark brown/black slightly sandy gravelly CLAY with some rootlets. Gravel is angular to sub-rounded fine to coarse of brick, concrete, mixed lithologies and some clinker and tarmac.	1.20	10.91	S	1.20-1.65	0.00		N=9 (2,2/2,3,2,2)	
			D5	1.20-1.65				
			B6	1.20-1.65				
			U7	2.00-2.45			21 blows	
Firm grey CLAY with occasional sub-angular, fine gravel of chalk. [POSSIBLE MADE GROUND]	2.20	9.91	B9	2.20-2.90				
			D8	2.45-2.60				
Soft to firm grey CLAY. [ALLUVIUM]	2.90	9.21	B10	2.90-3.20				
			S	3.00-3.45	3.00		N=3 (1,-/1,-,1,1)	
			D11	3.00-3.45				
Soft, brown fibrous PEAT. [ALLUVIUM]	3.20	8.91	B12	3.20-3.60				
			U13	4.00-4.45			44 blows	
Medium dense grey slightly silty very sandy GRAVEL. Gravel is angular to sub-rounded fine to coarse flint with occasional cobbles. Becoming brown below 5.20m. [KEMPTON PARK GRAVEL]	4.40	7.71	B15	4.40-5.00				
			D14	4.45-4.60				
			S	5.00-5.45	5.00		N=16 (3,3/4,4,4,4)	
			B16	5.20-6.00				
			S	6.00-6.45	6.00	(5.90)	N=27 (3,4/5,6,7,9)	
			B17	6.00-6.45				
Firm high strength grey CLAY. [LONDON CLAY FORMATION]	7.10	5.01	S	7.00-7.45	7.00	(6.50)	N=10 (2,1/2,2,3,3)	
			W33	7.00				
			U18	8.00-8.45			42 blows	
			D19	8.45-8.60				
			S	9.00-9.45	8.50	(7.00)	N=18 (3,2/4,4,5,5)	
			ES2	9.00-9.50				
			D20	9.00-9.45				
			B21	9.00-9.45				
Borehole continued...								

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.50	0.00			
200	7.00	7.50			
150	14.50	14.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
06/12/11	5.20	10	5.10	5.00	
06/12/11	5.20	20	5.00	5.00	
08/12/11	11.50	10	10.90	9.00	14.50
08/12/11	11.50	20	10.00	9.00	14.50

Dates:	05/12/2011-08/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 14.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 7.00mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Rrip Hammer ID=MG2

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Borehole Record

Sheet 2 of 2

BH204

Project: Phase 2 - Edmonton Ecopark

Project ID: GTS-11-055

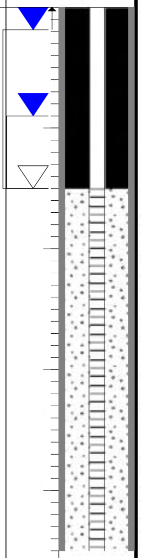
Client : AMEC (E&I) UK LIMITED

Engineer : N/A

Ground Level: 12.110mAOD
Coordinates: 535775.06E
192398.46N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Firm high strength grey CLAY. [LONDON CLAY FORMATION]			U22 D23	10.00-10.45 10.45-10.60			36 blows	
Firm grey CLAY with occasional shells. [LAMBETH GROUP]	11.30 11.50	0.81 0.61	B24 S D25 B26	11.30-11.50 11.50-11.95 11.50-11.95 11.50-11.95	9.00	(11.20)	N=49 (4,8/10,15,11,13)	
Firm grey/green sandy SILT. [LAMBETH GROUP]			ES3	11.50-12.00				
Very dense grey silty SAND with occasional shells. [LAMBETH GROUP]	12.80	-0.69	D27 S D28	12.80-12.90 13.00-13.45 13.00-13.45	9.00	(10.00)	N=41 (7,15/12,10,9,10)	
Firm grey silty CLAY with occasional black, rounded pebbles. [LAMBETH GROUP]	13.40 13.60	-1.29 -1.49	B29 D30	13.40-13.60 13.60-13.80				
Firm to stiff grey/brown mottled, slightly sandy CLAY. [LAMBETH GROUP]	14.00	-1.89	D31	14.00-14.10				
Stiff grey/blue occasionally laminated CLAY with some black organic staining. [LAMBETH GROUP]	14.50	-2.39	S D32	14.50-14.95 14.50-14.95	14.50		N=41 (7,7/7,10,11,13)	
Stiff grey/red/brown, silty, sandy CLAY. [LAMBETH GROUP]	14.95	-2.84						
Borehole Complete at 14.95 m								

Installations



Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.50	0.00
200	7.00	7.50
150	14.50	14.50

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
06/12/11	5.20	10	5.10	5.00	
06/12/11	5.20	20	5.00	5.00	
08/12/11	11.50	10	10.90	9.00	14.50
08/12/11	11.50	20	10.00	9.00	14.50

Dates:	05/12/2011-08/12/2011
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	AMEC (E&I) UK LIMITED
Checked By:	P. Lewin

Remarks:
1. Starter pit dug from GL to 1.20mbgl.
2. 63mm HDPE Standpipe installed to 14.50mbgl. Hole finished with gas tap and flush cover. Pipe installed with geosock.
3. Bentonite environmental seal placed at 2.50mbgl at reduction from 250mm to 200mm diameter drilling tools.
4. Bentonite grout seal added at 7.00mbgl at reduction of 200mm to 150mm diameter casing. Grout left to set for >24hrs.
5. Rrip Hammer ID=MG2

GTS-11-055

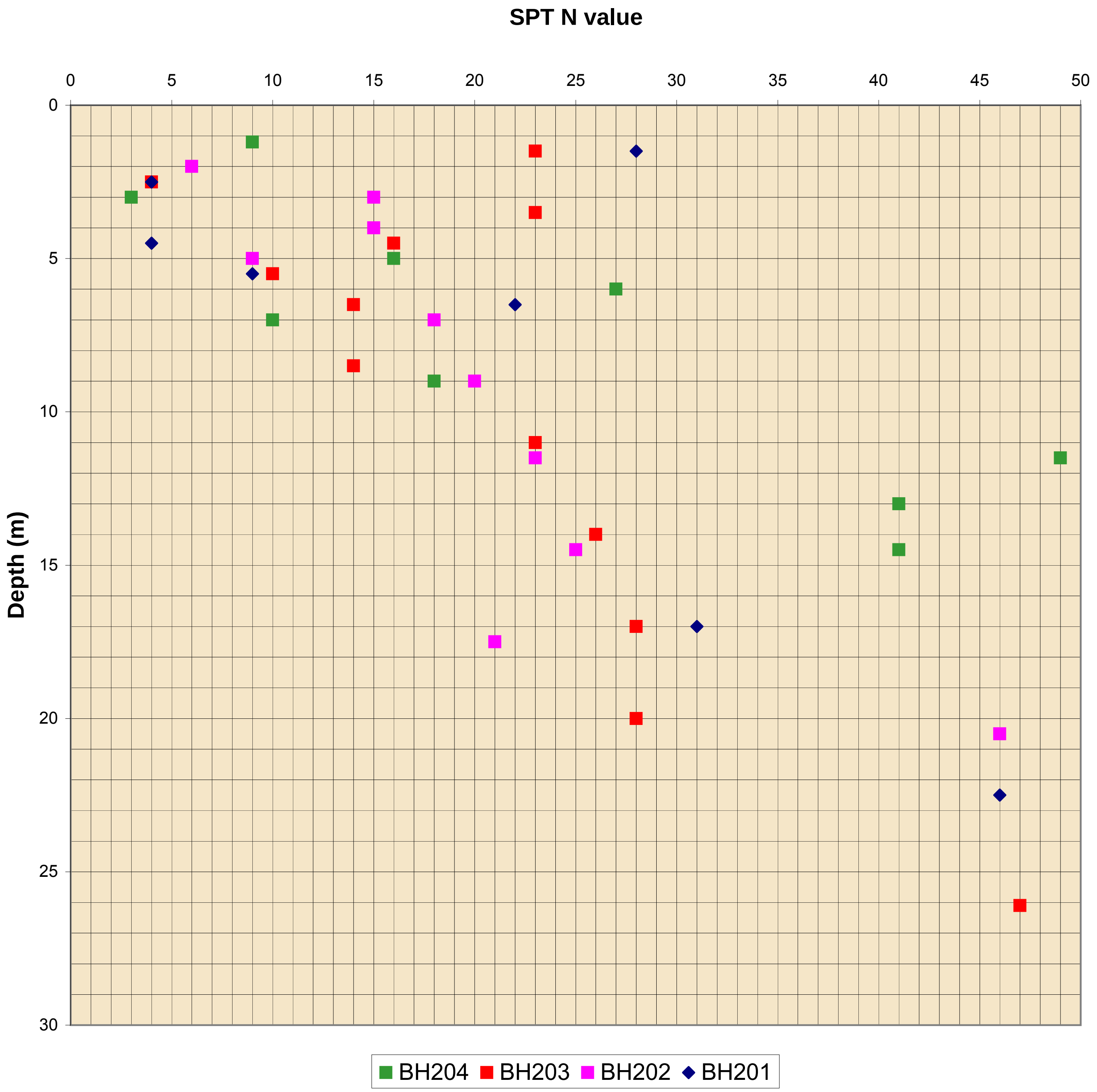
Phase 2

Edmonton Ecopark

Appendix B

In-situ Test Result

Ground Technology Services



Title:	**SPT V's Depth**		
Project:	Phase 2 - Edmonton Ecopark	Project ID.	GTS-11-055
Client:	AMEC (E&I) UK LIMITED	Date Drawn	21/01/2012

GTS-11-055

Phase 2

Edmonton Ecopark

Appendix C

Installation

Ground Technology Services

Summary of Instrumentation

Site:	Phase 2 - Edmonton Ecopark	Job No:	GTS-11-055
Client	AMEC Environment and Infrastructure UK Limited		
Engineer	n/a		

Hole ID	Installation Type*	Monitoring Point ID	Top of Responze Zone (mbgl)	Bottom of Response Zone (mbgl)	Pipe Diameter (mm)	Ground Level (mAOD)	Top of Response Zone (mAOD)	Bottom of Response Zone (mAOD)	Response Zone Geology
BH201	SP	-	19.50	22.50	63	11.56	-7.94	-10.94	LMBE
BH203	SP	-	23.00	26.10	63	11.63	-11.37	-14.47	LMBE
BH202	SP	-	17.50	20.50	63	11.3	-6.2	-9.2	LMBE
BH204	SP	-	23.00	26.10	63	12.11	-10.89	-13.99	LMBE

*SP=Standpipe, SPIE=Standpipe Piezometer

GTS-11-055

Phase 2
Edmonton Ecopark

Appendix D
Geotechnical Laboratory Results

Ground Technology Services

PROJECT NAME **EDMONTON ECOPARK**
Project Number: 29541
PROJECT NO: **GEO / 17722**

Date	12/01/2012
Approved	J Sturges
Page	1 of 3

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH201	1.50	9	B	Brown slightly silty sandy GRAVEL																Particle Size Distribution Test
BH201	3.50	12	U	Firm dark brown and black slightly organic CLAY	43					1.70	1.19	35 70 140	59 65 78	34	24	5				Oedometer Consolidation Test
BH201	4.50	15	B	Grey sandy GRAVEL																Particle Size Distribution Test
BH201	6.50	18	B	Grey and brown GRAVEL																Particle Size Distribution Test
BH201	2.50	10	D	Brown, blue-grey and rare black slightly organic slightly sandy CLAY	50	95	38	57	99											
BH201	7.50	19	U	Stiff fissured grey silty CLAY with rare coarse sand and fine to medium gravel	31					2.00	1.52	75	209	105						Sample failed on 1st stage of multistage test
BH201	18.50	38	U	Stiff dark brown silty CLAY																Triaxial Permeability Test
BH201	18.95	39	D	Dark brown silty CLAY	26	71	28	43	100											
BH201	20.00	42	D	Brown silty CLAY	24	47	27	20	100											
BH201	21.50	45	U	Firm Multi coloured silty CLAY with occasional fine to medium flint gravel	27					1.98	1.57	200 400 800	98 101 133	55	40	1.5				
BH202	2.00	7	B	Dark grey sandy silty organic CLAY																Particle Size Distribution Test
BH202	5.90	14	U	Firm dark brown CLAY	33					1.98	1.49	60 120	126 127	63	63	0				Oedometer Consolidation Test. Sample failed on 2nd stage of multistage test

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

PROJECT NAME	**EDMONTON ECOPARK** **Project Number: 29541**	Date	12/01/2012
		Approved	J Sturges
PROJECT NO:	**GEO / 17722**	Page	2 of 3

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH202	8.00	18	U	Firm fissured dark grey silty CLAY	33					1.92	1.45	75 150 300	132 134 135	67	65	0.5				
BH202	10.00	22	U	Firm to stiff fissured dark grey silty CLAY	30					1.99	1.53	100	166	78						Sample failed on 1st stage of multistage test
BH202	13.00	26	U	Stiff fissured dark brown CLAY																Triaxial Permeability Test
BH202	13.45	27	D	Dark grey-brown silty CLAY	29	77	31	46	100											
BH202	16.00	30	U	Stiff dark grey silty CLAY with rare fine to medium sand lenses	28					1.94	1.52	150 300 600	253 262 269	131	122	1				
BH202	16.45	31	D	Dark grey-brown slightly fine sandy silty CLAY	25	58	24	34	100											
BH203	2.50	17	B	Very dark grey sandy silty organic CLAY																Particle Size Distribution Test
BH203	3.50	19	B	Grey brown sandy silty CLAY																Particle Size Distribution Test
BH203	7.50	25	U	Firm fissured grey silty CLAY	33					1.96	1.48	75 150 300	126 133 138	66	60	1.5				
BH203	7.95	26	D	Dark brown silty CLAY	32	76	30	46	100											
BH203	9.50	30	U	Firm to stiff dark grey CLAY	33					1.91	1.43	100 200 400	186 193 198	96	90	1				
BH203	9.95	31	D	Dark brown silty CLAY	33	83	31	52	100											

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) [X] J Sturges (Ops Mgr) ☐ Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir)

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

PROJECT NAME	**EDMONTON ECOPARK** **Project Number: 29541**
PROJECT NO:	**GEO / 17722**

Date	12/01/2012
Approved	J Sturges
Page	3 of 3

Sample details					Classification Tests					Density Tests		Undrained Triaxial Compression Tests					Chemical Tests			
Borehole No.	Depth (m)	No.	Type	Description	MC (%)	LL (%)	PL (%)	PI	<425 mic (%)	Bulk (Mg/m³)	Dry (Mg/m³)	Cell Pressure (kPa)	Deviator Stress (kPa)	Mean Shear Stress (kPa)	Apparent Cohesion (kPa)	Angle of Shearing Resistance (°)	pH	2:1 W/S SO4 (g/l)	Ground Water SO4 (g/l)	Other tests and comments
BH203	12.50	35	U	Stiff grey silty CLAY																Triaxial Permeability Test
BH203	12.95	36	D	Dark brown silty CLAY	28	76	29	47	100											
BH203	18.50	45	U	Stiff dark grey silty CLAY	29					1.95	1.51	200 400 800	231 236 241	118	113	0.5				
BH204	2.00	7	U	Firm dark grey silty CLAY with rare fine gravel	31					2.05	1.57	20 40 80	121 131 142	66	50	8				Oedometer Consolidation Test
BH204	4.40	15	B	Dark grey silty sandy GRAVEL																
BH204	5.20	16	B	Grey and brown sandy GRAVEL																
BH204	8.00	18	U	Stiff fissured grey silty CLAY	28					2.03	1.59	75 150 300	220 222 224	111	108	0.5				
BH204	8.45	19	D	Dark grey-brown silty CLAY	27	70	26	44	100											
BH204	10.00	22	U	Stiff dark grey CLAY	26					2.02	1.60	100 200	155 160	79	73	1.5				Triaxial Permeability Test. Sample failed on 2nd stage of multistage test
BH204	10.45	23	D	Dark grey-brown silty CLAY	26	69	27	42	100											
BH204	13.00	28	D	Brown clayey fine SAND with occasional fine to medium flint gravel	21	NP	NP	NP	87											Sample Non - Plastic

SUMMARY OF GEOTECHNICAL TESTING

GEOLABS®

Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) [X] J Sturges (Ops Mgr) ☐ Simon Burke (Snr Tech) ☐ J J M Powell (Tech Dir)

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

BS1377 : Part 7 : Clause 9 : 1990

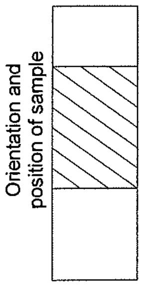
Quick Undrained Triaxial Test

Borehole Number: BH201
Sample Number: 12
Depth (m): 3.50

Description:
Firm dark brown and black slightly organic CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.1		
Diameter (mm):	104.0		
Moisture Content (%):	43		
Bulk Density (Mg/m³):	1.70		
Dry Density (Mg/m³):	1.19		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.6	0.7	1.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	35	70	140
Strain at failure (%):	7.9	11.4	19.8
Maximum Deviator Stress (kPa):	59	65	78
Shear Stress Cu (kPa):	29	32	39



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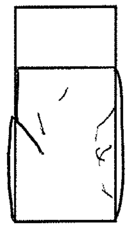
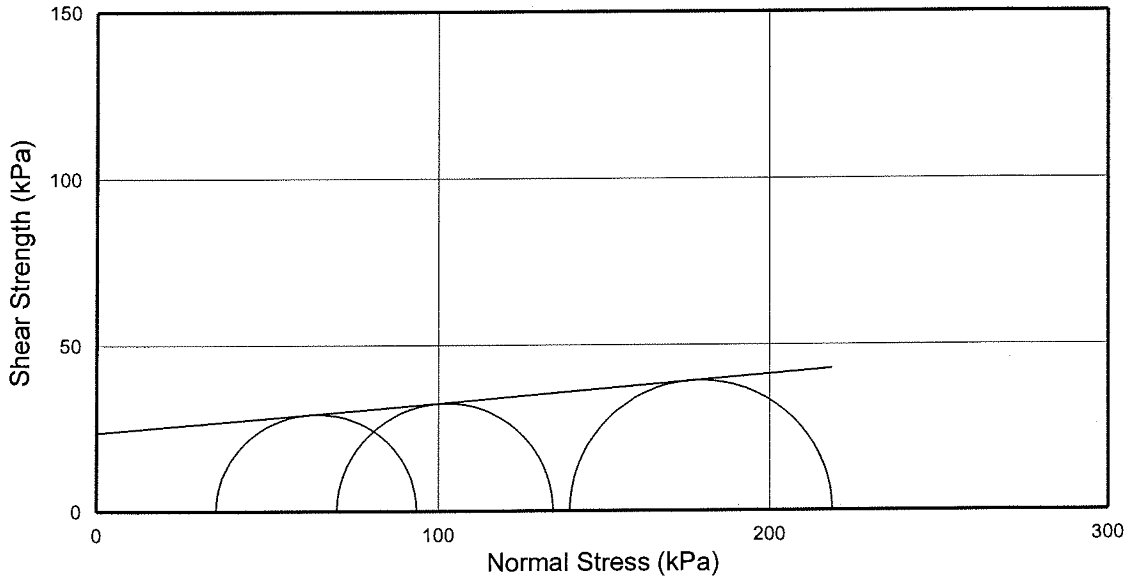




c = 24 kPa Ø = 5 °

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 8 : 1990

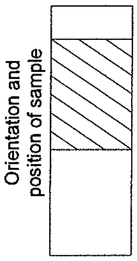
Quick Undrained Triaxial Test

Borehole Number: BH201
Sample Number: 19
Depth (m): 7.50

Description:
Stiff fissured grey silty CLAY with rare coarse sand and fine to medium gravel

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	201.9
Diameter (mm):	102.5
Moisture Content (%):	31
Bulk Density (Mg/m³):	2.00
Dry Density (Mg/m³):	1.52
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	0.7
Axial displacement rate (%/min):	2.0
Cell pressure (kPa):	75
Strain at failure (%):	9.9
Maximum Deviator Stress (kPa):	209
Shear Stress Cu (kPa):	105



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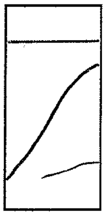


Sample failed on 1st stage of multistage test

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

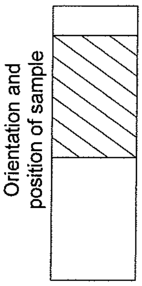
Quick Undrained Triaxial Test

Borehole Number: BH201
Sample Number: 45
Depth (m): 21.50

Description:
Firm Multi coloured silty CLAY with occasional fine to medium flint gravel

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.0		
Diameter (mm):	104.3		
Moisture Content (%):	27		
Bulk Density (Mg/m³):	1.98		
Dry Density (Mg/m³):	1.57		
Test details	**Stage 1**	**Stage 2**	**Stage 3**
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.2	0.3	0.8
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	200	400	800
Strain at failure (%):	2.5	3.2	12.9
Maximum Deviator Stress (kPa):	98	101	133
Shear Stress Cu (kPa):	49	51	66



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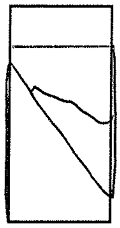
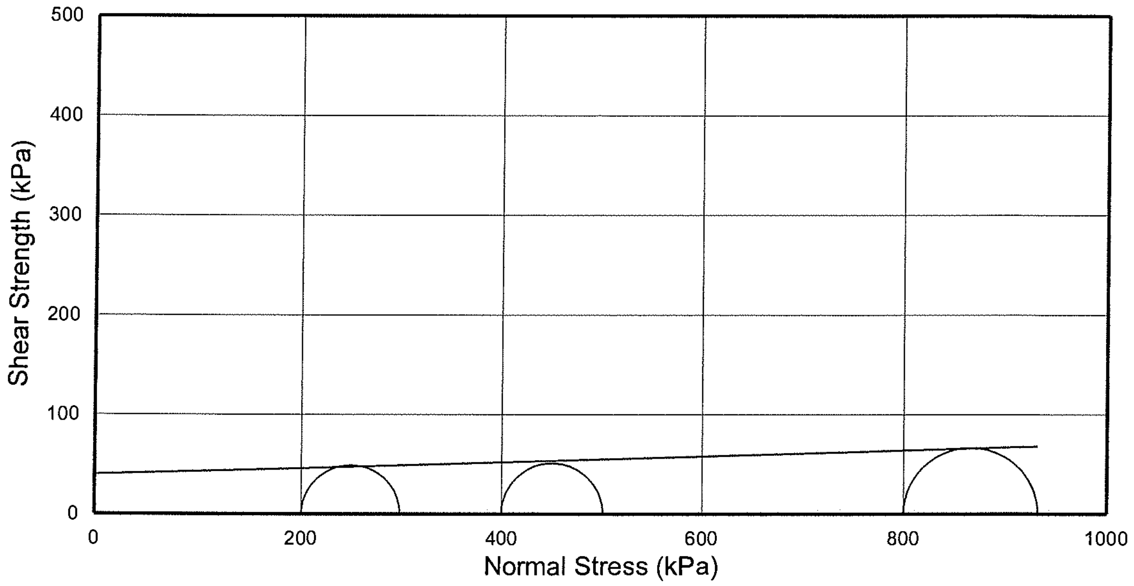




c = 40 kPa Ø = 1.5 °

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

UKAS TESTING 1982

GEOLABS ®

BS1377 : Part 7 : Clause 9 : 1990

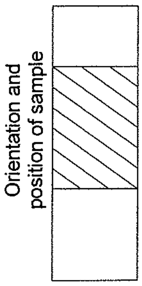
Quick Undrained Triaxial Test

Borehole Number: BH202
Sample Number: 14
Depth (m): 5.90

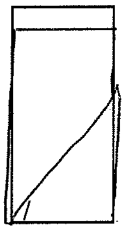
Description:
Firm dark brown CLAY

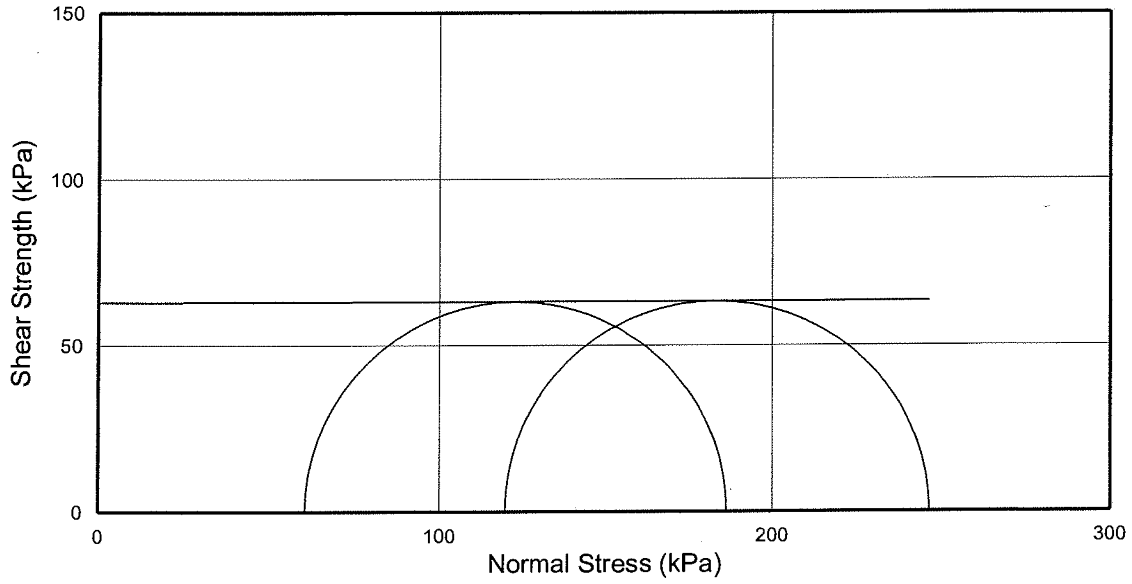
2 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.1		
Diameter (mm):	104.1		
Moisture Content (%):	33		
Bulk Density (Mg/m³):	1.98		
Dry Density (Mg/m³):	1.49		
Test details	Stage 1	Stage 2	
Latex membrane thickness (mm):	0.3	0.3	
Membrane correction (kPa):	0.3	0.4	
Axial displacement rate (%/min):	2.0	2.0	
Cell pressure (kPa):	60	120	
Strain at failure (%):	3.5	4.7	
Maximum Deviator Stress (kPa):	126	127	
Shear Stress Cu (kPa):	63	63	



Mode of failure:





c = 63 kPa Ø = 0 °

Sample failed on 2nd stage of multistage test

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

UKAS TESTING 1982

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BS1377 : Part 7 : Clause 9 : 1990

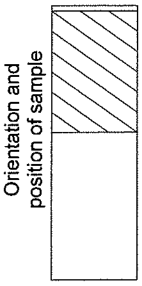
Quick Undrained Triaxial Test

Borehole Number: BH202
Sample Number: 18
Depth (m): 8.00

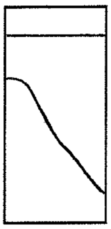
Description:
Firm fissured dark grey silty CLAY

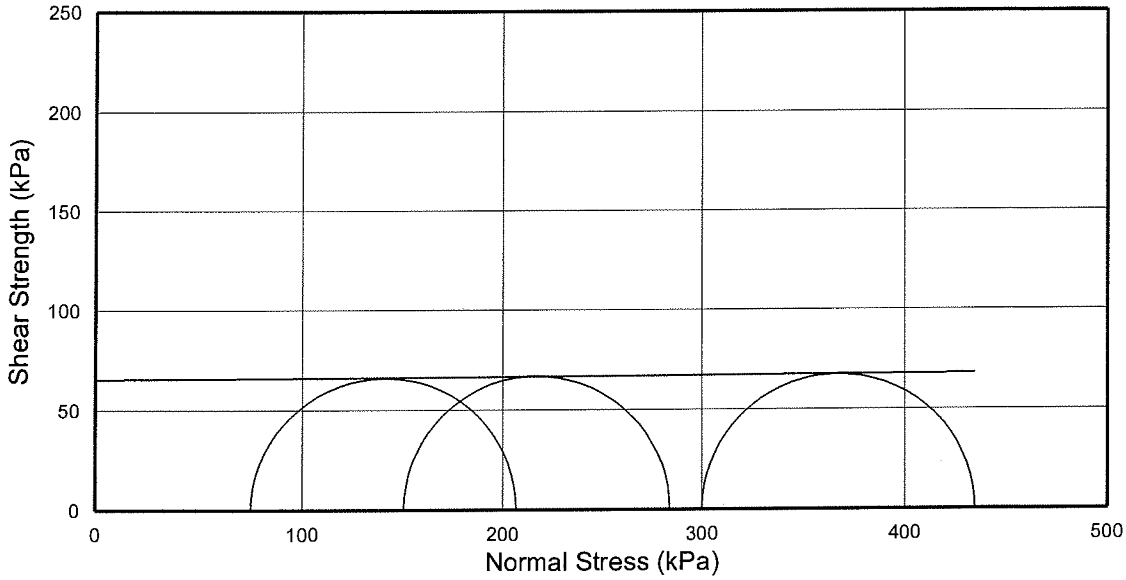
3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.9		
Diameter (mm):	104.9		
Moisture Content (%):	33		
Bulk Density (Mg/m³):	1.92		
Dry Density (Mg/m³):	1.45		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.3	0.4	0.5
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	4.2	5.4	6.7
Maximum Deviator Stress (kPa):	132	134	135
Shear Stress Cu (kPa):	66	67	67



Mode of failure:





c = 65 kPa Ø = 0.5 °

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722

Project Name:
EDMONTON ECOPARK

Project Number: 29541

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BS1377 : Part 7 : Clause 8 : 1990

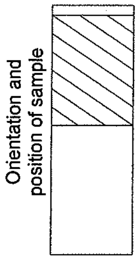
Quick Undrained Triaxial Test

Borehole Number: BH202
Sample Number: 22
Depth (m): 10.00

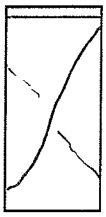
Description:
Firm to stiff fissured dark grey silty CLAY

Single Stage Specimen

Specimen details	Single Specimen
Specimen condition:	Undisturbed
Length (mm):	183.0
Diameter (mm):	104.0
Moisture Content (%):	30
Bulk Density (Mg/m³):	1.99
Dry Density (Mg/m³):	1.53
Test details	
Latex membrane thickness (mm):	0.3
Membrane correction (kPa):	0.2
Axial displacement rate (%/min):	2.2
Cell pressure (kPa):	100
Strain at failure (%):	2.7
Maximum Deviator Stress (kPa):	166
Shear Stress Cu (kPa):	83



Mode of failure:



Sample failed on 1st stage of multistage test

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

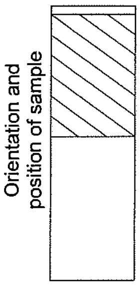
Quick Undrained Triaxial Test

Borehole Number:	BH202
Sample Number:	30
Depth (m):	16.00

Description:
Stiff dark grey silty CLAY with rare fine to medium sand lenses

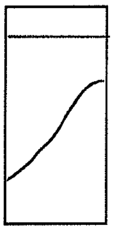
3 Stage Specimen

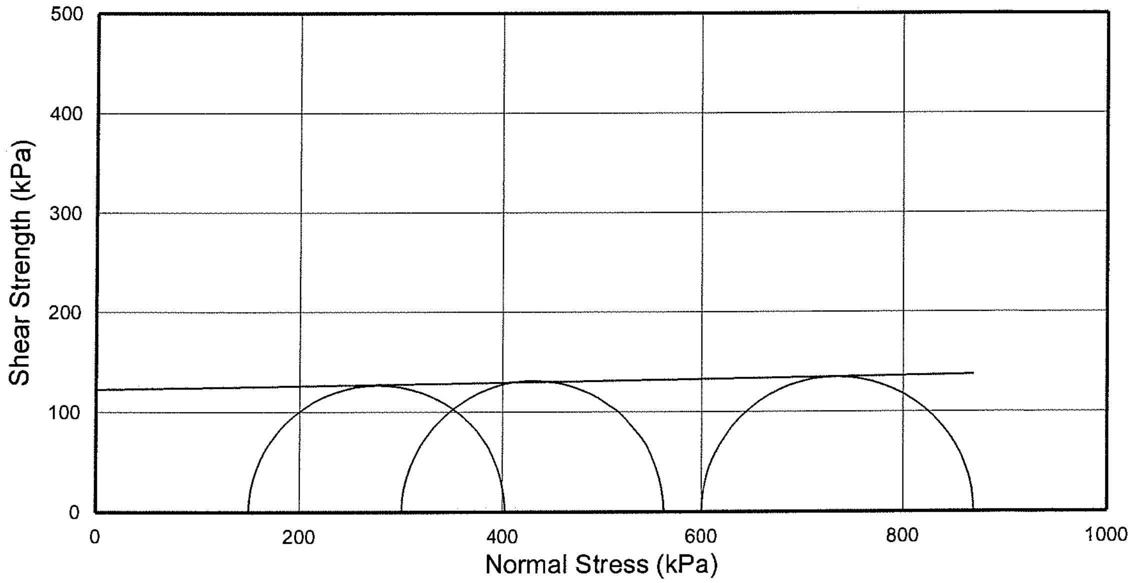
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	202.2
Diameter (mm):	105.3
Moisture Content (%):	28
Bulk Density (Mg/m³):	1.94
Dry Density (Mg/m³):	1.52



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.3	0.4	0.6
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	150	300	600
Strain at failure (%):	4.2	5.2	8.2
Maximum Deviator Stress (kPa):	253	262	269
Shear Stress Cu (kPa):	126	131	135

Mode of failure:





c = 122 kPa Ø = 1 °

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Initials: JS

Date: 12/01/2012

Project Number:

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Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

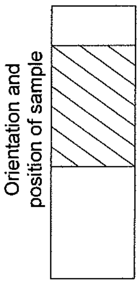
Quick Undrained Triaxial Test

Borehole Number:	BH203
Sample Number:	25
Depth (m):	7.50

Description:
Firm fissured grey silty CLAY

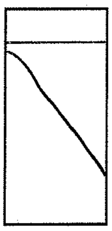
3 Stage Specimen

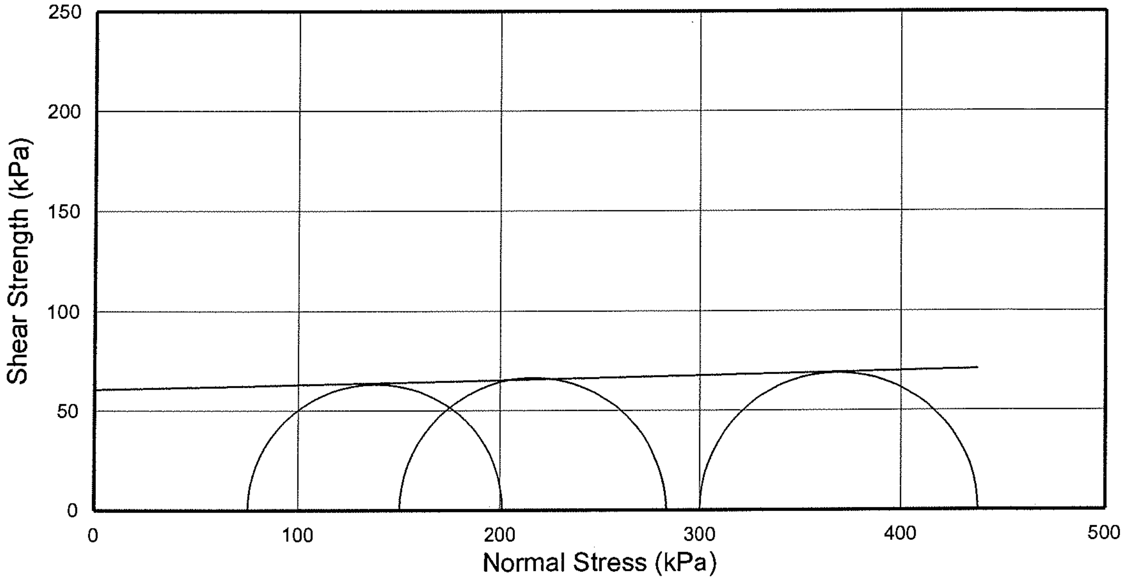
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	202.0
Diameter (mm):	103.5
Moisture Content (%):	33
Bulk Density (Mg/m³):	1.96
Dry Density (Mg/m³):	1.48



Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.3	0.4	0.6
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	4.0	5.9	9.2
Maximum Deviator Stress (kPa):	126	133	138
Shear Stress Cu (kPa):	63	66	69

Mode of failure:





c = 60 kPa   Ø = 1.5 °

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Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

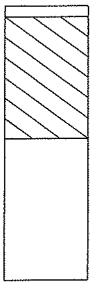
Quick Undrained Triaxial Test

Borehole Number: BH203
Sample Number: 30
Depth (m): 9.50

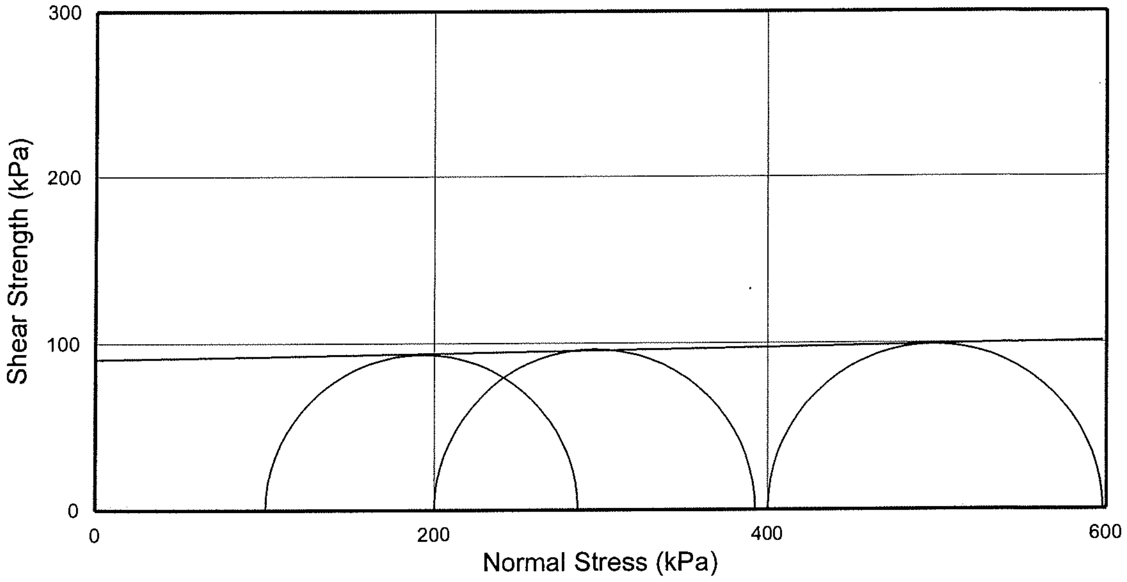
Description:
Firm to stiff dark grey CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.9		
Diameter (mm):	104.3		
Moisture Content (%):	33		
Bulk Density (Mg/m³):	1.91		
Dry Density (Mg/m³):	1.43		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.3	0.4	0.5
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	100	200	400
Strain at failure (%):	3.7	4.9	7.1
Maximum Deviator Stress (kPa):	186	193	198
Shear Stress Cu (kPa):	93	96	99



Mode of failure:



c = 90 kPa Ø = 1 °

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Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

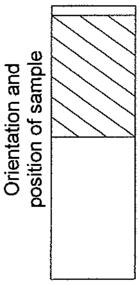
Quick Undrained Triaxial Test

Borehole Number: BH203
Sample Number: 45
Depth (m): 18.50

Description:
Stiff dark grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	202.8		
Diameter (mm):	103.1		
Moisture Content (%):	29		
Bulk Density (Mg/m³):	1.95		
Dry Density (Mg/m³):	1.51		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.5	0.5	0.6
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	200	400	800
Strain at failure (%):	6.2	7.1	8.4
Maximum Deviator Stress (kPa):	231	236	241
Shear Stress Cu (kPa):	116	118	120



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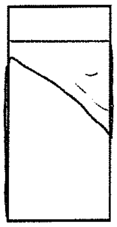

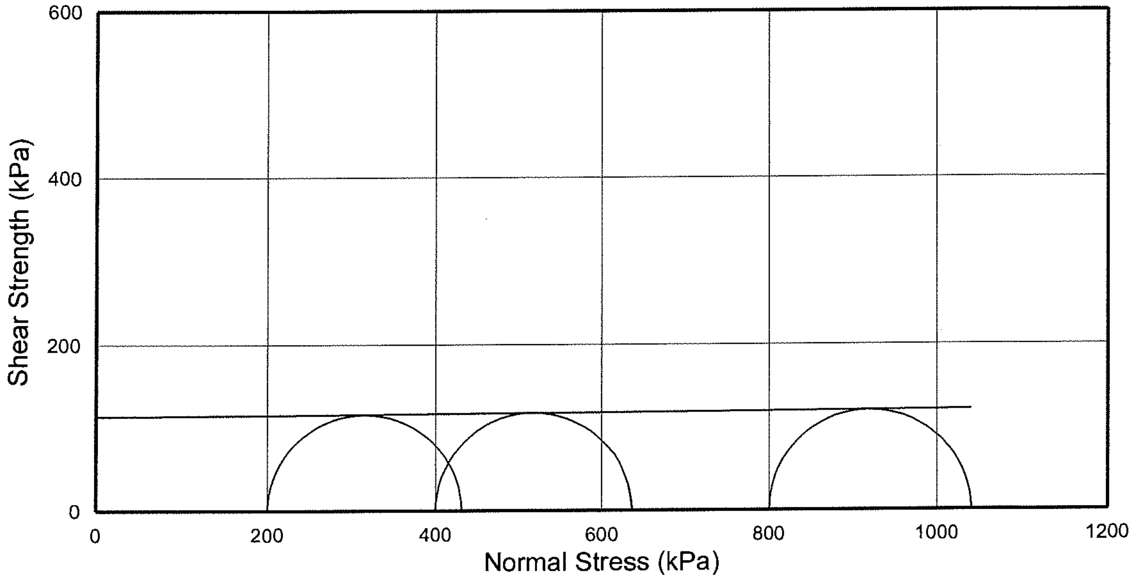

c = 113 kPa   Ø = 0.5 °

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Initials: JS
Date: 12/01/2012

Project Number:
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Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

Quick Undrained Triaxial Test

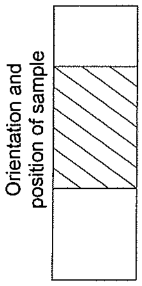
Borehole Number: BH204
Sample Number: 7
Depth (m): 2.00

Description:
Firm dark grey silty CLAY with rare fine gravel

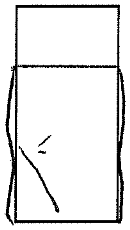
3 Stage Specimen

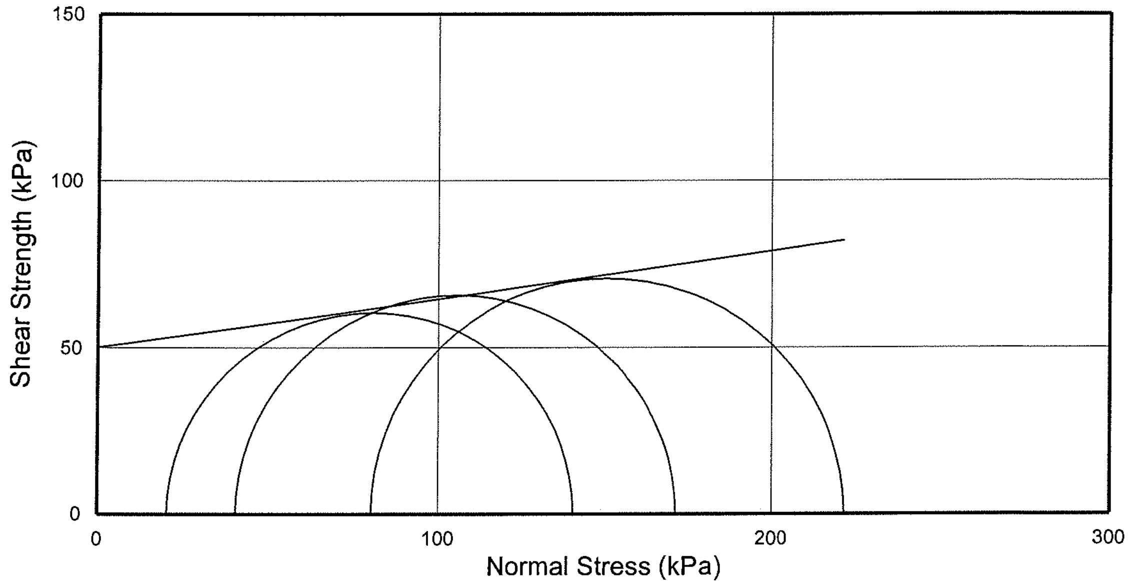
Specimen details	Single Specimen
Specimen conditions:	Undisturbed
Length (mm):	202.5
Diameter (mm):	102.1
Moisture Content (%):	31
Bulk Density (Mg/m³):	2.05
Dry Density (Mg/m³):	1.57

Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.0	0.8	1.1
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	20	40	80
Strain at failure (%):	0.5	13.3	19.3
Maximum Deviator Stress (kPa):	121	131	142
Shear Stress Cu (kPa):	60	66	71



Mode of failure:





c = 50 kPa Ø = 8 °

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Initials:
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Date: 12/01/2012

Project Number:
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Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

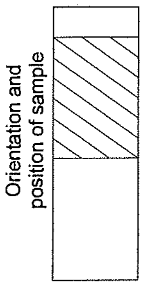
Quick Undrained Triaxial Test

Borehole Number: BH204
Sample Number: 18
Depth (m): 8.00

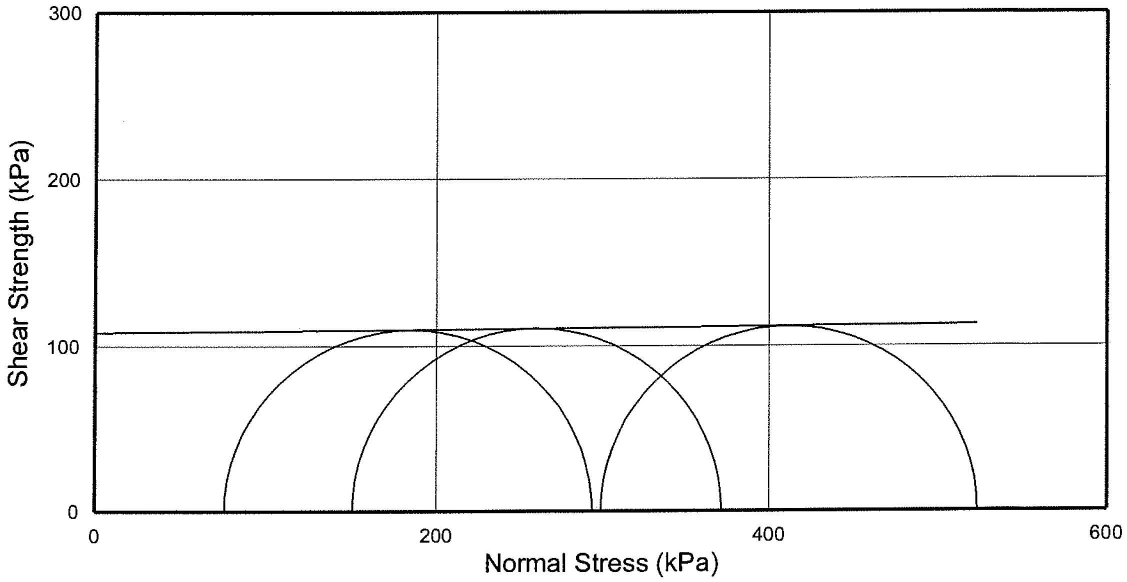
Description:
Stiff fissured grey silty CLAY

3 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	201.6		
Diameter (mm):	103.9		
Moisture Content (%):	28		
Bulk Density (Mg/m³):	2.03		
Dry Density (Mg/m³):	1.59		
Test details	Stage 1	Stage 2	Stage 3
Latex membrane thickness (mm):	0.3	0.3	0.3
Membrane correction (kPa):	0.6	0.6	0.7
Axial displacement rate (%/min):	2.0	2.0	2.0
Cell pressure (kPa):	75	150	300
Strain at failure (%):	7.9	8.9	10.3
Maximum Deviator Stress (kPa):	220	222	224
Shear Stress Cu (kPa):	110	111	112



Mode of failure:



c = 108 kPa Ø = 0.5 °

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 7 : Clause 9 : 1990

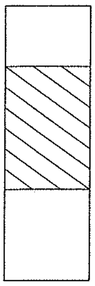
Quick Undrained Triaxial Test

Borehole Number:	BH204
Sample Number:	22
Depth (m):	10.00

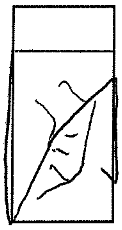
Description:
Stiff dark grey CLAY

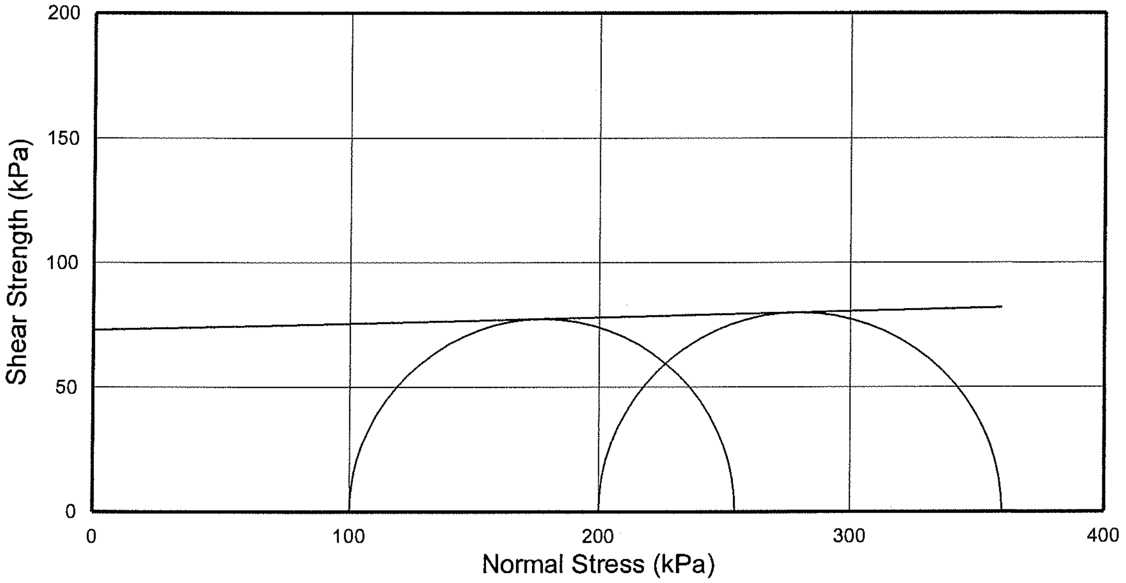
2 Stage Specimen

Specimen details	Single Specimen		
Specimen conditions:	Undisturbed		
Length (mm):	169.8		
Diameter (mm):	104.0		
Moisture Content (%):	26		
Bulk Density (Mg/m³):	2.02		
Dry Density (Mg/m³):	1.60		
Test details	Stage 1	Stage 2	
Latex membrane thickness (mm):	0.3	0.3	
Membrane correction (kPa):	0.7	0.9	
Axial displacement rate (%/min):	2.4	2.4	
Cell pressure (kPa):	100	200	
Strain at failure (%):	10.6	15.3	
Maximum Deviator Stress (kPa):	155	160	
Shear Stress Cu (kPa):	77	80	



Mode of failure:





c = 73 kPa Ø = 1.5 °

Sample failed on 2nd stage of multistage test

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
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Project Number: 29541

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BS1377 : Part 2 : Clause 9 : 1990

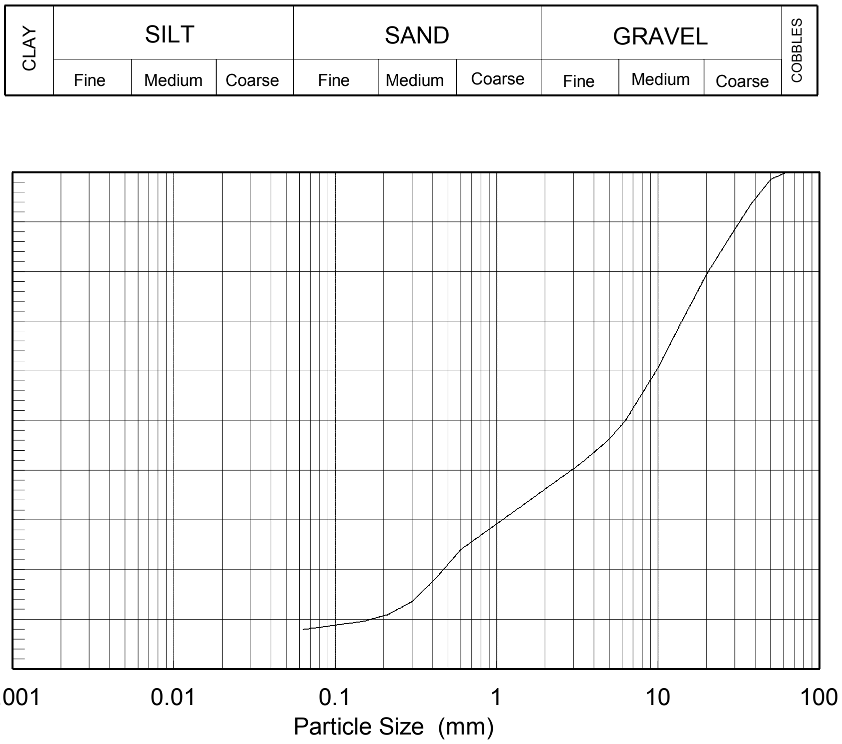
Determination of Particle Size Distribution

Borehole Number: BH201
Sample Number: 9
Depth (m): 1.50

Description:
Brown slightly silty sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	99
37.5 mm	94
28 mm	87
20 mm	79
14 mm	70
10 mm	61
6.3 mm	50
5 mm	46
3.35 mm	41
2 mm	36
1.18 mm	31
600 µm	24
425 µm	18
300 µm	14
212 µm	11
150 µm	10
63 µm	8



Particle Proportions		
Cobbles	0.0	%
Gravel	63.8	%
Sand	28.3	%
Silt & Clay	7.9	%

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722

Project Name:
EDMONTON ECOPARK

Project Number: 29541

UKAS TESTING 1982

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) [x] J Sturges (Ops Mgr) ☐ P Heritage (Ops Mgr) ☐ S Burke (Snr Tech) ☐ J J M Powell (Tech Dir)

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

BS1377 : Part 2 : Clause 9 : 1990

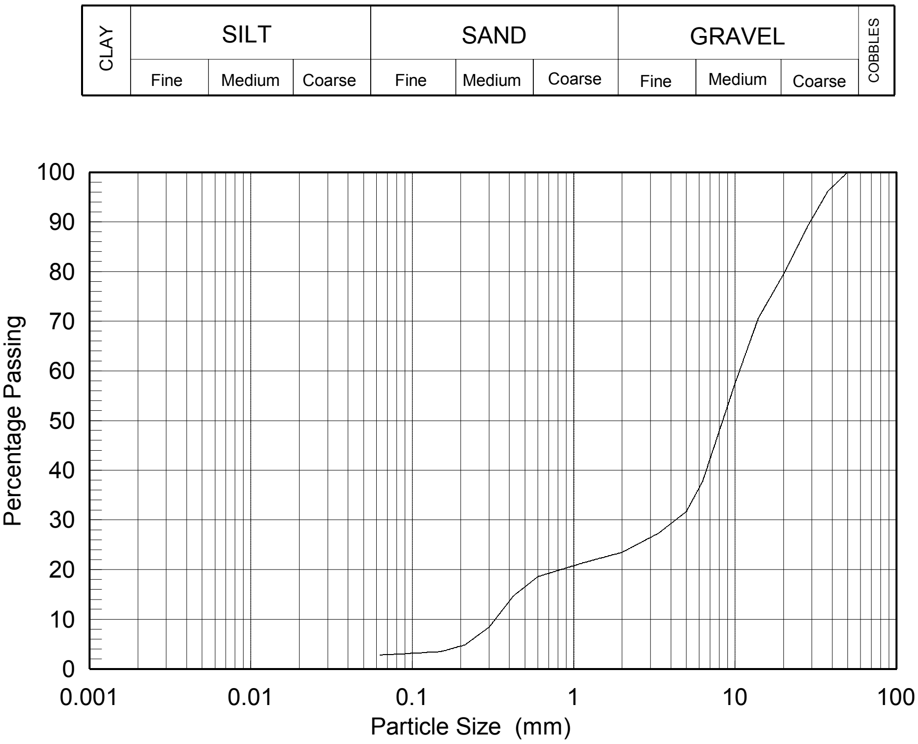
Determination of Particle Size Distribution

Borehole Number: BH201
Sample Number: 15
Depth (m): 4.50

Description:
Grey sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	96
28 mm	89
20 mm	80
14 mm	71
10 mm	58
6.3 mm	38
5 mm	32
3.35 mm	27
2 mm	24
1.18 mm	21
600 µm	19
425 µm	15
300 µm	8
212 µm	5
150 µm	3
63 µm	3



Particle Proportions		
Cobbles	0.0	%
Gravel	76.5	%
Sand	20.7	%
Silt & Clay	2.8	%

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
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Project Name:
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Project Number: 29541

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BS1377 : Part 2 : Clause 9 : 1990

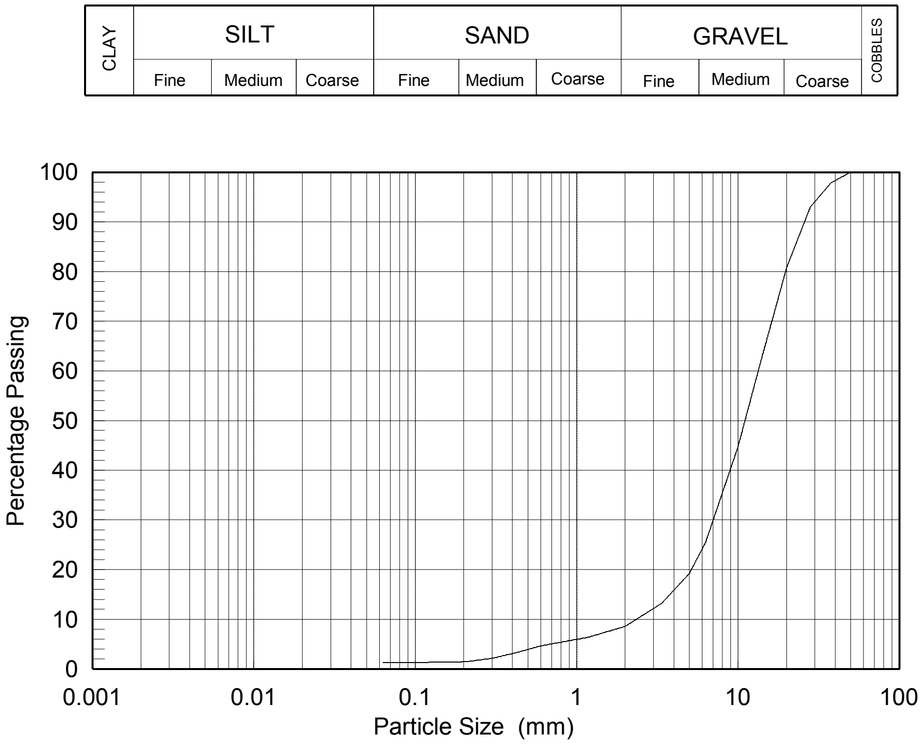
Determination of Particle Size Distribution

Borehole Number: BH201
Sample Number: 18
Depth (m): 6.50

Description:
Grey and brown GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	98
28 mm	93
20 mm	81
14 mm	62
10 mm	45
6.3 mm	26
5 mm	19
3.35 mm	13
2 mm	9
1.18 mm	6
600 µm	5
425 µm	3
300 µm	2
212 µm	2
150 µm	1
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	91.5	%
Sand	7.3	%
Silt & Clay	1.2	%

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
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Project Name:
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Project Number: 29541

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BS1377 : Part 2 : Clause 9 : 1990

Determination of Particle Size Distribution

Borehole Number:	BH202
Sample Number:	7
Depth (m):	2.00

Description:
Dark grey sandy silty organic CLAY

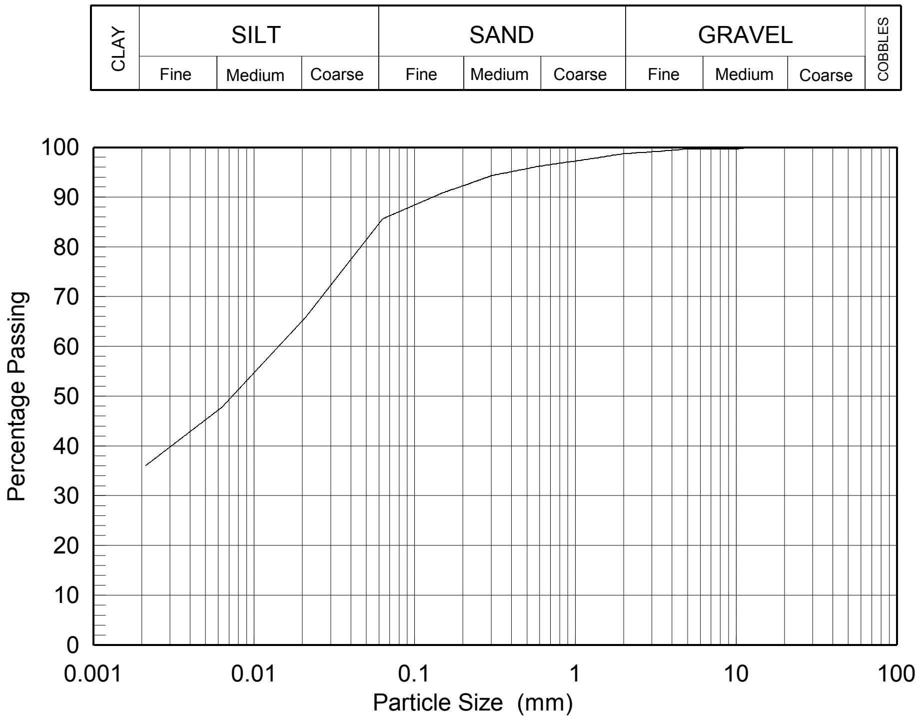
BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	100
5 mm	100
3.35 mm	99
2 mm	99
1.18 mm	98
600 µm	96
425 µm	95
300 µm	94
212 µm	93
150 µm	91
63 µm	86

PIPETTE	
Particle size	% pass
21.1 µm	66
6.3 µm	48
2.1 µm	36

Preparation:
No Pre-treatment used

Temp (°C)	20



Particle Proportions		
Cobbles	0.0	%
Gravel	1.3	%
Sand	13.1	%
Silt	49.6	%
Clay	36.0	%

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX © GEOLABS LIMITED (Ref4920.633900) Page 1 of 1

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) [x] J Sturges (Ops Mgr) ☐ P Heritage (Ops Mgr) ☐ S Burke (Snr Tech) ☐ J J M Powell (Tech Dir) GEOLABS®

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

BS1377 : Part 2 : Clause 9 : 1990

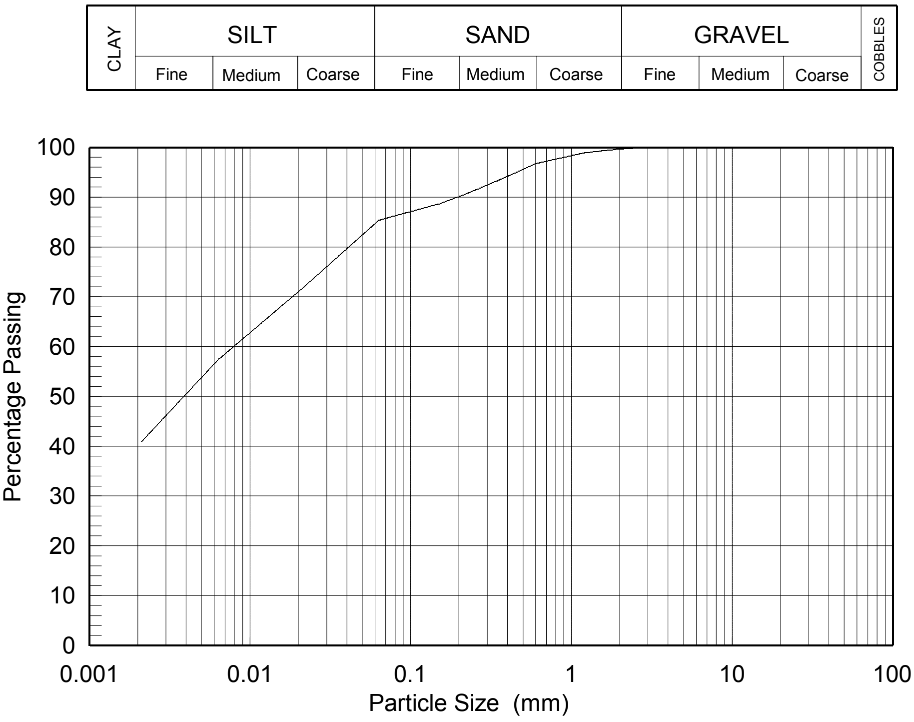
Determination of Particle Size Distribution

Borehole Number:	BH203
Sample Number:	17
Depth (m):	2.50

Description:
Very dark grey sandy silty organic CLAY

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	100
6.3 mm	100
5 mm	100
3.35 mm	100
2 mm	100
1.18 mm	99
600 µm	97
425 µm	95
300 µm	92
212 µm	90
150 µm	89
63 µm	85



Particle Proportions		
Cobbles	0.0	%
Gravel	0.3	%
Sand	14.3	%
Silt	44.5	%
Clay	40.9	%

PIPETTE	
Particle size	% pass
21.1 µm	72
6.3 µm	57
2.1 µm	41

Preparation:
No Pre-treatment used

Temp (°C)	20

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

UKAS TESTING 1982

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Test Report by GEOLABS Limited Bucknalls Lane, Garston, Watford, Hertfordshire, WD25 9XX

Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) [x] J Sturges (Ops Mgr) ☐ P Heritage (Ops Mgr) ☐ S Burke (Snr Tech) ☐ J J M Powell (Tech Dir)

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

BS1377 : Part 2 : Clause 9 : 1990

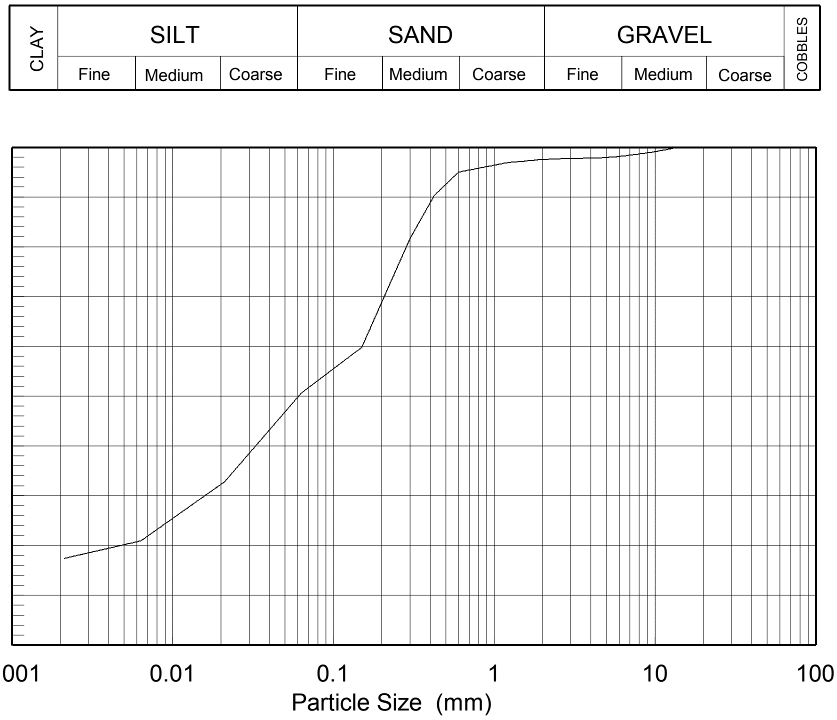
Determination of Particle Size Distribution

Borehole Number:	BH203
Sample Number:	19
Depth (m):	3.50

Description:
Grey brown sandy silty CLAY

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method
BS1377 : Part 2 : Clause 9.4 : 1990 Sedimentation by the Pipette Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	100
28 mm	100
20 mm	100
14 mm	100
10 mm	99
6.3 mm	98
5 mm	98
3.35 mm	98
2 mm	98
1.18 mm	97
600 µm	95
425 µm	90
300 µm	82
212 µm	71
150 µm	60
63 µm	51



Particle Proportions		
Cobbles	0.0	%
Gravel	2.5	%
Sand	46.9	%
Silt	33.2	%
Clay	17.4	%

PIPETTE	
Particle size	% pass
21.1 µm	33
6.3 µm	21
2.1 µm	17
Preparation: No Pre-treatment used	

Temp (°C)	20

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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BS1377 : Part 2 : Clause 9 : 1990

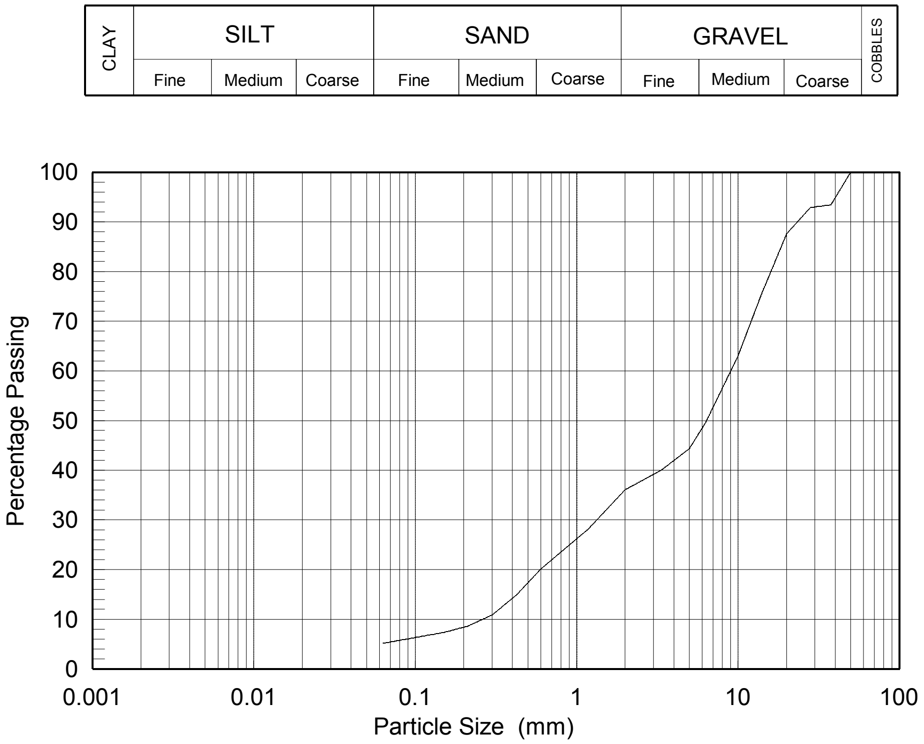
Determination of Particle Size Distribution

Borehole Number: BH204
Sample Number: 15
Depth (m): 4.40

Description:
Dark grey silty sandy GRAVEL

BS1377 : Part 2 : Clause 9.2 : 1990 Wet Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	100
37.5 mm	93
28 mm	93
20 mm	88
14 mm	75
10 mm	63
6.3 mm	50
5 mm	44
3.35 mm	40
2 mm	36
1.18 mm	28
600 µm	20
425 µm	15
300 µm	11
212 µm	9
150 µm	7
63 µm	5



Particle Proportions		
Cobbles	0.0	%
Gravel	63.9	%
Sand	31.0	%
Silt & Clay	5.1	%

Checked and Approved
Initials: JS
Date: 12/01/2012

Project Number:
GEO / 17722
Project Name:
EDMONTON ECOPARK
Project Number: 29541

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BS1377 : Part 2 : Clause 9 : 1990

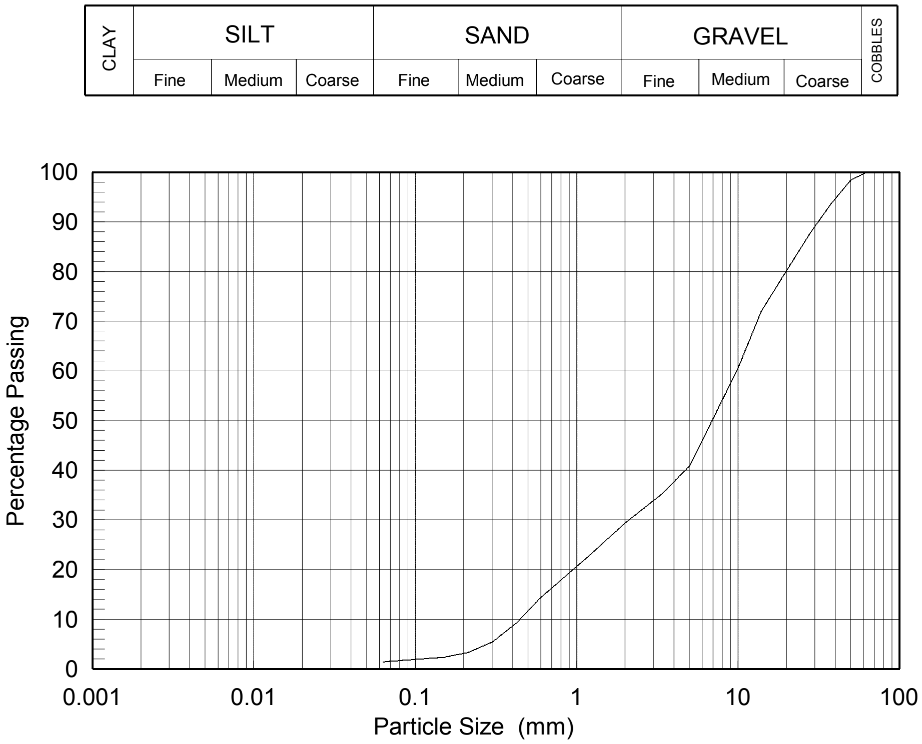
Determination of Particle Size Distribution

Borehole Number:	BH204
Sample Number:	16
Depth (m):	5.20

Description:
Grey and brown sandy GRAVEL

BS1377 : Part 2 : Clause 9.3 : 1990 Dry Sieving Method

SIEVE	
Sieve	% pass
200 mm	100
125 mm	100
90 mm	100
75 mm	100
63 mm	100
50 mm	98
37.5 mm	94
28 mm	88
20 mm	80
14 mm	72
10 mm	61
6.3 mm	47
5 mm	41
3.35 mm	35
2 mm	29
1.18 mm	23
600 µm	14
425 µm	9
300 µm	5
212 µm	3
150 µm	2
63 µm	1



Particle Proportions		
Cobbles	0.0	%
Gravel	70.6	%
Sand	28.0	%
Silt & Clay	1.4	%

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

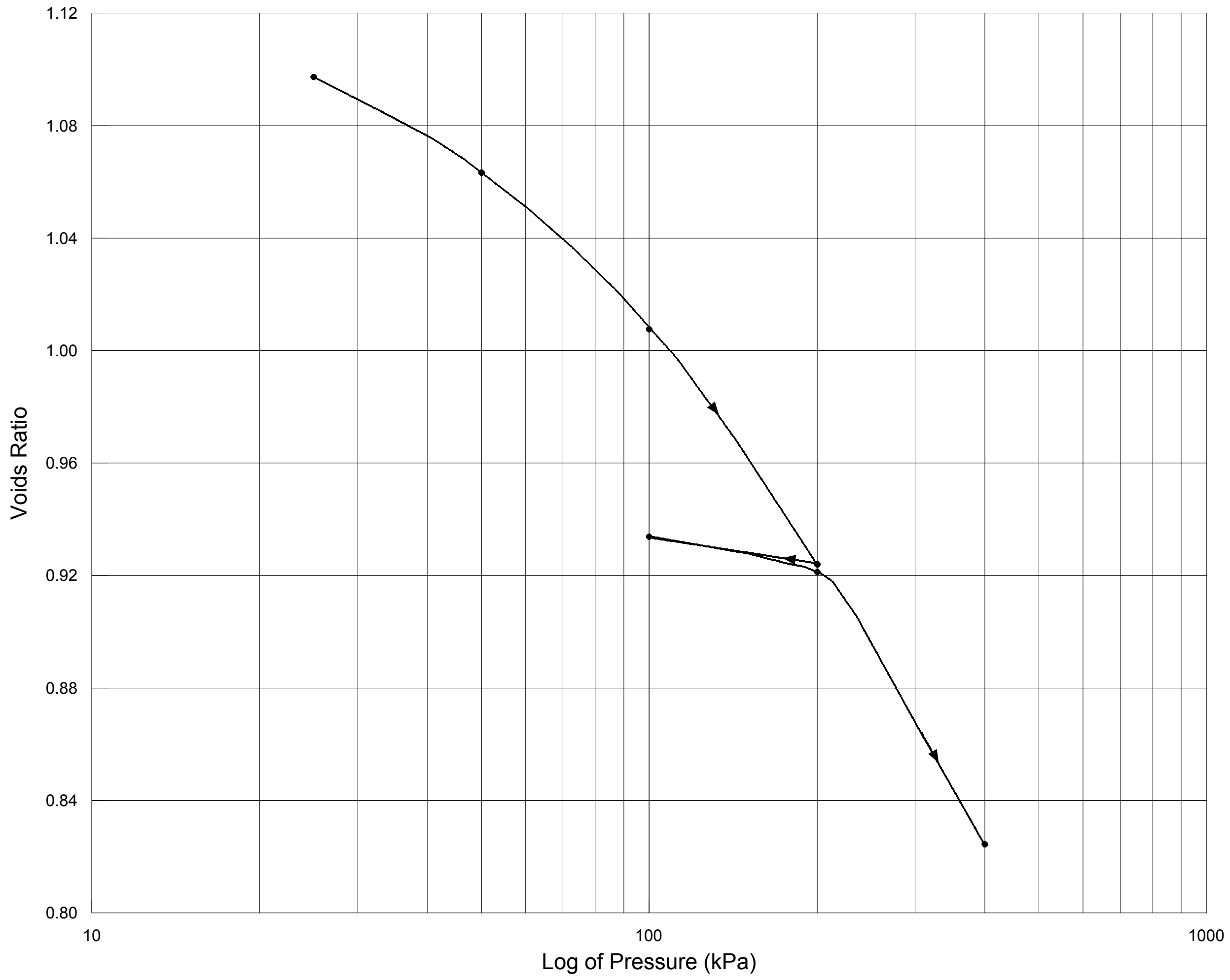
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH201
Sample Ref:	12
Depth (m):	3.50
Depth of test specimen (m):	3.56
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Soft very dark grey silty slightly organic CLAY



Initial Conditions:

Moisture Content (%)	35	Particle Density (Mg/m³)	2.72 (Assumed)
Voids Ratio	1.119		
Diameter (mm)	76.2	Laboratory Temperature (°C)	19.2
Height (mm)	18.7		
Bulk Density (Mg/m³)	1.73		
Dry Density (Mg/m³)	1.28		

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	0.417	3.52	t50	1.097
25 - 50	0.650	0.996	t50	1.063
50 - 100	0.539	0.880	t50	1.008
100 - 200	0.416	0.667	t50	0.924
200 - 100	- 0.0512	1.94 (Sv)	t50	0.934
100 - 200	0.0650	3.17	t50	0.921
200 - 400	0.252	0.426	t50	0.824

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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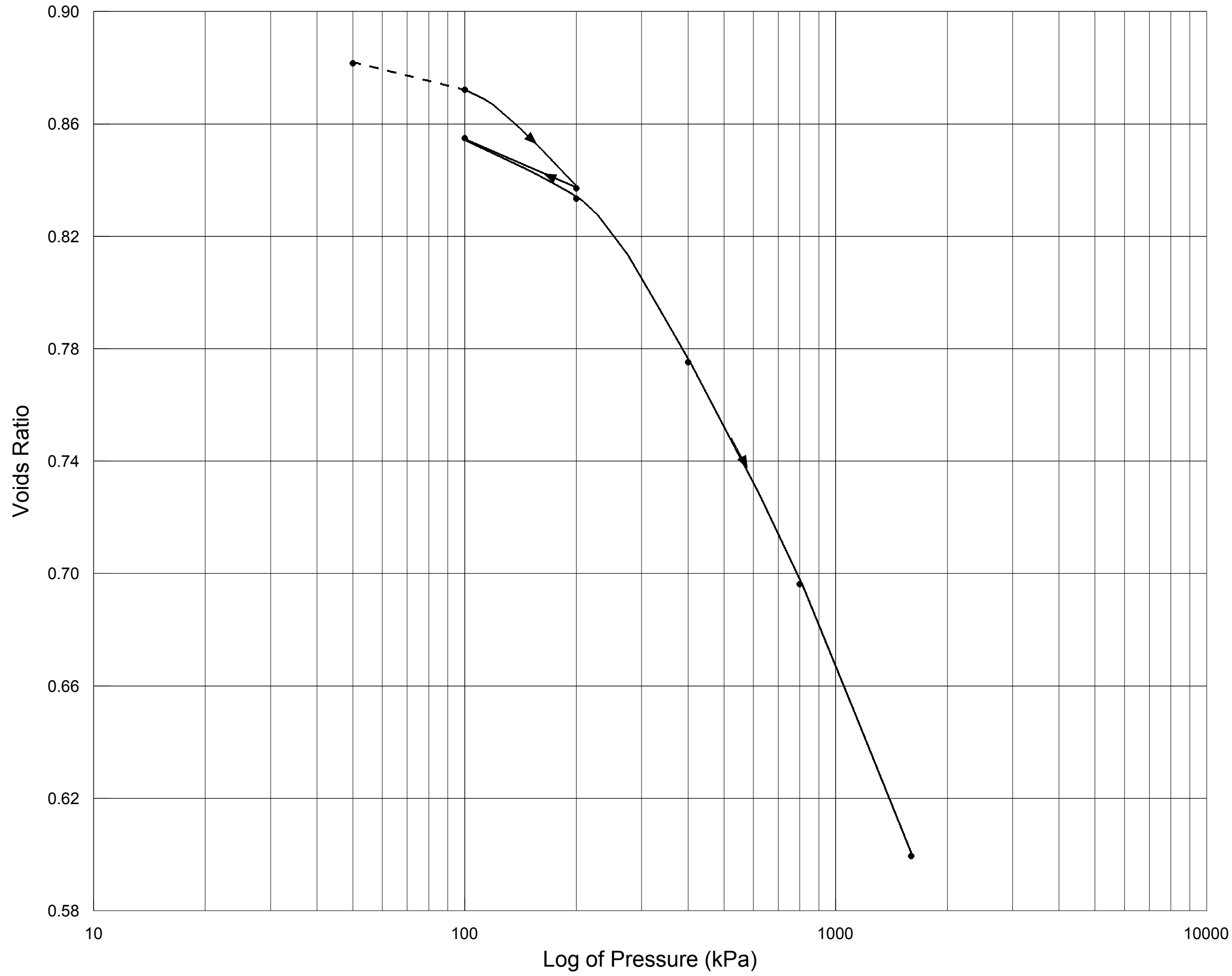
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH202
Sample Ref:	14
Depth (m):	5.90
Depth of test specimen (m):	6.11
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm grey silty CLAY



Initial Conditions:

Moisture Content (%)	33
Voids Ratio	0.885
Diameter (mm)	76.1
Height (mm)	18.8
Bulk Density (Mg/m³)	1.92
Dry Density (Mg/m³)	1.44
Particle Density (Mg/m³)	2.72 (Assumed)
Laboratory Temperature (°C)	19.2

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 50	-	Specimen swelled	-	0.881
50 - 100	0.100	2.34	t50	0.872
100 - 200	0.187	0.457	t50	0.837
200 - 100	- 0.0970	0.551 (Sv)	t50	0.855
100 - 200	0.116	0.725	t50	0.833
200 - 400	0.159	0.453	t50	0.775
400 - 800	0.111	0.560	t50	0.696
800 - 1600	0.0713	0.566	t50	0.599

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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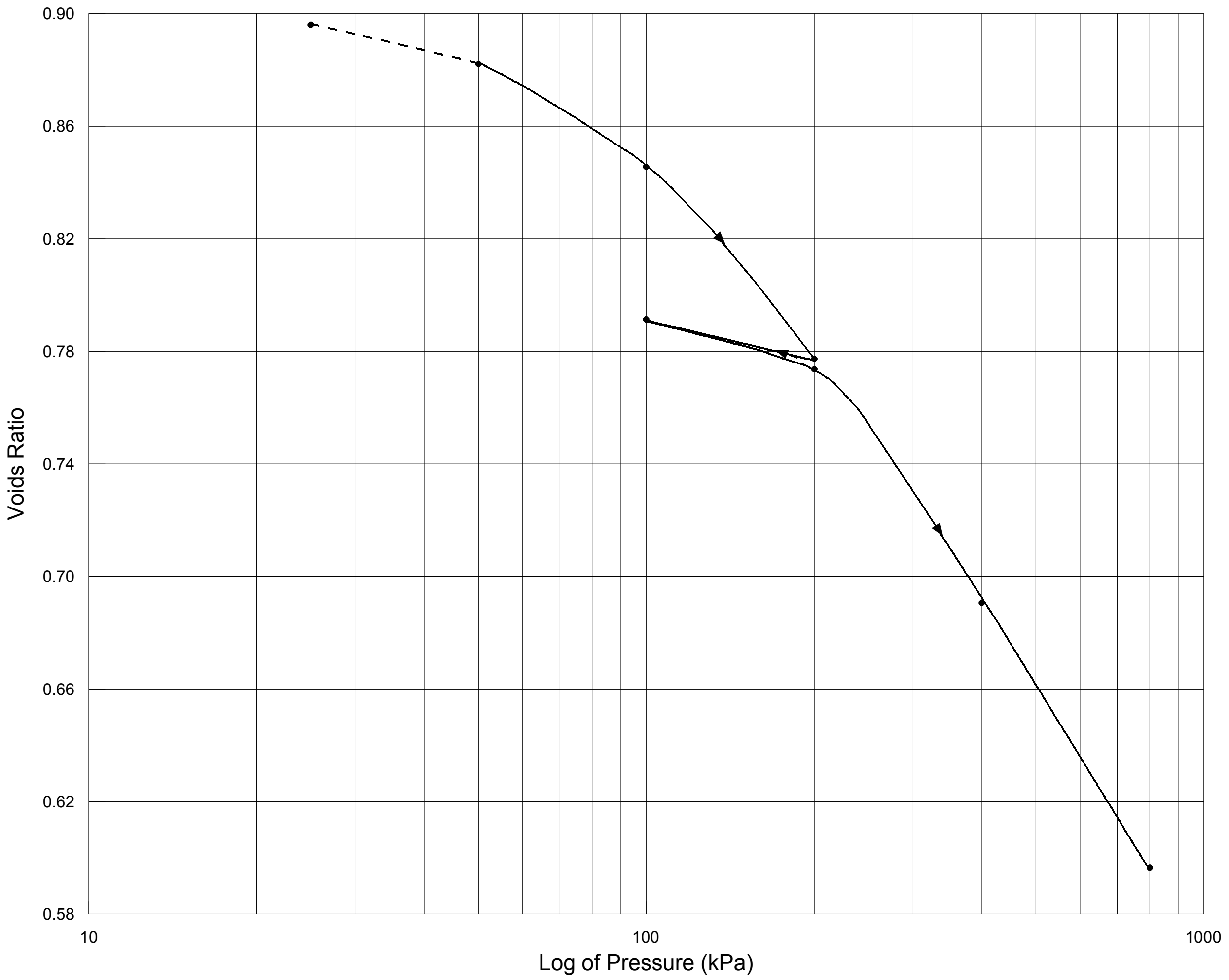
BS1377 : Part 5 : Clause 3 : 1990

Determination of One Dimensional Consolidation Properties of Soil

Borehole No:	BH204
Sample Ref:	7
Depth (m):	2.00
Depth of test specimen (m):	2.06
Orientation:	Vertical
Specimen preparation:	Undisturbed

Description:

Firm grey silty CLAY with
rare fine to medium gavel



Initial Conditions:

Moisture Content (%)	31	Particle Density (Mg/m³)	2.72 (Assumed)
Voids Ratio	0.897		
Diameter (mm)	76.1	Laboratory Temperature (°C)	19.2
Height (mm)	18.8		
Bulk Density (Mg/m³)	1.88		
Dry Density (Mg/m³)	1.43		

Pressure Range (kPa)	Mv (m²/MN)	Cv (m²/yr)	Time Fitting Method	Voids Ratio
0 - 25	-	Specimen swelled	-	0.896
25 - 50	0.292	2.50	t50	0.882
50 - 100	0.389	0.375	t50	0.845
100 - 200	0.370	0.262	t50	0.777
200 - 100	- 0.0789	0.572 (Sv)	t50	0.791
100 - 200	0.0986	0.678	t50	0.774
200 - 400	0.234	0.234	t50	0.691
400 - 800	0.139	0.221	t50	0.597

Checked and Approved

Initials: JS

Date: 12/01/2012

Project Number:

GEO / 17722

Project Name:

EDMONTON ECOPARK

Project Number: 29541

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Authorised Signatories: ☐ J R Masters (Qual Mgr) ☐ C F Wallace (Tech Mgr) ☐ G J Corio (Tech Mgr) [X] J Sturges (Tech Mgr) ☐ S Burke (Snr Tech) GEOLABS LIMITED ®

Client: Ground Technology Services, Maple Road, Kings Lynn, Norfolk PE34 3AF

Chemtest
The right chemistry to deliver results

Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070

Ground Technology Services
Maple Road
Kings Lynn

PE34 3AF

FAO Paul Lewin
10 January 2012

Dear Paul Lewin

Test Report Number **161345**
Your Project Reference **Edmonton Ecopark**

Please find enclosed the results of analysis for the samples received 23 December 2011.

All soil samples will be retained for a period of one month and all water samples will be retained for 7 days following the date of the test report. Should you require an extended retention period then please detail your requirements in an email to customerservices@chemtest.co.uk. Please be aware that charges may be applicable for extended sample storage.

If you require any further assistance, please do not hesitate to contact the Customer Services team.

Yours sincerely

Authorised Signatory

☑ Darrell Hall	Director
☐ Phil Hellier	Director
☐ Keith Jones	Technical Manager
☐ John Crawford	Quality Manager
☐ Malcolm Avis	Director

UKAS TESTING
2183

ISO 14001 Registered Company sira
UKAS ENVIRONMENTAL MANAGEMENT

Notes to accompany report:

- *The sign < means 'less than'*
- *Tests marked 'U' hold UKAS accreditation*
- *Tests marked 'M' hold MCertS (and UKAS) accreditation*
- *Tests marked 'N' do not currently hold UKAS accreditation*
- *Tests marked 'S' were subcontracted to an approved laboratory*
- *n/e means 'not evaluated'*
- *i/s means 'insufficient sample'*
- *u/s means 'unsuitable sample'*
- *Comments or interpretations are beyond the scope of UKAS accreditation*
- *The results relate only to the items tested*

Ground Technology Services
Maple Road
Kings Lynn

PE34 3AF

FAO Paul Lewin

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 22 December 2011

Edmonton Ecopark

Report Date
10 January 2012

Login Batch No					**161345**						
Chemtest LIMS ID					AG84855	AG84856	AG84857	AG84858	AG84859	AG84860	AG84862
Sample ID					BH201	BH202	BH202	BH202	BH203	BH203	BH204
Sample No					D7	D6	D10	D15	D26	D33	D11
Sampling Date					Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided	Not Provided
Depth					1.5m	2m	4m	6.35m	7.95m	11m	3m
Matrix					*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*	*SOIL*
SOP↓	Determinand↓	CAS No↓	Units↓	*							
2010	pH			M	10.0	8.6	8.9	8.0	8.1	8.2	6.7
2220	Chloride (extractable)	16887006	g l^{-1}	M	0.13	0.088	<0.010	0.026	0.015	0.024	0.10
	Nitrate (extractable)	14797558	g l^{-1}	N	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
2120	Sulfate (2:1 water soluble) as SO4	14808798	g l^{-1}	M	0.22	0.96	0.05	0.31	0.14	0.43	0.18
2420	Magnesium (soluble)	7439954	g l^{-1}	N	<0.01	<0.01	<0.01	0.02	0.01	0.03	0.01

All tests undertaken between 05/01/2012 and 10/01/2012

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

LIMS sample ID range AG84854 to AG84863

Ground Technology Services
Maple Road
Kings Lynn

PE34 3AF

FAO Paul Lewin

LABORATORY TEST REPORT

Results of analysis of 10 samples
received 22 December 2011

Edmonton Ecopark

Report Date
10 January 2012

Login Batch No					**161345**		
Chemtest LIMS ID					AG84854	AG84861	AG84863
Sample ID					BH201	BH203	BH204
Sample No					W22	W61	W33
Sampling Date					Not Provided	Not Provided	Not Provided
Depth					3.7m	17m	7m
Matrix					*WATER*	*WATER*	*WATER*
SOP↓	Determinand↓	CAS No↓	Units↓	*			
1010	pH	PH		U	7.7	8.9	7.7
1220	Chloride	16887006	mg l^{-1}	U	210	36	180
	Nitrate	14797558	mg l^{-1}	U	12	<0.50	<0.50
1415	Magnesium	7439954	mg l^{-1}	U	13	33	14
1220	Sulfate	14808798	mg l^{-1}	U	84	42	73

All tests undertaken between 05/01/2012 and 10/01/2012

* Accreditation status

This report should be interpreted in conjuction with the notes on the accompanying cover page.

GTS-11-055

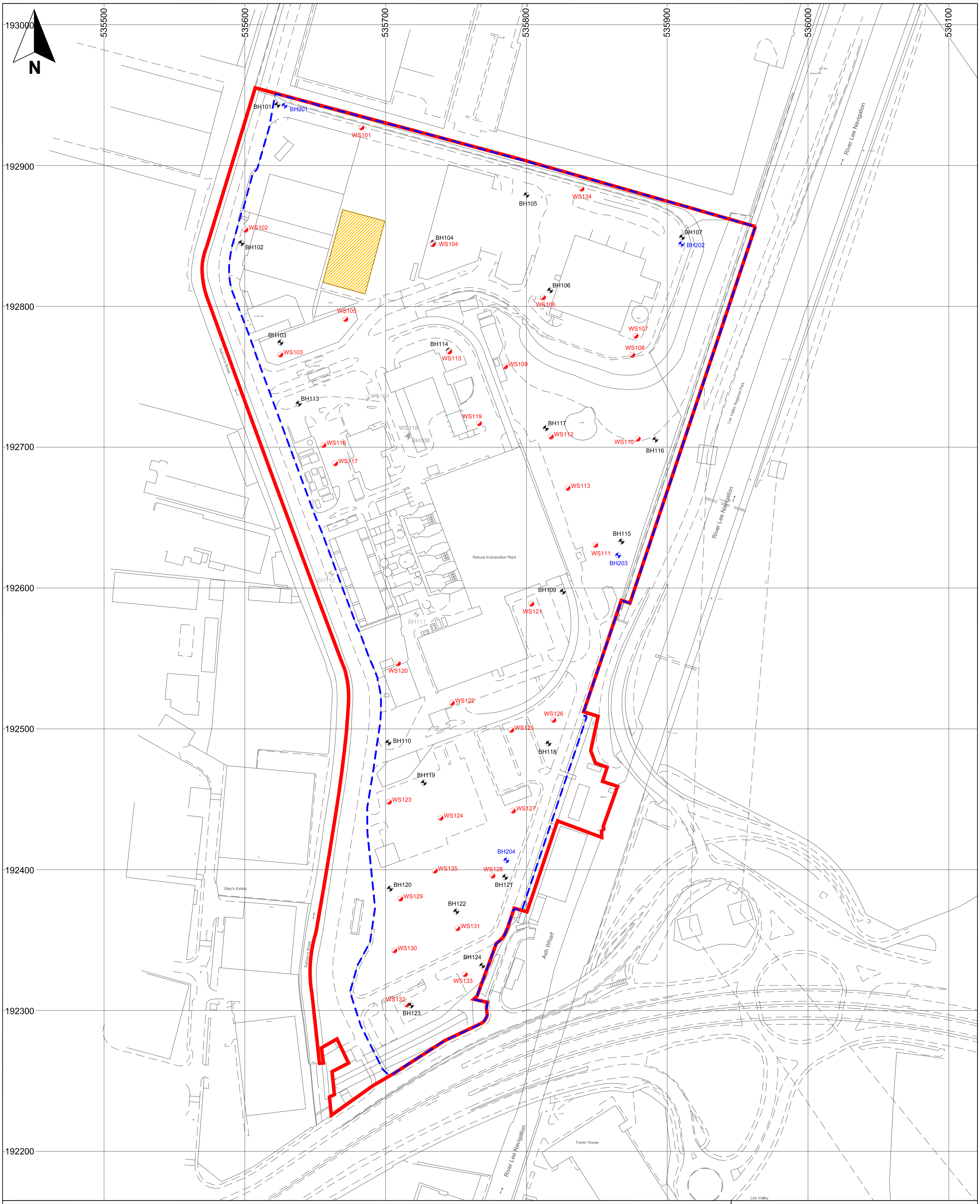
Phase 2

Edmonton Ecopark

Appendix E

Exploratory Hole Location Plan

Ground Technology Services



Key

▬ Site boundary

┅ Boundary of proposed development

Borehole

Proposed borehole - monitoring Lambeth Group

Window sample

Locations not drilled

Locations drilled but not installed

▨ Area with an underlying protective membrane

0 m 150 m
Scale 1:2500 @ A3

NLWA
ISDS Baseline Supplementary
Geo-Environmental Site Investigation
Proposal

Figure 1
Borehole Location Plan

July 2011
29541-A26.dwg squij

Based upon the Ordnance Survey Map with the permission of the Controller of Her Majesty's Stationery Office. © Crown Copyright. 100001776.

GTS-11-055

Phase 2

Edmonton Ecopark

Appendix G

Calibration Certificates

Ground Technology Services

SPT Calibration Report

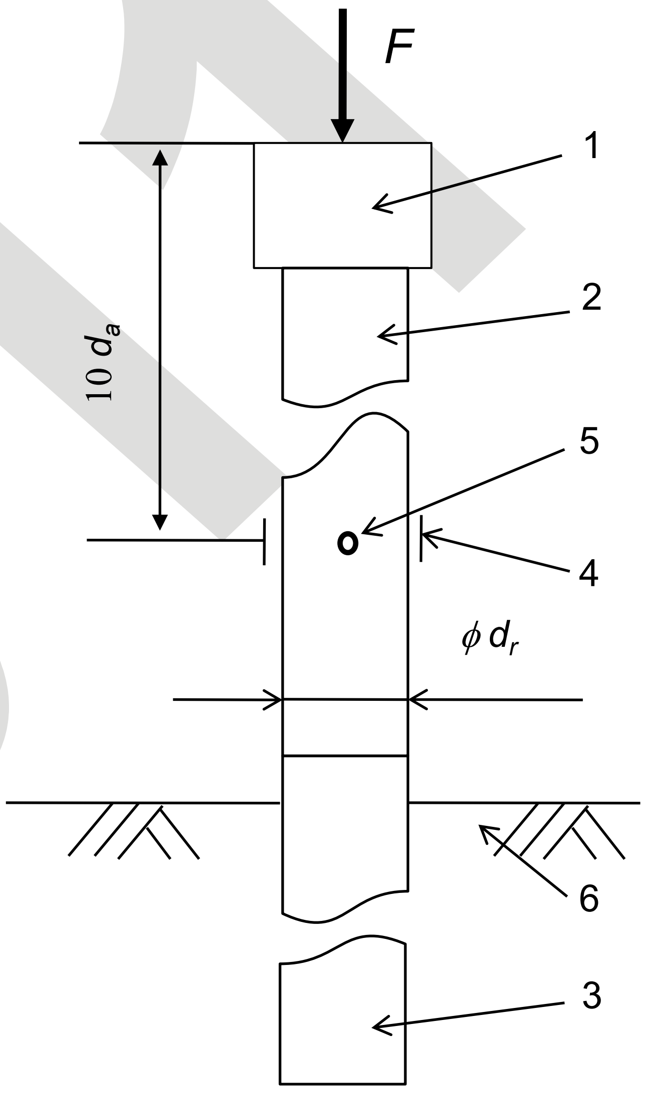
www.equipetraining.co.uk

Hammer Energy Measurement Report

Type of Hammer		SPT
Client		GTS
Test No		EQU442
Test Depth (m)		7.10
Date of Test		**22 January 2011**
Valid until		**22 January 2012**
Hammer ID		**MG1**
Mass of the hammer	m =	63.5kg
Falling height	h =	0.76m
E_{theor} =	$m \times g \times h$ =	473J

Characteristics of the instrumented rod

Diameter	d_r =	0.052 m
Length of the instrumented rod		0.558 m
Area	A =	11.61 cm^2
Modulus	E_a =	206843 MPa

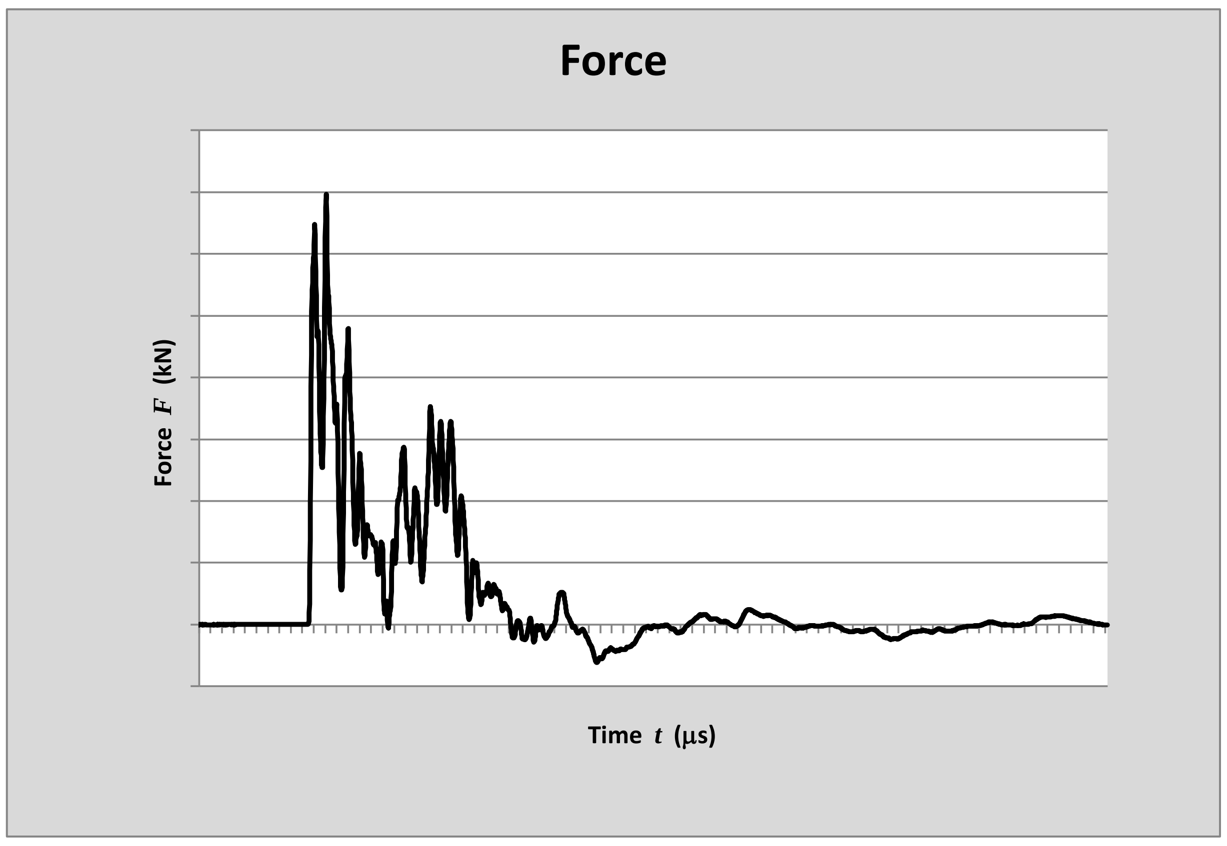


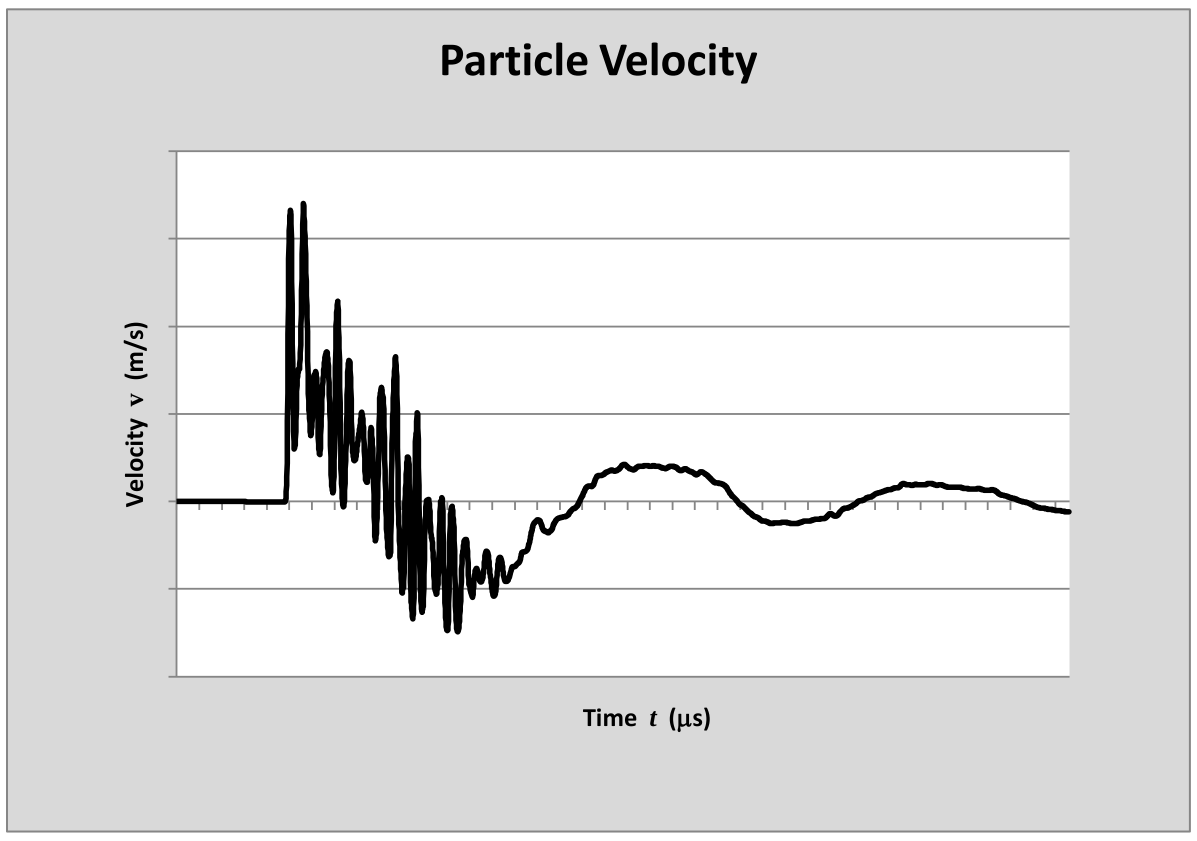
Key

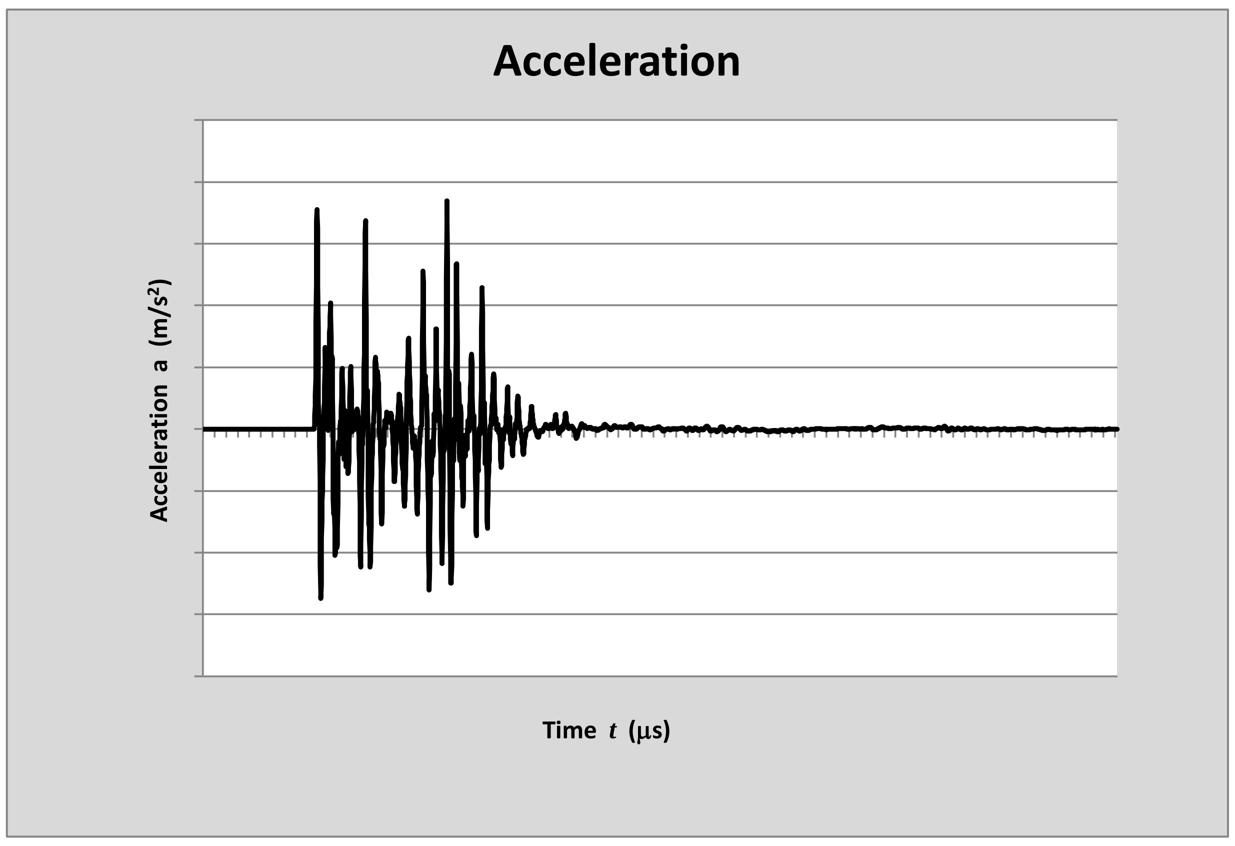
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

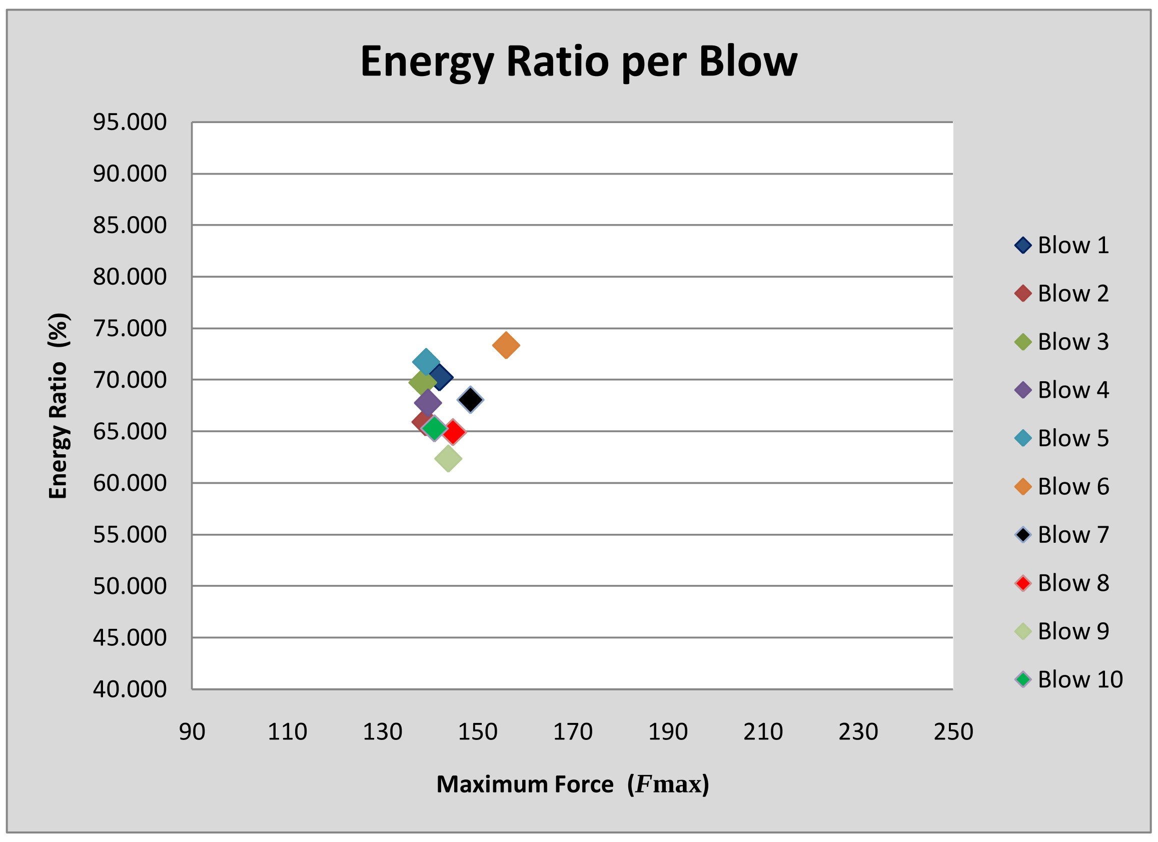
F Force
d_r Diameter of rod

Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005









Observations:
1.

E_{meas} = **0.320** kN-m

E_{theor} = **0.473** kN-m

Energy Ratio (E_r) = $\frac{E_{meas}}{E_{theor}}$ = 67.68%

Equipe SPT Analyzer Operators: KS

Prepared by:	**Checked by:**	**Date**	**24/01/2011**

SPT Calibration Report

www.equipetraining.co.uk

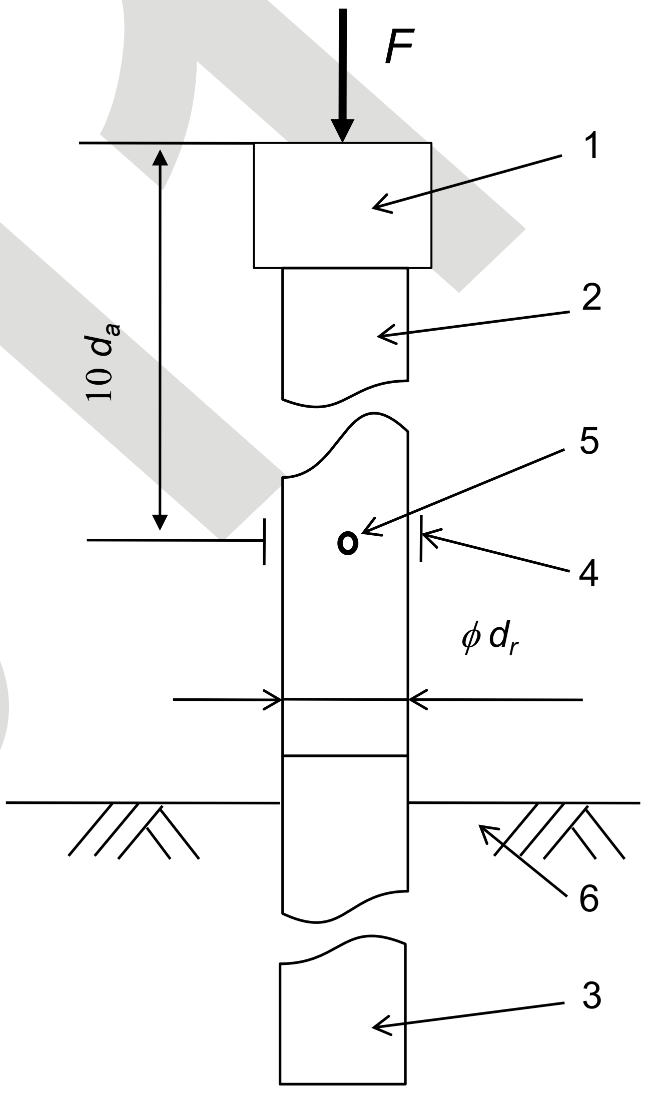
Hammer Energy Measurement Report

Type of Hammer	SPT
Client	GTS
Test No	EQU443
Test Depth (m)	7.10
Date of Test	**22 January 2011**
Valid until	**22 January 2012**
Hammer ID	**MG2**

Mass of the hammer	$m =$	63.5kg
Falling height	$h =$	0.76m
E_{theor} =	$m \times g \times h =$	473J

Characteristics of the instrumented rod

Diameter	$d_r =$	0.052 m
Length of the instrumented rod		0.558 m
Area	$A =$	11.61 cm^2
Modulus	$E_a =$	206843 MPa

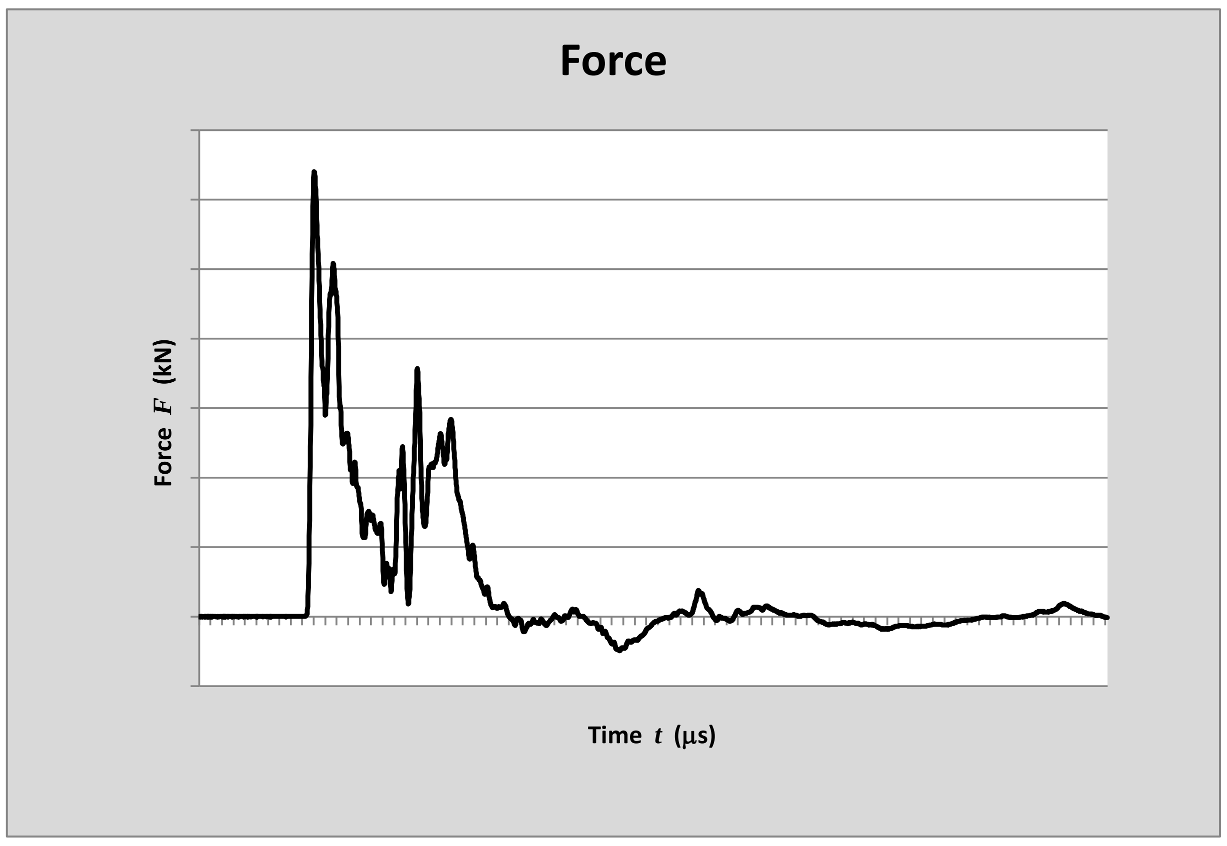


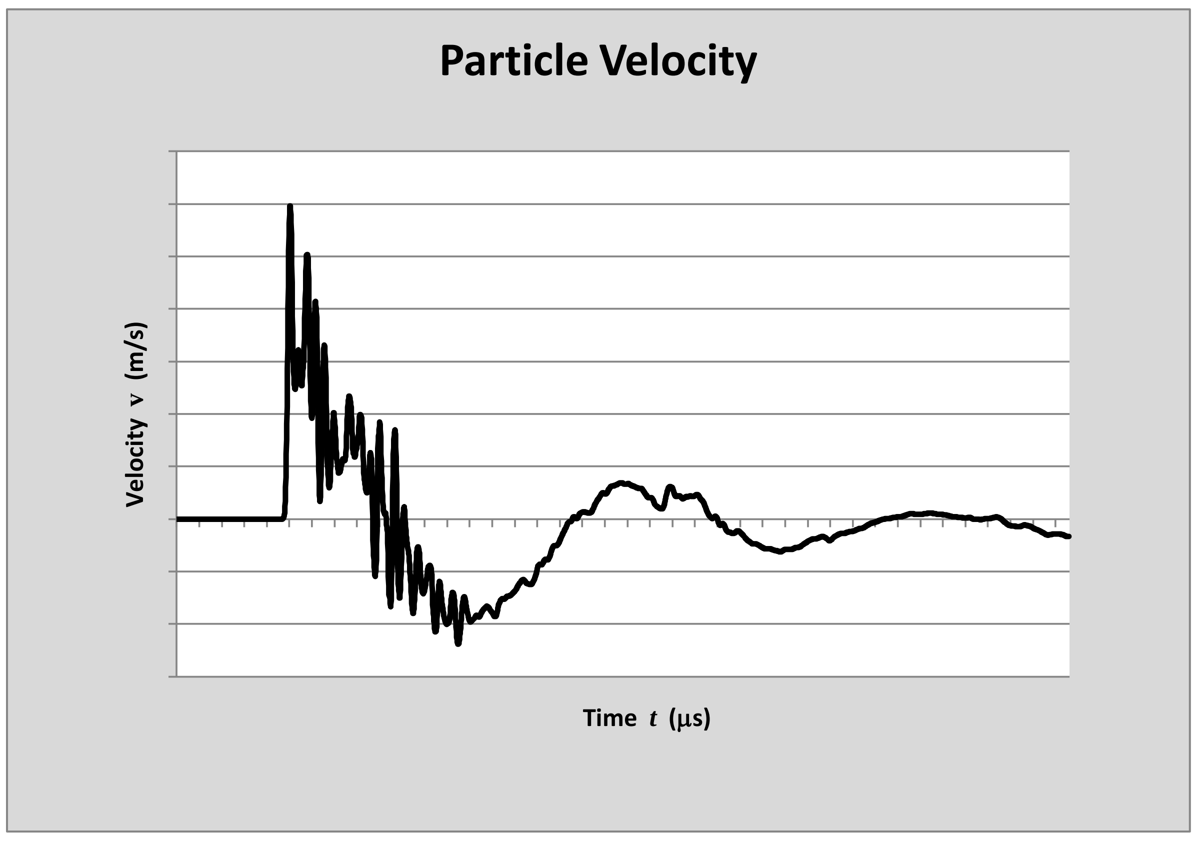
Key

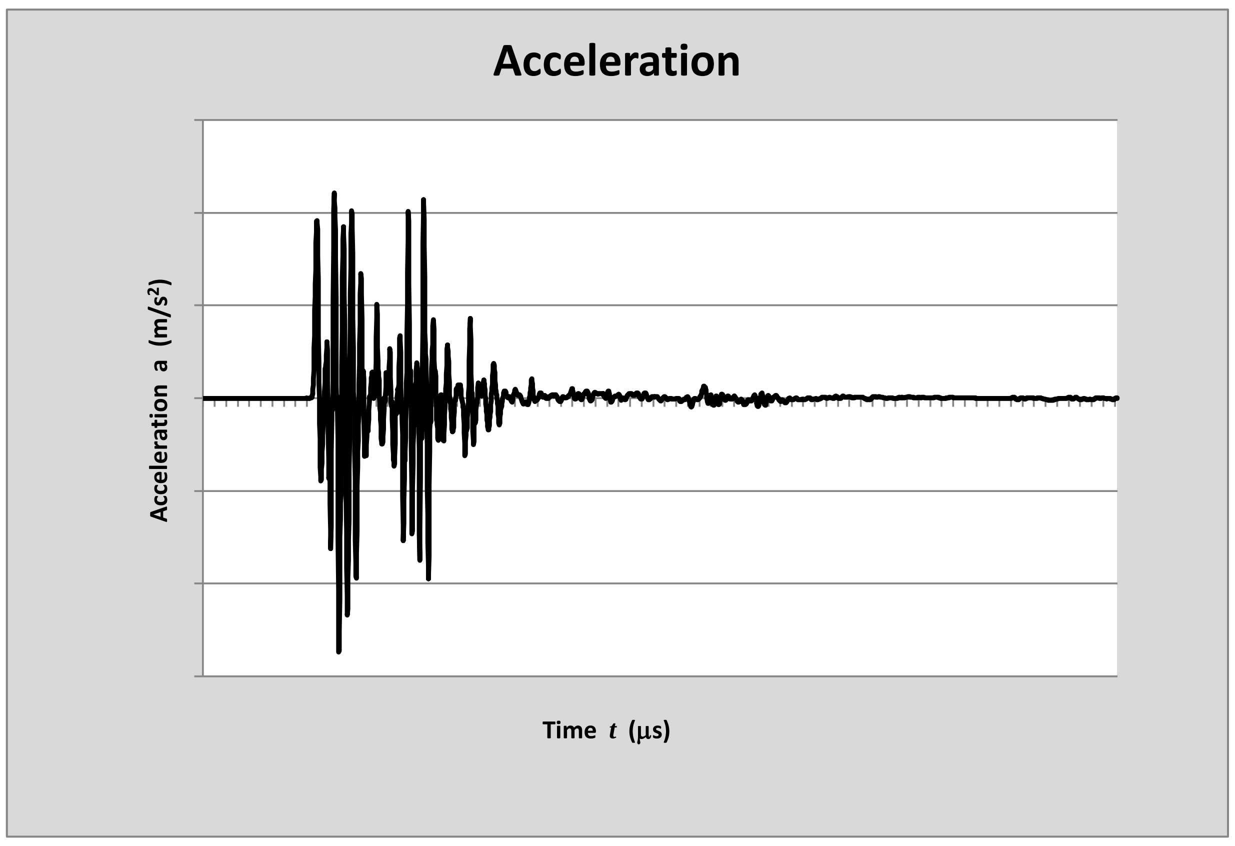
1 Anvil
2 Part of instrumented rod
3 Drive Rod
4 Strain Gauge
5 Accelerometer
6 Ground

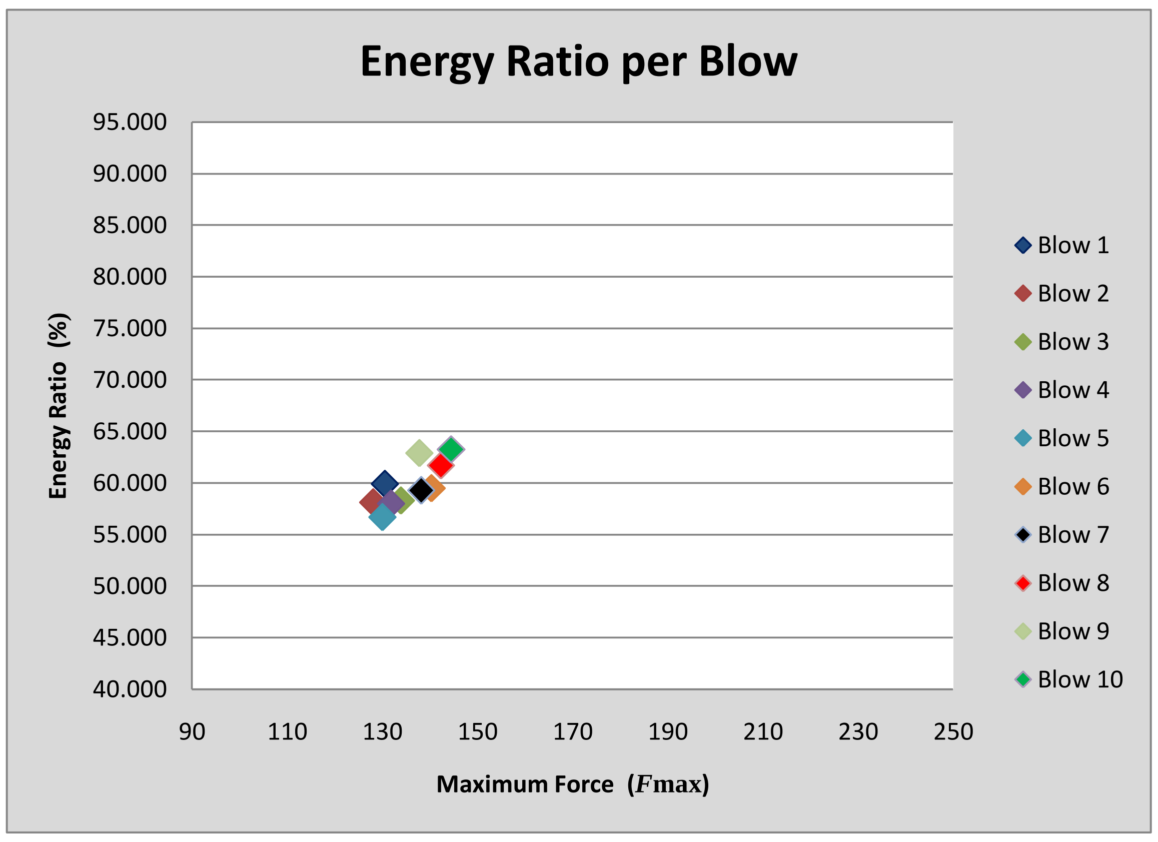
F Force
d_r Diameter of rod

Fig. B.1 and B.2 BS EN ISO 22476-3 : 2005









Observations:
1.

E_{meas} = **0.282** kN-m

E_{theor} = **0.473** kN-m

Energy Ratio = (E_r) $\frac{E_{meas}}{E_{theor}}$ = **59.53%**

Equipe SPT Analyzer Operators: KS

Prepared by:	**Checked by:**	**Date**	**24/01/2011**

Equipe Training Limited, The Paddocks, Home Farm Offices, The Upton Estate, Banbury, Oxfordshire, OX15 6HU
Tel: 01295 670990 Fax: 01295 678232 Email: info@equipetraining.co.uk

Project: **Edmonton Ecopark Factual Data**

Project ID: **GTS-14-524**

Client: **Amec Foster Wheeler**

SITE INVESTIGATION

Ground Technology Services

FACTUAL DATA

Reference GTS-14-524

Date: March 2015

Site:
Edmonton Ecopark
Advent Way
Edmonton
London
N18 3AG

Client:

amec foster wheeler

Amec Foster Wheeler Environment & Infrastructure UK Ltd
17 Angel Gate, City Road
London,
EC1V 2SH

GROUND TECHNOLOGY
Maple Road
Kings Lynn
Norfolk
PE34 3AF
Tel: 01553 817657
www.groundtechnology.co.uk

GTS-14-524– Edmonton Ecopark

Document Control

Project ID:	GTS-14-524
Site:	Edmonton Ecopark
Client:	Amec Foster Wheeler
Date:	March 2015

Compiled by:
G Day BSc MSc
Geotechnical Engineer

Checked and Authorised for issue:
P Lewin BSc
Senior Geotechnical Engineer

Revision Record

Revision	Date	Description	Prepared By
0	03/02/2015	Factual Data	GWD/PL
1	26/02/2015	Updated BH Records	PL
2	18/03/2015	Geology Changes to logs	PL

Contents

Appendices

Section 1: Introduction

1.1 General Introduction

Ground Technology Services (GTS) were instructed by Amec Foster Wheeler to carry out a ground investigation in order to obtain information on the geotechnical and chemical condition of the underlying soils at Edmonton Ecopark, Advent Way, Edmonton, London.

The specification for the site investigation was completed by Amec Foster Wheeler and GTS were appointed as Ground Investigation Contractor for the intrusive investigation.

This brief report presents the exploratory hole records and geotechnical laboratory data for the ground investigation works completed.

Section 2: Fieldwork

2.1 Scope of Works

The scope of the field work was specified by Amec Foster Wheeler and was undertaken in general accordance with Eurocode 7 Part 2[2], The Steering Group Specification (1993)[6] and where there is no conflict BS 5930:1999[7]. The soil descriptions used in the exploratory hole records are in broad accordance with the relevant European Standards[3&4] and Section Six of BS 5930: 1999[7]

The exploratory hole locations were set out and recorded by Amec Foster Wheeler. Full exploratory records are presented in Appendix A. The fieldwork was carried out between the 9th and 19th December 2014.

A summary of the exploratory holes is presented in Table 1 below.

Hole ID	Hole Type	Completion Depth of Hole (m)
BH401	Cable Percussive	25.00
BH402	Cable Percussive	25.00
BH403	Cable Percussive	10.60
BH404	Cable Percussive	18.45

Table 1: Summary of Exploratory Holes

Section 3: Laboratory Testing

3.1 Geotechnical Testing

A schedule of geotechnical laboratory testing, prepared by GTS and completed by Amec Foster Wheeler, was carried out in accordance with BS1377:1990[8] as noted below.

Test Type	Part	Method	No. of Tests
Moisture Content	2	3	27
Liquid Limit	2	4	27
Plastic Limit and Plasticity Index	2	5	27
Unconsolidated Undrained Triaxial	7	8	6
Particle Size Distribution (Wet Sieve)	2	9.2	11
Particle Size Distribution (Sedimentation)	2	9.4	7
Determination of Permeability in Triaxial Cell	6	6	6

Table 2: Geotechnical Testing

A selection of geochemical testing was also completed, which comprised a total of 14 brownfield suites.

All geotechnical lab results are presented in Appendix B.

3.2 Chemical Testing

A chemical testing regime of both soils and groundwater was undertaken by Amec Foster Wheeler and is not presented within this report.

Section 6: References

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Section 6: References

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GTS-14-524

Edmondton Ecopark

Advent Way

Edmonton

Appendix A

Exploratory Hole Records

Ground Technology Services

Sheet 1 of 3

GROUND TECHNOLOGY
Maple Road, Kings Lynn
Norfolk, PE34 3AF
Tel: 01553 817657
www.groundtechnology.co.uk

Borehole Record

BH401

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535850.08E
192455.09N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Fine GRAVEL and moss.	0.02	
MADE GROUND: Brownish grey silty fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse flint, brick and concrete.	0.40	
MADE GROUND: Dark grey and brownish grey slightly gravelly slightly sandy SILT. Gravel is angular to subangular fine to coarse flint, brick and concrete. Some plant debris.	0.60	
MADE GROUND: Stiff very low strength brown and grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint and brick.	1.40	
Firm greyish brown and brownish grey CLAY, with some fine roots. (ALLUVIUM)	2.00	
Very soft brown silty sandy CLAY, with some fine roots. (ALLUVIUM)	2.60	
Loose becoming medium dense grey clayey silty sandy GRAVEL. Gravel is angular to subangular fine to medium flint. Some peat fragments. Becoming sand and gravel. (KEMPTON PARK GRAVEL FORMATION)	4.50	
Medium dense grey clayey silty gravelly SAND. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)	5.80	
Grey and brown slightly gravelly CLAY. Gravel is subrounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)	6.00	
Loose grey fine to coarse SAND and GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)	6.80	
Stiff grey CLAY. (LONDON CLAY FORMATION)	7.80	
Stiff to very stiff locally closely fissured and or thinly laminated grey silty CLAY. Occasional subrounded fine flint gravel and white sandy lenses. (LAMBETH GROUP UNDIFFERENTIATED)	8.50	
Stiff to very stiff high strength locally closely fissured and or thinly laminated grey silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		

Borehole continued...

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)
B1	0.00-0.30				
B2	0.40-0.60				
B3	0.60-0.80				
B4	1.00-1.20				
S	1.50-1.95	0.00		N=3 (1,0,1,0,1,1)	
D5	1.50-1.95				
B6	1.50-2.00				
B7	2.00-2.30				
S	2.50-2.95	2.50		N=4 (2,2,1,1,1,1)	
D8	2.50-2.95				
B9	2.50-3.00				
S	3.50-3.95	3.50	(3.50)	N=11 (1,2,2,2,3,4)	
D10	3.50-3.95				
B11	3.50-4.00				
S	4.50-4.95	4.50	(4.10)	N=11 (1,2,1,2,3,5)	
D12	4.50-4.95				
B13	4.50-5.00				
S	5.50-5.95	5.50	(3.80)	N=19 (2,3,3,4,6,6)	
D14	5.50-5.95				
B15	5.50-6.00				
B16	5.50-5.80				
B17	5.80-6.00				
S	6.50-6.95	6.50	(4.10)	N=9 (2,3,1,2,3,3)	
D18	6.50-6.95				
B19	6.50-6.80				
B20	6.80-7.00				
S	7.50-7.95	7.50		N=14 (1,2,2,3,4,5)	
D21	7.50-7.95				
B22	7.50-8.00				
UT23	8.50-9.95			40 blows	
D24	8.95-9.00				
S	9.50-9.95	9.50		N=17 (1,2,3,3,5,6)	
D25	9.50-9.95				
B26	9.50-10.00				

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
150	25.00	25.00
250	2.50	2.50
200	8.50	7.50

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/12/14	3.30	5	3.30	3.30	7.50
10/12/14	3.30	10	3.30	3.30	7.50
10/12/14	3.30	15	3.30	3.30	7.50
10/12/14	3.30	20	3.30	3.30	7.50

Dates: 09/12/2014-19/12/2014
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: J. Tomalin
Checked By: P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seals installed from 2.40m to 0.40mbgl and 7.80m to 5.80mbgl.
3. Exploratory hole backfilled with cement / bentonite grout.
4. Geological interpretation completed by Amec Foster Wheeler.

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Borehole Record

BH401

Sheet 2 of 3

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

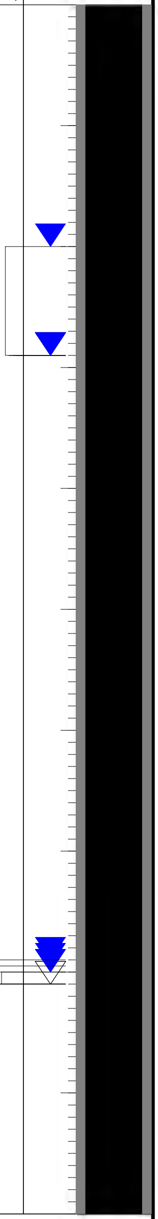
Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535850.08E
192455.09N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	FID (ppm)
Stiff to very stiff high strength locally closely fissured and or thinly laminated grey silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)	11.00		UT27	11.00-11.45			40 blows		
Very stiff very high strength thinly laminated grey and brown silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)			D28	11.45-11.50					
			S D29 B30	12.50-12.95 12.50-12.95 12.50-13.00	9.00		N=23 (3,4,4,5,6,8)		
	12.70								
Dark brown organic SILT. Organic fibrous black and brown matrix with coal. (AMEC description) (LAMBETH GROUP UNDIFFERENTIATED)	13.20		B31	13.20-13.40					
Very stiff high strength greyish brown slightly silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)			UT32	14.00-14.45			60 blows		
			D33	14.45-14.50					
			S D34 B35	15.50-15.95 15.50-15.95 15.50-16.00	9.00	(15.40)	N=23 (3,4,5,5,6,7)		
			UT36	17.00-17.45			70 blows		
			D37	17.45-17.50					
	17.80		B38	17.80-18.10					
Very stiff thinly laminated greenish grey and brownish grey slightly silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)	18.10		B39	18.10-18.30					
Very high strength greenish grey gravelly sandy clayey SILT. (LAMBETH GROUP UNDIFFERENTIATED)			S D40 B41	18.50-18.89 18.50-18.89 18.70-19.00	15.00	(18.10)	50/240mm (4,7,9,12,20,9)		
	18.70								
Dense grey silty fine SAND, with sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)			B42	19.30-19.50					
	19.60		B43	19.60-19.80					
Borehole continued...									

Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/12/14	3.30	5	3.30	3.30	7.50
10/12/14	3.30	10	3.30	3.30	7.50
10/12/14	3.30	15	3.30	3.30	7.50
10/12/14	3.30	20	3.30	3.30	7.50

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	25.00	25.00			
250	2.50	2.50			
200	8.50	7.50			

Dates:	09/12/2014-19/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seals installed from 2.40m to 0.40mbgl and 7.80m to 5.80mbgl.
3. Exploratory hole backfilled with cement / bentonite grout.
4. Geological interpretation completed by Amec Foster Wheeler.

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Maple Road, Kings Lynn
Norfolk, PE34 3AF
Tel: 01553 817657
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Borehole Record

BH401

Sheet 3 of 3

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -

Coordinates: 535850.08E 192455.09N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)	Installations
Greenish grey and brownish grey slightly sandy SILT, with occasional shell fragments and fine flint gravel. (LAMBETH GROUP UNDIFFERENTIATED)				S D44 B45	20.00-20.39 20.00-20.39 20.00-20.50	20.00	(12.00)	51/235mm (7,12,13,11,20,7)		
Very stiff light bluish grey and reddish brown slightly silty CLAY, locally slightly gravelly, some sandy silt and sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)		21.50		S D46 B47	21.50-21.95 21.50-21.95 21.50-22.00	21.00	(12.20)	N=32 (3,5,7,7,8,10)		
Very stiff light greenish grey and brown slightly sandy CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		22.40		B48	22.40-22.60					
Dense to very dense light grey clayey silty gravelly SAND. Some sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)		22.80		D49 S D50 B51	22.80-22.90 23.00-23.30 23.00-23.30 23.00-23.50	23.00	(22.50)	68/150mm (5,10,18,18,32)		
				S D52 B53	24.50-24.95 24.50-24.95 24.50-25.00	24.50	(12.50)	N=40 (3,6,11,13,8,8)		
Borehole Complete at 25.00 m		25.00								

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	25.00	25.00			
250	2.50	2.50			
200	8.50	7.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
10/12/14	3.30	5	3.30	3.30	7.50
10/12/14	3.30	10	3.30	3.30	7.50
10/12/14	3.30	15	3.30	3.30	7.50
10/12/14	3.30	20	3.30	3.30	7.50

Dates:	09/12/2014-19/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seals installed from 2.40m to 0.40mbgl and 7.80m to 5.80mbgl.
3. Exploratory hole backfilled with cement / bentonite grout.
4. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
Maple Road, Kings Lynn
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Tel: 01553 817657
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Borehole Record

BH402

Sheet 1 of 3

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

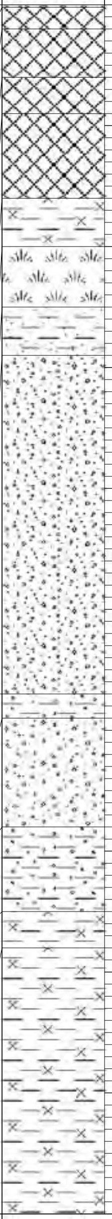
Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535845.11E
192432.46N

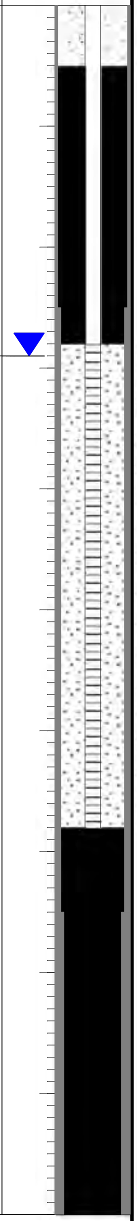
Description	Depth (m)	O.D. Level (m)
MADE GROUND: GRAVEL.	0.02	
MADE GROUND: Grey slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to coarse brick and concrete.	0.20	
MADE GROUND: Firm dark brown sandy gravelly CLAY. Gravel is angular fine to coarse flint, brick and concrete. Rare shell and plant debris.	0.60	
MADE GROUND: Light brownish grey silty fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse concrete.	0.90	
MADE GROUND: Firm brownish brown slightly gravelly silty CLAY, with occasional shell fragments. Gravel is angular fine to coarse flint and concrete.	1.60	
Soft greenish grey silty CLAY, with some black organic specks and an organic odour. (ALLUVIUM)	2.00	
Firm to stiff greyish brown pseudo-fibrous PEAT. (ALLUVIUM)	2.50	
Soft light brownish grey slightly sandy CLAY. (ALLUVIUM)	2.90	
Medium dense brownish slightly silty very sand gravel, becoming sandy GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)	5.70	
Soft brownish grey gravelly CLAY. Gravel is subangular to rounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)	5.90	
Medium dense grey very sandy GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)	6.80	
Firm brownish grey gravelly CLAY. Gravel is angular to subrounded fine to coarse flint. (LONDON CLAY FORMATION)	7.50	
Very stiff high strength thinly laminated brownish grey silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)	7.80	
Very stiff high strength brownish grey silty CLAY with traces of fine and medium gravel and fine to coarse sand. (LAMBETH GROUP UNDIFFERENTIATED)		
Borehole continued...		

Legend



Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)
B1	0.00-0.30				
B2	0.50-0.60				
B3	0.65-0.80				
B4	0.90-1.20				
S	1.50-1.95	0.00		N=2 (1,0,1,0,0,1)	
D5	1.50-2.15				
B6	1.50-2.00				
B7	2.00-2.30				
S	2.50-2.95	2.50		N=3 (1,0,1,0,1,1)	
D8	2.50-2.95				
B9	2.50-2.90				
B10	2.90-3.10				
S	3.50-3.95	3.50	(3.40)	N=10 (2,2,2,3,2,3)	
D11	3.50-3.95				
B12	3.50-4.00				
S	4.50-4.95	4.50	(4.00)	N=19 (2,3,4,4,5,6)	
D13	4.50-4.95				
B14	4.50-5.00				
S	5.50-5.95	5.50	(4.00)	N=12 (1,1,2,2,3,5)	
D15	5.50-5.95				
B16	5.50-6.00				
B17	5.70-5.90				
S	6.50-6.95	6.50	(3.60)	N=10 (1,2,2,2,3,3)	
D18	6.50-6.95				
B19	6.50-7.00				
B20	7.00-7.20				
UT21	7.50-7.95			30 blows	
D22	7.95-8.00				
S	8.50-8.95	8.00		N=18 (1,2,4,4,4,6)	
D23	8.50-8.95				
B24	8.50-9.00				
UT25	9.50-9.95			25 blows	
D26	9.95-10.00				

Installations



Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.50	2.50
200	8.50	7.50
150	25.00	25.00

Chiseling Details

From (m)	To (m)	Time (hours)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
09/12/14	2.90	5	2.90	2.50	
09/12/14	2.90	10	2.90	2.50	
09/12/14	2.90	15	2.90	2.50	
09/12/14	2.90	20	2.90	2.50	

Dates:	08/12/2014-12/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seal installed from 2.50m to 0.50mbgl and from 7.80m to 5.80mbgl.
3. Groundwater monitoring well installed with 50mm HDPE standpipe screened from 2.80m to 6.80mbgl.
4. Groundwater dipped at 3.50mbgl on 18/12/2014.
5. Backfilled with cement/bentonite grout from 6.80m to 25.00mbgl.
6. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
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Tel: 01553 817657
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Borehole Record

BH402

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535845.11E
192432.46N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)	Installations
Very stiff high strength brownish grey silty CLAY with traces of fine and medium gravel and fine to coarse sand. (LAMBETH GROUP UNDIFFERENTIATED)										
Stiff greenish grey and grey sandy CLAY. Some white sandy lenses, rare gypsum crystals and possible shell fragments. (LAMBETH GROUP UNDIFFERENTIATED)		11.00		B27	11.00-11.10					
				S	11.10-11.55	9.00		N=18 (2,4,4,4,5,5)		
				D28	11.10-11.55					
				B29	11.10-11.60					
Very stiff brownish grey and greyish brown silty CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		11.40								
Very stiff very high strength greyish brown CLAY, with some silty fine sand bands. (LAMBETH GROUP UNDIFFERENTIATED)		12.40		UT30	12.50-12.95			50 blows		
				D31	12.95-13.00					
				S	14.00-14.45	9.00		N=19 (2,3,4,4,5,6)		
				D32	14.00-14.45					
				B33	14.00-14.50					
Very stiff locally closely fissured and or thinly laminated brownish grey silty CLAY, with some sandy silt bands, locally bioturbated. (LAMBETH GROUP UNDIFFERENTIATED)		15.20		B34	15.20-15.40					
				UT35	15.50-15.95			60 blows		
				D36	15.95-16.00					
				S	17.00-17.45	15.00		N=26 (2,5,5,5,7,9)		
				D37	17.00-17.45					
				B38	17.00-17.50					
Very stiff greenish grey and brown silty fine SAND, with some sandy silt and sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)		17.40		B39	17.50-17.60					
Very stiff closely fissured greyish brown CLAY/SILT, with some sandy silt and silty fine sand bands. (LAMBETH GROUP UNDIFFERENTIATED)		17.80		B40	17.80-18.00					
				S	18.50-18.89	15.00	(16.00)	50/235mm (4,8,9,13,19,9)		
				D41	18.50-18.89					
				B42	18.50-19.00					
Very stiff thinly laminated brown with a little green sandy CLAY, with occasional shell fragments. (LAMBETH GROUP UNDIFFERENTIATED)		18.70								
Borehole continued...		19.60		B43	19.60-19.80					

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.50	2.50			
200	8.50	7.50			
150	25.00	25.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
09/12/14	2.90	5	2.90	2.50	
09/12/14	2.90	10	2.90	2.50	
09/12/14	2.90	15	2.90	2.50	
09/12/14	2.90	20	2.90	2.50	

Dates:	08/12/2014-12/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seal installed from 2.50m to 0.50mbgl and from 7.80m to 5.80mbgl.
3. Groundwater monitoring well installed with 50mm HDPE standpipe screened from 2.80m to 6.80mbgl.
4. Groundwater dipped at 3.50mbgl on 18/12/2014.
5. Backfilled with cement/bentonite grout from 6.80m to 25.00mbgl.
6. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
Maple Road, Kings Lynn
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Borehole Record

BH402

Sheet 3 of 3

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535845.11E
192432.46N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)	Installations
Dense brownish grey clayey silty gravelly fine SAND, with occasional shell fragments. Gravel is rounded fine to coarse flint. Some sandy clay bands and pockets of green sand. (LAMBETH GROUP UNDIFFERENTIATED)				S	20.00-20.43	20.00	(11.20)	50/280mm (5,8,8,12,15,15)		
				D44	20.00-20.43					
		20.40		B45	20.40-20.70					
Brown and grey silty slightly gravelly fine SAND. Gravel is subrounded fine flint. (LAMBETH GROUP UNDIFFERENTIATED)				S	21.50-21.95	21.50	(10.80)	N=42 (5,7,10,10,9,13)		
				D46	21.50-21.95					
		21.70		B47	21.70-22.00					
Very stiff light grey slightly sandy CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		22.10		B48	22.10-22.50					
Dense light grey clayey silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)				B49	22.80-23.00					
				S	23.00-23.41	23.00	(17.50)	50/260mm (6,13,16,12,14,8)		
				D50	23.00-23.41					
				B51	23.00-23.50					
				S	24.50-24.87	24.50	(17.10)	50/220mm (5,8,8,18,24)		
				D52	24.50-24.87					
				B53	24.50-25.00					
		25.00								
Borehole Complete at 25.00 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	2.50	2.50			
200	8.50	7.50			
150	25.00	25.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
09/12/14	2.90	5	2.90	2.50	
09/12/14	2.90	10	2.90	2.50	
09/12/14	2.90	15	2.90	2.50	
09/12/14	2.90	20	2.90	2.50	

Dates: 08/12/2014-12/12/2014
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: J. Tomalin
Checked By: P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seal installed from 2.50m to 0.50mbgl and from 7.80m to 5.80mbgl.
3. Groundwater monitoring well installed with 50mm HDPE standpipe screened from 2.80m to 6.80mbgl.
4. Groundwater dipped at 3.50mbgl on 18/12/2014.
5. Backfilled with cement/bentonite grout from 6.80m to 25.00mbgl.
6. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
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Borehole Record

BH403

Sheet 1 of 2

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535794.32E
192587.13N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Brick Cobbles	0.08	
MADE GROUND: Orangish brown silty fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse flint, brick and concrete.	0.25	
MADE GROUND: Yellowish brown fine to coarse SAND and GRAVEL, with occasional wood fragments. Gravel is angular to subangular fine to coarse flint and concrete.	0.50	
MADE GROUND: Yellowish brown slightly silty very gravelly fine to coarse SAND. Gravel is angular fine to coarse flint and brick.	0.80	
MADE GROUND: Medium dense brown sandy GRAVEL, with frequent cobbles. Gravel is angular fine to coarse concrete.	1.50	
MADE GROUND: Brownish grey silty gravelly fine to coarse SAND. Gravel is angular fine to medium flint and brick.	1.60	
MADE GROUND: Firm brownish grey sandy slightly gravelly CLAY. Gravel is angular fine to medium flint and brick.	2.10	
MADE GROUND: Firm dark grey and brownish grey sandy slightly gravelly CLAY, with frequent cobbles. Gravel is angular fine to coarse flint, brick and concrete.	3.80	
MADE GROUND: Light grey weak concrete.	4.20	
MADE GROUND: Brownish grey clayey fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse brick and concrete.	4.80	
MADE GROUND: Soft dark grey and grey sandy slightly gravelly CLAY, with occasional shell fragments. Gravel is angular to subrounded fine to medium flint with rare brick. Moderate organic odour.	6.00	
MADE GROUND: Grey silty very sandy GRAVEL. Gravel is angular fine to coarse flint and concrete.	7.50	
MADE GROUND: Firm brownish grey silty gravelly CLAY. Gravel is angular fine to coarse brick and concrete.	8.60	
Stiff thinly laminated brownish grey slightly silty CLAY, with some fine sandy lenses. (LAMBETH GROUP UNDIFFERENTIATED)		

Borehole continued...

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)
B1	0.05-0.15				
B2	0.25-0.40				
B3	0.50-0.70				
B4	0.80-1.00				
B5	1.50-1.60				
S	1.60-2.05	0.00		N=17 (2,1,6,7,3,1)	
D6	1.60-2.05				
B7	1.60-2.00				
B8	2.10-2.30				
S	2.50-2.95	0.00		N=4 (1,1,1,1,1,1)	
B10	2.50-3.00				
D9	2.50-2.95				
S	3.50-3.78	2.50		49/132mm - Abandoned	
D11	3.50-3.78				
B12	3.50-3.80				
B13	3.80-4.20				
S	4.50-4.95	4.50	(4.40)	N=3 (1,0,1,0,1,1)	
D14	4.50-4.95				
B15	4.50-5.00				
B17	4.80-5.00				
S	5.50-5.95	5.50	(5.40)	N=5 (4,3,2,1,1,1)	
D16	5.50-5.95				
B18	5.50-6.00				
S	6.50-6.95	6.50	(6.00)	N=7 (7,4,2,1,2,2)	
D19	6.50-6.95				
B20	6.50-7.00				
B21	6.50-7.00				
S	7.50-7.95	7.50	(7.50)	N=4 (1,1,1,1,1,1)	
D22	7.50-7.95				
B23	7.50-8.00				
S	8.50-8.95	8.50		N=16 (1,1,3,4,4,5)	
D24	8.50-8.95				
B25	8.60-9.00				
UT26	9.50-9.95			50 blows	
D27	9.95-10.00				

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hours)
250	10.60	10.60	3.80	4.20	0120

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
12/12/14	3.80	5	3.80	3.50	7.50
12/12/14	3.80	10	3.80	3.50	7.50
12/12/14	3.80	15	3.80	3.50	7.50
12/12/14	3.80	20	3.80	3.50	7.50

Dates:	12/12/2014-15/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Exploratory hole terminated at 10.60mbgl.
3. Exploratory hole backfilled with grout and surface finished with bricks upon completion.
4. Geological interpretation completed by Amec Foster Wheeler.

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Borehole Record

BH403

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535794.32E
192587.13N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)	Installations
Stiff thinly laminated brownish grey slightly silty CLAY, with some fine sandy lenses. (LAMBETH GROUP UNDIFFERENTIATED)	▨	10.60								■
Borehole Complete at 10.60 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
250	10.60	10.60	3.80	4.20	0120

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
12/12/14	3.80	5	3.80	3.50	7.50
12/12/14	3.80	10	3.80	3.50	7.50
12/12/14	3.80	15	3.80	3.50	7.50
12/12/14	3.80	20	3.80	3.50	7.50

Dates:	12/12/2014-15/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Exploratory hole terminated at 10.60mbgl.
3. Exploratory hole backfilled with grout and surface finished with bricks upon completion.
4. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
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Borehole Record

BH404

Sheet 1 of 2

Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535762.18E
192693.05N

Description	Depth (m)	O.D. Level (m)
MADE GROUND: Reinforced Concrete	0.25	
MADE GROUND: Sandy GRAVEL. Gravel is angular fine to coarse concrete.	0.40	
MADE GROUND: Orangish brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint and concrete.	0.60	
MADE GROUND: Brown silty very gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse flint and brick.	1.00	
MADE GROUND: Brownish grey clayey very gravelly fine to coarse SAND, with occasional cobbles. Gravel is angular fine to coarse flint and brick. Rare pottery and glass.	1.80	
MADE GROUND: Soft thinly laminated brownish grey and greyish brown gravelly CLAY, with occasional cobbles. Gravel is angular fine to coarse flint, brick and concrete. Rare pottery, glass and metal.	6.50	
Firm brownish grey silty CLAY, with some sandy silt bands. (LAMBETH GROUP UNDIFFERENTIATED)	8.00	
Stiff to very stiff locally thinly laminated brownish grey silty CLAY, with rare flint gravel, locally bioturbated , some thin sandy silt bands. (LAMBETH GROUP UNDIFFERENTIATED)		
Borehole continued...		

Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)
B1	0.25-0.40				
B2	0.40-0.60				
B3	0.60-0.80				
B4	1.00-1.20				
S	1.50-1.95	0.00		N=7 (3,5,3,2,1,1)	
D5	1.50-1.95				
B6	1.50-2.00				
S	2.50-2.95	2.00		N=4 (1,0,1,1,1,1)	
D7	2.50-2.95				
B8	2.50-3.00				
S	3.50-3.95	3.00		N=3 (1,0,1,0,1,1)	
B10	3.50-4.00				
D9	3.50-3.95				
S	4.50-4.95	4.00		N=5 (1,1,1,1,1,2)	
D11	4.50-4.95				
B12	4.50-5.00				
S	5.50-5.95	5.00		N=11 (1,1,1,2,4,4)	
D13	5.50-5.95				
B14	5.50-6.00				
B16	5.90-6.10				
S	6.50-6.95	6.50	(6.40)	N=4 (1,1,1,1,1,1)	
D15	6.50-6.95				
B17	6.50-7.00				
S	7.50-7.95	7.50	(7.30)	N=7 (1,1,1,1,2,3)	
D18	7.50-7.95				
B19	7.50-8.00				
S	8.00-8.45	8.00	(3.60)	N=13 (1,2,3,3,3,4)	
D1	8.00-8.45				
B2	8.00-8.50				
S	9.00-9.45	9.00	(3.40)	N=18 (2,2,3,5,5,5)	
D3	9.00-9.45				
B4	9.00-9.50				

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	18.45	12.00			
250	8.00	8.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
16/12/14	6.00	5	5.95	6.00	8.00
16/12/14	6.00	10	5.90	6.00	8.00
16/12/14	6.00	15	5.90	6.00	8.00
16/12/14	6.00	20	5.85	6.00	8.00

Dates: 15/12/2014-18/12/2014
Plant: Dando 2000
Drilled By: A. Elshof
Logged By: J. Tomalin
Checked By: P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seal installed from 7.50m to 5.50mbgl.
3. Exploratory hole backfilled with grout and surface reinstated with hardstanding on completion.
4. Geological interpretation completed by Amec Foster Wheeler.

GROUND TECHNOLOGY
Maple Road, Kings Lynn
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Borehole Record

Sheet 2 of 2

BH404

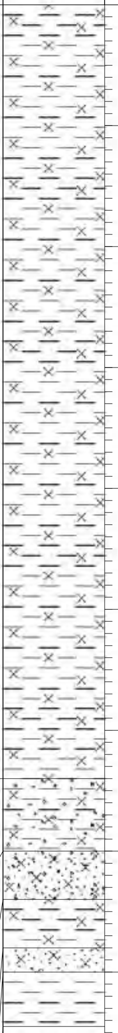
Project: Edmonton Ecopark 2nd Phase

Project ID: GTS-14-524

Client : Amec Foster Wheeler

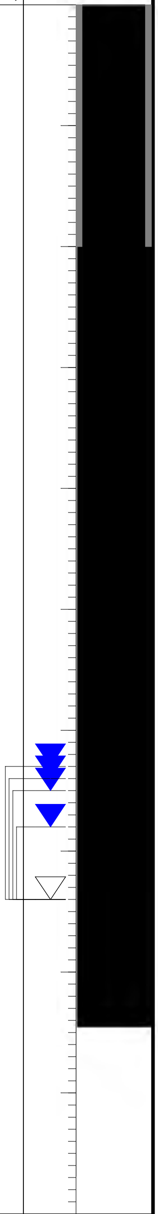
Engineer : Joanne Gavigan / Ben Smith

Ground Level: -
Coordinates: 535762.18E
192693.05N



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	FID (ppm)
Stiff to very stiff locally thinly laminated brownish grey silty CLAY, with rare flint gravel, locally bioturbated , some thin sandy silt bands. (LAMBETH GROUP UNDIFFERENTIATED)			UT5	10.00-10.45			30 blows	
			D6	10.45-10.50				
			S D7 B8	11.50-11.95 11.50-11.95 11.50-12.00	11.00		N=20 (2,3,4,4,6,6)	
			UT9	13.00-13.45			40 blows	
			D10	13.45-13.50				
			S D11 B12	14.50-14.95 14.50-14.95 14.50-15.00	12.00		N=22 (2,3,4,5,6,7)	
			UT13	16.00-16.45			45 blows	
Very stiff greenish grey and grey silty slightly gravelly CLAY, with occasional shell fragments. Gravel is rounded fine flint. (LAMBETH GROUP UNDIFFERENTIATED)	16.40		D14	16.45-16.50				
Brownish grey gravelly very silty fine to medium SAND, with occasional shell fragments. Gravel is rounded fine flint. (LAMBETH GROUP UNDIFFERENTIATED)	17.00		B15	17.00-17.20				
Greenish grey silty CLAY, with occasional shell fragments. Some sandy silt and silty fine sand bands. (LAMBETH GROUP UNDIFFERENTIATED)	17.40		S D16	17.50-17.95 17.50-17.95	12.00	(10.50)	N=25 (5,5,5,5,7,8)	
Green and blue silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)	17.80							
Firm to stiff green and blue CLAY. (LAMBETH GROUP UNDIFFERENTIATED)	18.00							
Borehole Complete at 18.45 m	18.45							

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hours)
150	18.45	12.00			
250	8.00	8.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
16/12/14	6.00	5	5.95	6.00	8.00
16/12/14	6.00	10	5.90	6.00	8.00
16/12/14	6.00	15	5.90	6.00	8.00
16/12/14	6.00	20	5.85	6.00	8.00

Dates:	15/12/2014-18/12/2014
Plant:	Dando 2000
Drilled By:	A. Elshof
Logged By:	J. Tomalin
Checked By:	P. Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Environmental seal installed from 7.50m to 5.50mbgl.
3. Exploratory hole backfilled with grout and surface reinstated with hardstanding on completion.
4. Geological interpretation completed by Amec Foster Wheeler.

GTS-14-524

Edmondton Ecopark

Advent Way

Edmonton

Appendix B

Geotechnical Lab Results

Ground Technology Services

UKAS TESTING 2788

Laboratory Report

GEO Site & Testing Services Ltd

Contract Number: 25599

Client's Reference: **GTS-14-524**

Report Date: **26-01-2015**

Client
Ground Technology Services
Maple Road
Kings Lynn
Norfolk
PE34 3AF

Contract Title: **Edmonton Eco Park 2nd Phase**
For the attention of: **Mail**

Date Received: **12-01-2015**
Date Commenced: **12-01-2015**
Date Completed: **26-01-2015**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	27
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	27
PSD Wet Sieve method 1377 : 1990 Part 2 : 9.2 - * UKAS	11
PSD: Sedimentation by pipette carried out with Wet Sieve 1377 : 1990 Part 2 : 9.4 - * UKAS	7
Quick Undrained Triaxial Compression test - single specimen at one confining pressure (100mm or 38mm diameter) 1377 : 1990 Part 7 : 8 - * UKAS	6
Determination of Permeability in a triaxial cell BS1377 Part 6 :1990 Clause 6 - * UKAS	6
Extra Over Item (4 Days Over)	30

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Williams (Office Manager) - Paul Evans (Quality/Technical Manager)

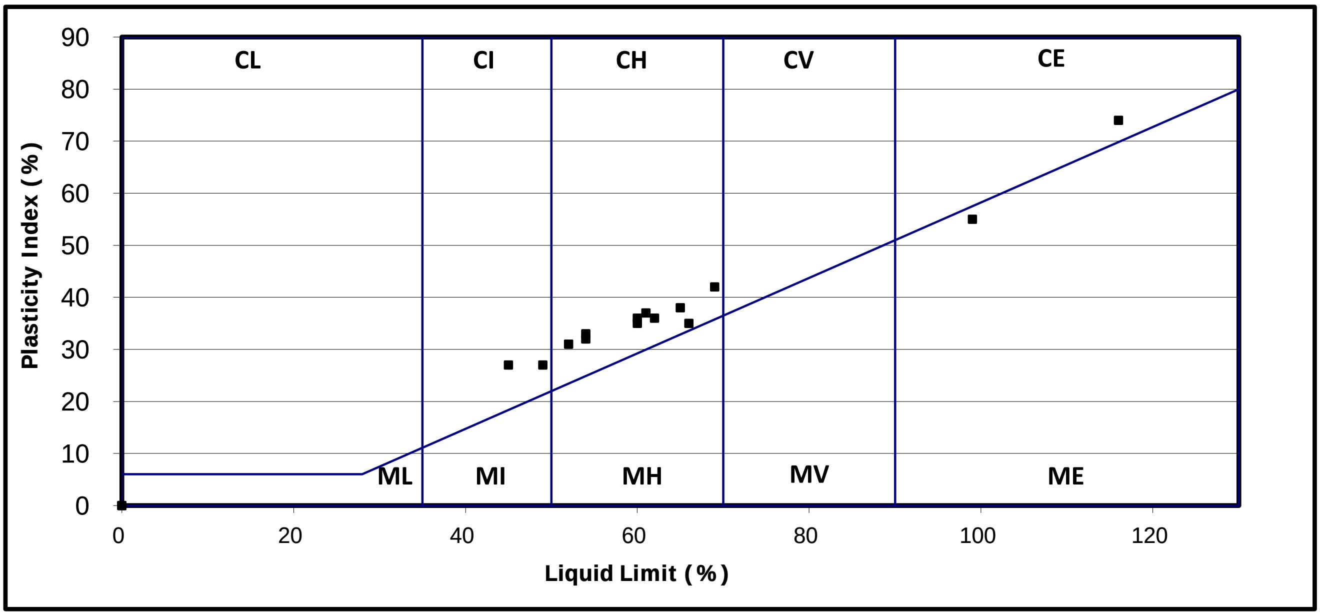
Test Report: **Method of the Determination of the plastic limit and plasticity index**
BS 1377 : Part 2 : 1990 Method 5

Client ref: **GTS-14-524**
Location: **Edmonton Eco Park 2nd Phase**
Contract Number: **25599-120115**

Hole / Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
BH401/7	B	2.00 - 2.30	73	99	44	55	100	ME Extremely High Plasticity
BH401/20	B	6.80 - 7.00	35	66	31	35	100	CH High Plasticity
BH401A/24	D	8.95 - 9.00	23	52	21	31	100	CH High Plasticity
BH401A/28	D	11.45 - 11.50	24	54	22	32	100	CH High Plasticity
BH401A/33	D	14.45 - 14.50	30	65	27	38	100	CH High Plasticity
BH401A/37	D	17.45 - 17.50	25	60	24	36	100	CH High Plasticity
BH401A/41	B	18.70 - 19.00	36	62	26	36	75	CH High Plasticity
BH401A/46	D	21.50 - 21.95	21	49	22	27	100	CI Intermediate Plasticity
BH402/5	D	1.50 - 2.15	85	116	42	74	100	CE Extremely High Plasticity
BH402/17	B	5.70 - 5.90	25	54	21	33	74	CH High Plasticity
BH402/18	D	6.50 - 6.95	2.7		NP		5	
BH402/22	D	7.95 - 8.00	28	60	25	35	100	CH High Plasticity
BH402A/26	D	9.95 - 10.00	29	69	27	42	100	CH High Plasticity
BH402A/36	D	15.95 - 16.00	25	61	24	37	100	CH High Plasticity
BH402A/47	B	21.70 - 22.00	19	45	18	27	90	CI Intermediate Plasticity

Symbols: **NP : Non Plastic** **# : Liquid Limit and Plastic Limit Wet Sieved**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Jonathan Tatam (Office/Quality Assistant)
Date: 22.1.15

UKAS TESTING 2788

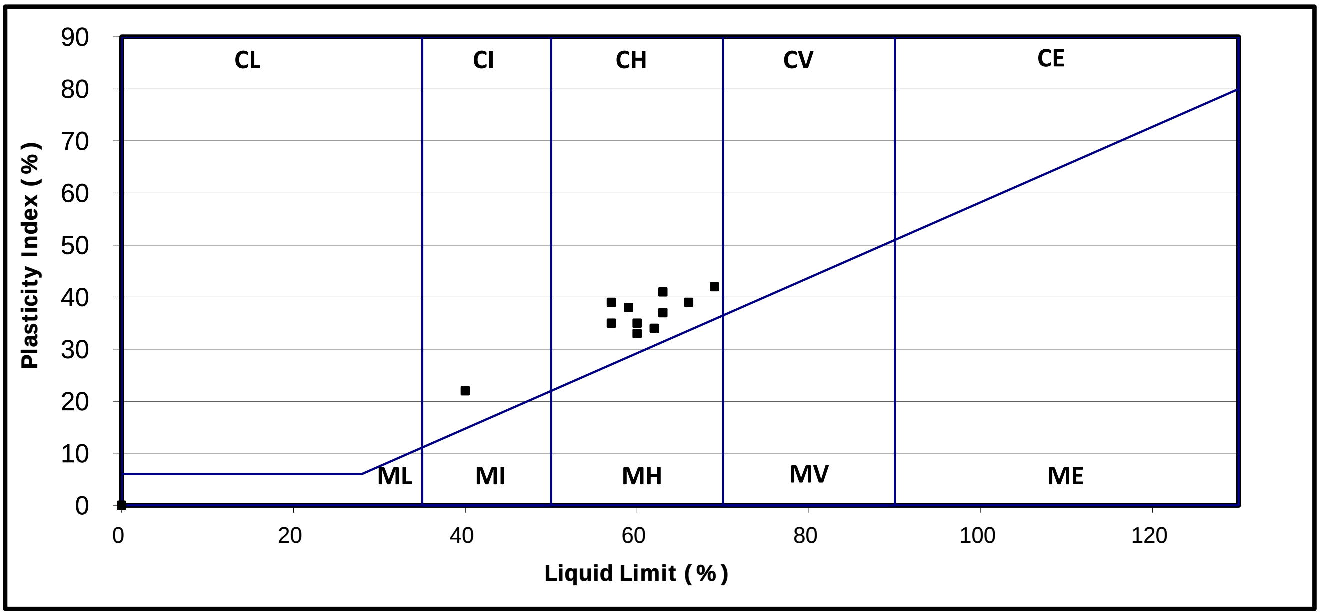
Test Report: **Method of the Determination of the plastic limit and plasticity index**
BS 1377 : Part 2 : 1990 Method 5

Client ref: **GTS-14-524**
Location: **Edmonton Eco Park 2nd Phase**
Contract Number: **25599-120115**

Hole / Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3/4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
BH403/22	D	7.50 - 7.95	39	60	25	35	88	CH High Plasticity
BH403/23	B	7.50 - 8.00	39	62	28	34	82	CH High Plasticity
BH403/25	B	8.60 - 9.00	31	57	18	39	100	CH High Plasticity
BH403/27	D	9.95 - 10.00	23	40	18	22	100	CI Intermediate Plasticity
BH404/16	B	5.90 - 6.10	52	60	27	33	75	CH High Plasticity
BH404/19	B	7.50 - 8.00	33	62	28	34	88	CH High Plasticity
BH404A/2	B	8.00 - 8.50	36	63	22	41	93	CH High Plasticity
BH404A/4	B	9.00 - 9.50	27	57	22	35	100	CH High Plasticity
BH404A/8	B	11.50 - 12.00	29	66	27	39	100	CH High Plasticity
BH404A/10	D	13.45 - 13.50	27	69	27	42	100	CH High Plasticity
BH404A/12	B	14.50 - 15.00	25	59	21	38	100	CH High Plasticity
BH404A/14	D	16.45 - 16.50	26	63	26	37	100	CH High Plasticity

Symbols: **NP : Non Plastic** **# : Liquid Limit and Plastic Limit Wet Sieved**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



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For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Jonathan Tatam (Office/Quality Assistant)
Date: 22.1.15

UKAS TESTING 2788

Test Report:

Particle Size Distribution Test

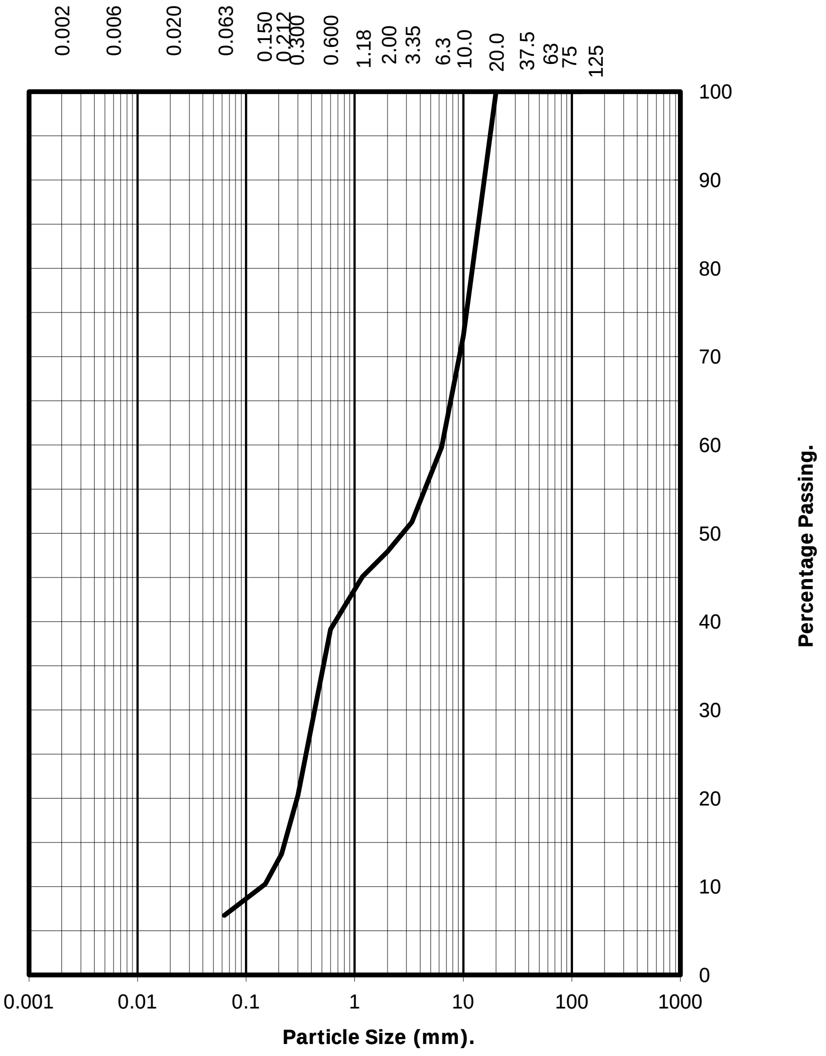
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH401**
Sample Number:	**10**
Depth from (m):	**3.50**
Depth to (m):	**3.95**
Description:	**Brown silty clayey sandy GRAVEL (fine-medium)**
Sample Type:	**D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	72
6.3	60
3.35	51
2.00	48
1.18	45
0.60	39
0.300	20
0.212	14
0.150	10
0.063	7

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	7	**41**	**52**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Katam

Date: 22.1.15

UKAS TESTING 2788

Test Report: **Particle Size Distribution Test**

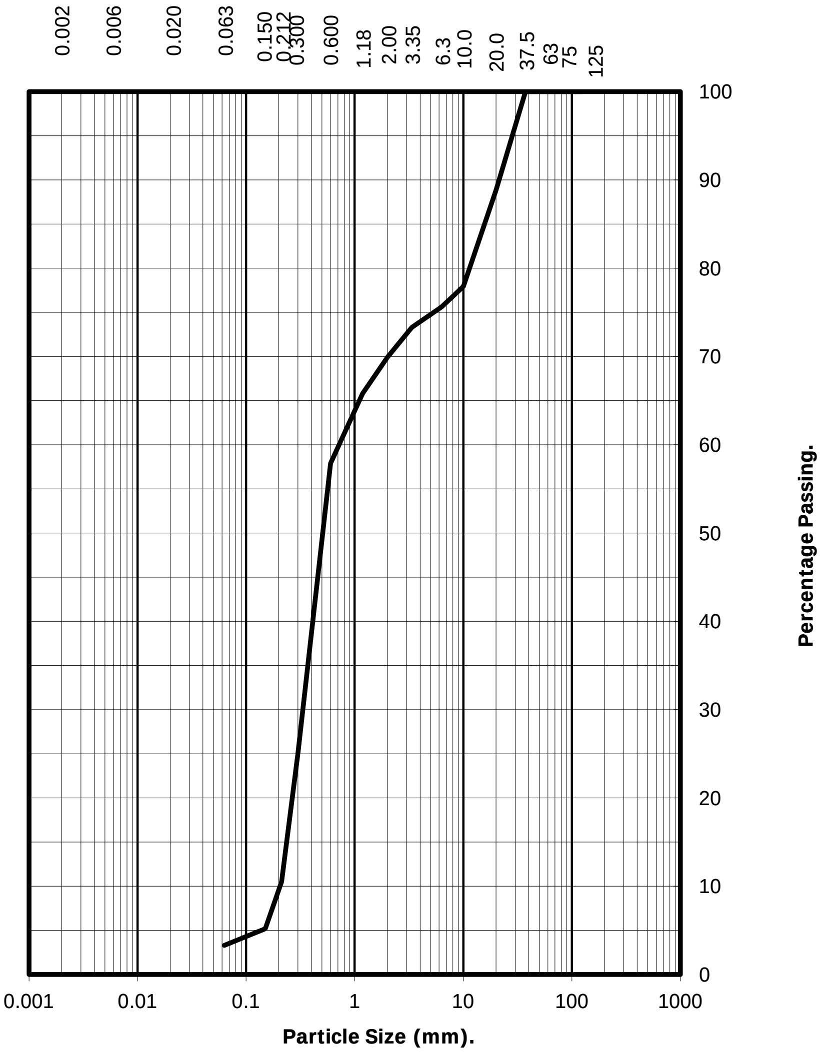
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH401**
Sample Number:	**14**
Depth from (m):	**5.50**
Depth to (m):	**5.95**
Description:	**Brown silty clayey gravelly (fine-coarse) SAND**
Sample Type:	**D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	89
10	78
6.3	76
3.35	73
2.00	70
1.18	66
0.60	58
0.300	25
0.212	10
0.150	5
0.063	3

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	3	**67**	**30**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

GSTL
GEO SITE & TESTING SERVICES LTD

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Ktatam

Date: 22.1.15

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Test Report: **Particle Size Distribution Test**

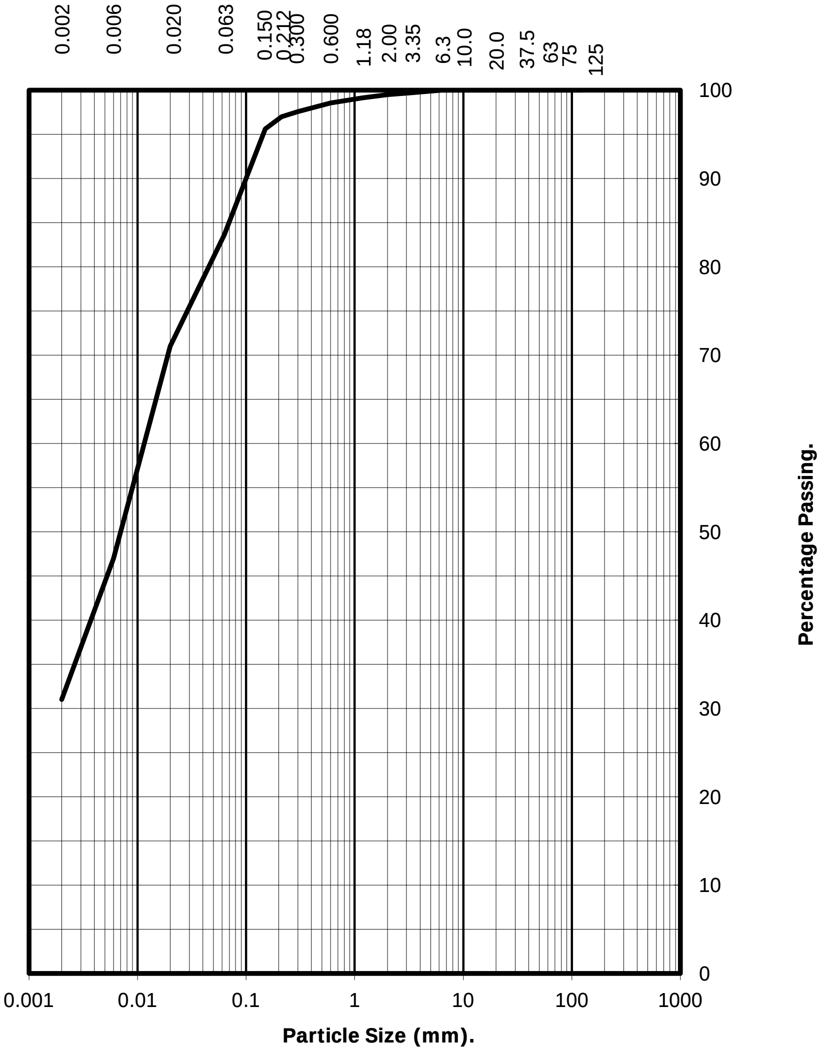
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH401A**
Sample Number:	**39**
Depth from (m):	**18.10**
Depth to (m):	**18.30**
Description:	**Brown gravelly (fine) sandy clayey SILT**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2.00	99
1.18	99
0.60	99
0.300	98
0.212	97
0.150	96
0.063	84

Particle Diameter	Percentage Passing
0.02	71
0.006	47
0.002	31



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
31	**53**	**15**	**1**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Katam

Date: 22.1.15

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GEO SITE & TESTING SERVICES LTD

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Test Report: **Particle Size Distribution Test**

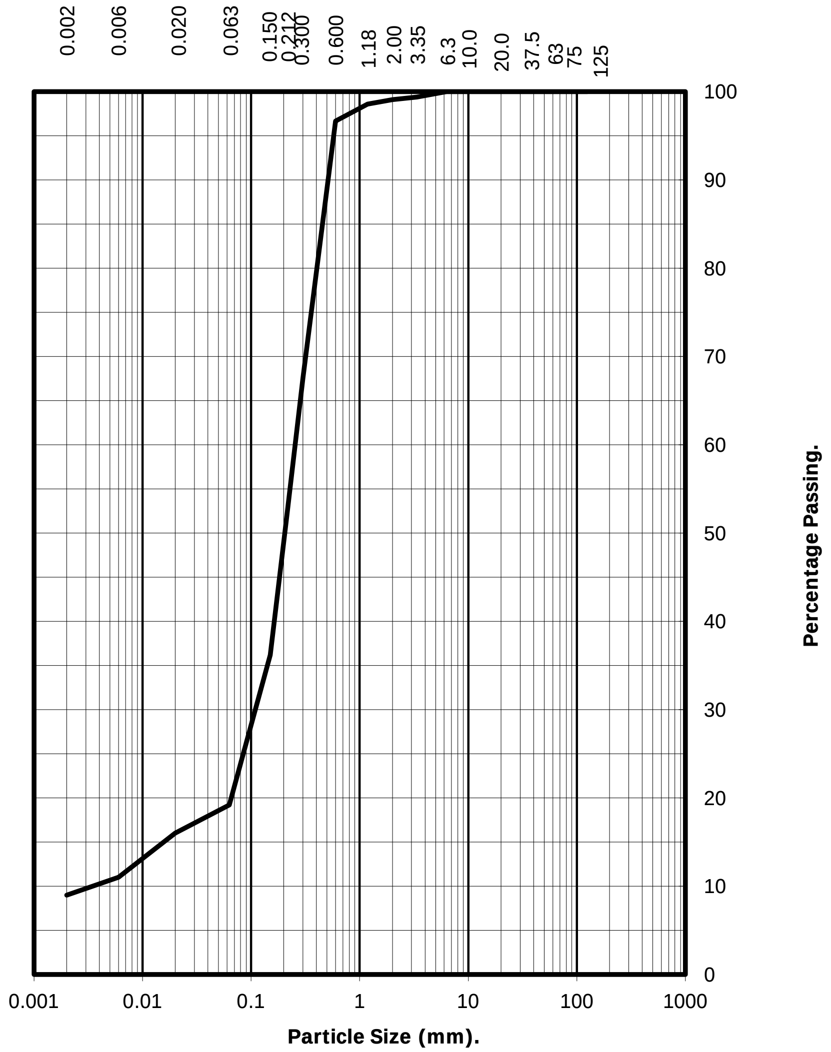
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref: **GTS-14-524**
Location: **Edmonton Eco Park 2nd Phase**
Contract Number: **25599-120115**
Hole Number: **BH401A**
Sample Number: **52**
Depth from (m): **24.50**
Depth to (m): **24.95**
Description: **Brown gravelly (fine) clayey silty SAND**
Sample Type: **D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2.00	99
1.18	99
0.60	97
0.300	68
0.212	52
0.150	36
0.063	19

Particle Diameter	Percentage Passing
0.02	16
0.006	11
0.002	9



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
9	**10**	**80**	**1**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

Test Report: **Particle Size Distribution Test**

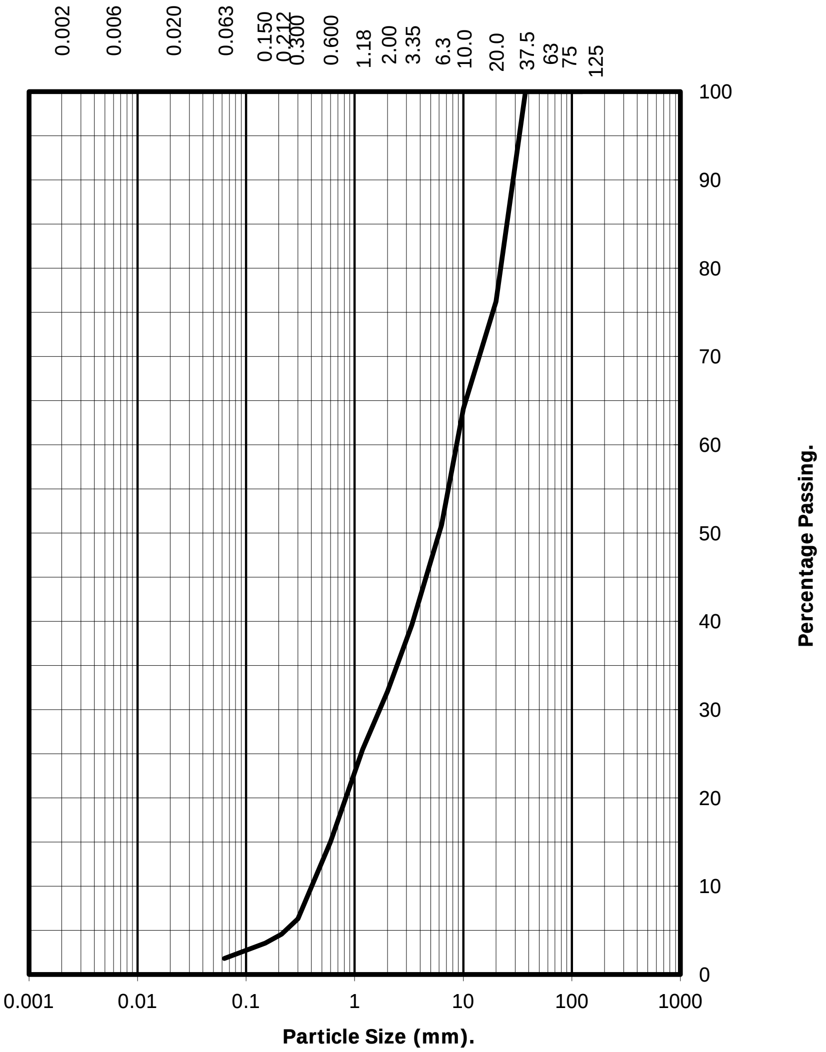
BS 1377 Part 2:1990.

Wet Sieve, Clause 9.2

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402**
Sample Number:	**11**
Depth from (m):	**3.50**
Depth to (m):	**3.95**
Description:	**Brown silty clayey sandy GRAVEL (fine-coarse)**
Sample Type:	**D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	76
10	64
6.3	51
3.35	40
2.00	32
1.18	25
0.60	15
0.300	6
0.212	5
0.150	4
0.063	2

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	2	**30**	**68**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

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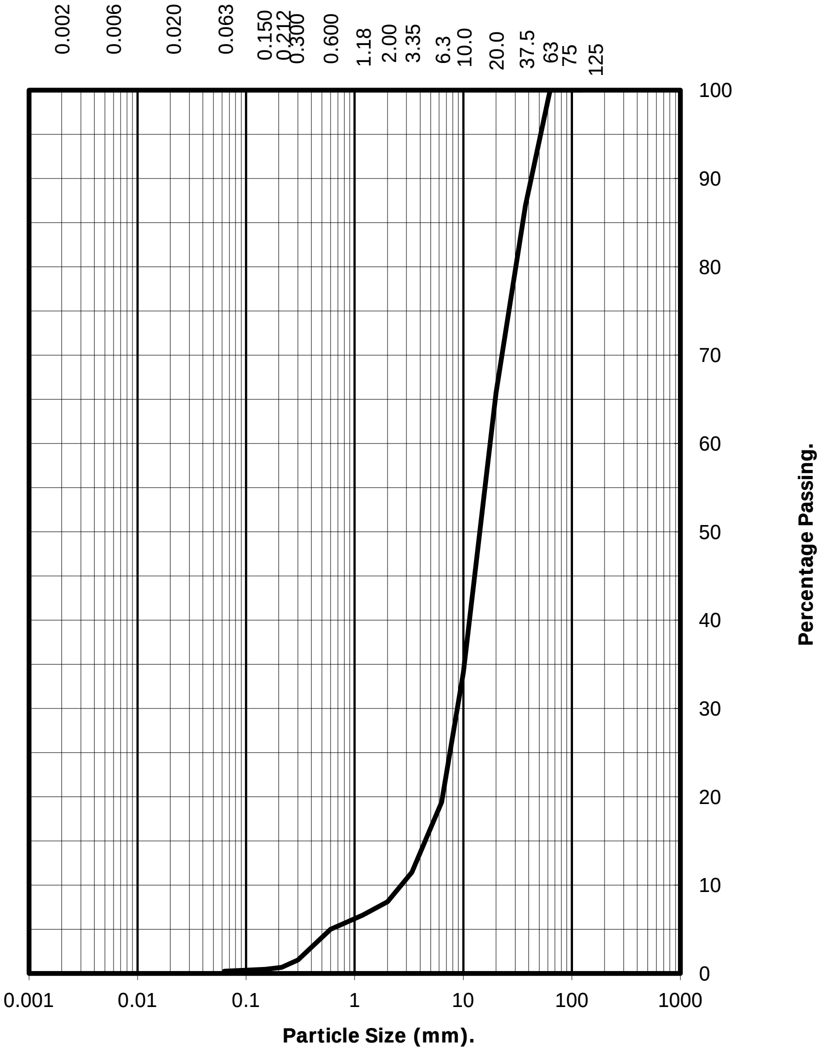
Test Report:	**Particle Size Distribution Test**
	BS 1377 Part 2:1990.
	Wet Sieve, Clause 9.2
Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402**
Sample Number:	**16**
Depth from (m):	**5.50**
Depth to (m):	**6.00**
Description:	**Brown sandy GRAVEL (fine-coarse)**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	87
20	66
10	34
6.3	19
3.35	11
2.00	8
1.18	7
0.60	5
0.300	2
0.212	1
0.150	0
0.063	0

Particle Diameter	Percentage Passing
0.02	#
0.006	#
0.002	#



	Silt and Clay	Sand	Gravel	Cobbles	Soil Fraction
	0	**8**	**92**	**0**	Total Percentage

Remarks:

#- not determined

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

GEO SITE & TESTING SERVICES LTD

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Test Report: **Particle Size Distribution Test**

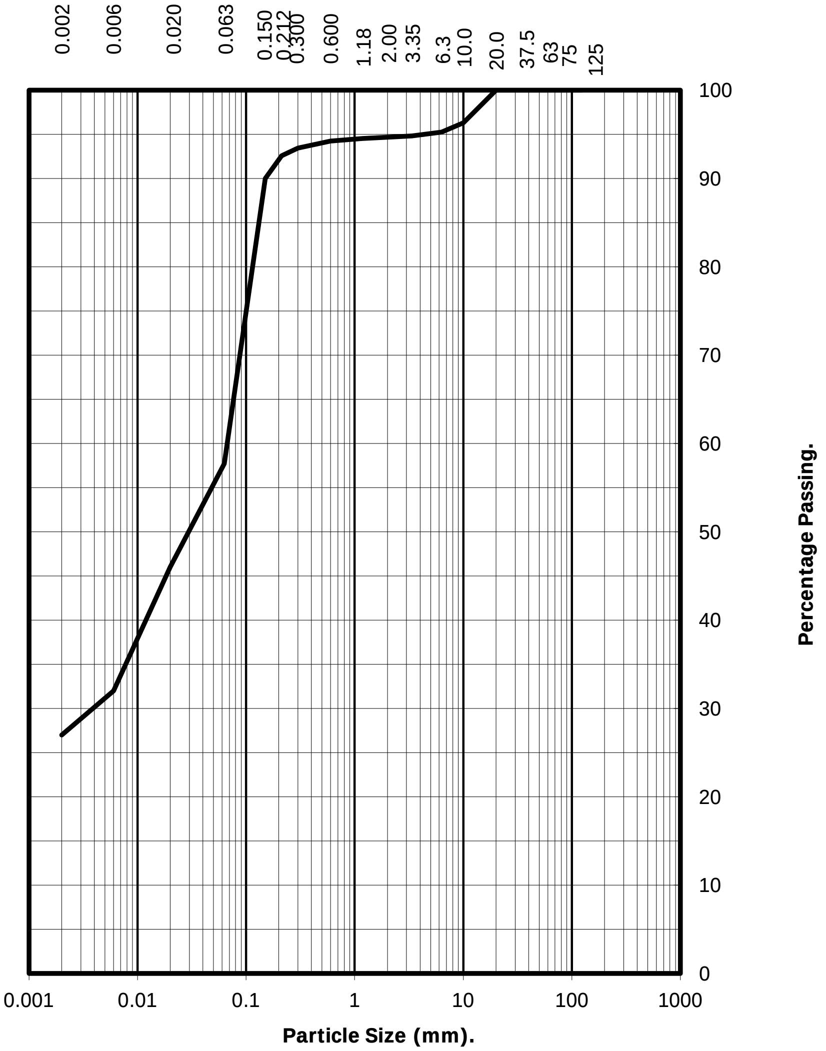
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402A**
Sample Number:	**40**
Depth from (m):	**17.80**
Depth to (m):	**18.00**
Description:	**Brown gravelly (fine-medium) clayey silty SAND**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	96
6.3	95
3.35	95
2.00	95
1.18	95
0.60	94
0.300	93
0.212	93
0.150	90
0.063	58

Particle Diameter	Percentage Passing
0.02	46
0.006	32
0.002	27



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
27	**31**	**37**	**5**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

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UKAS TESTING 2788

Test Report: **Particle Size Distribution Test**

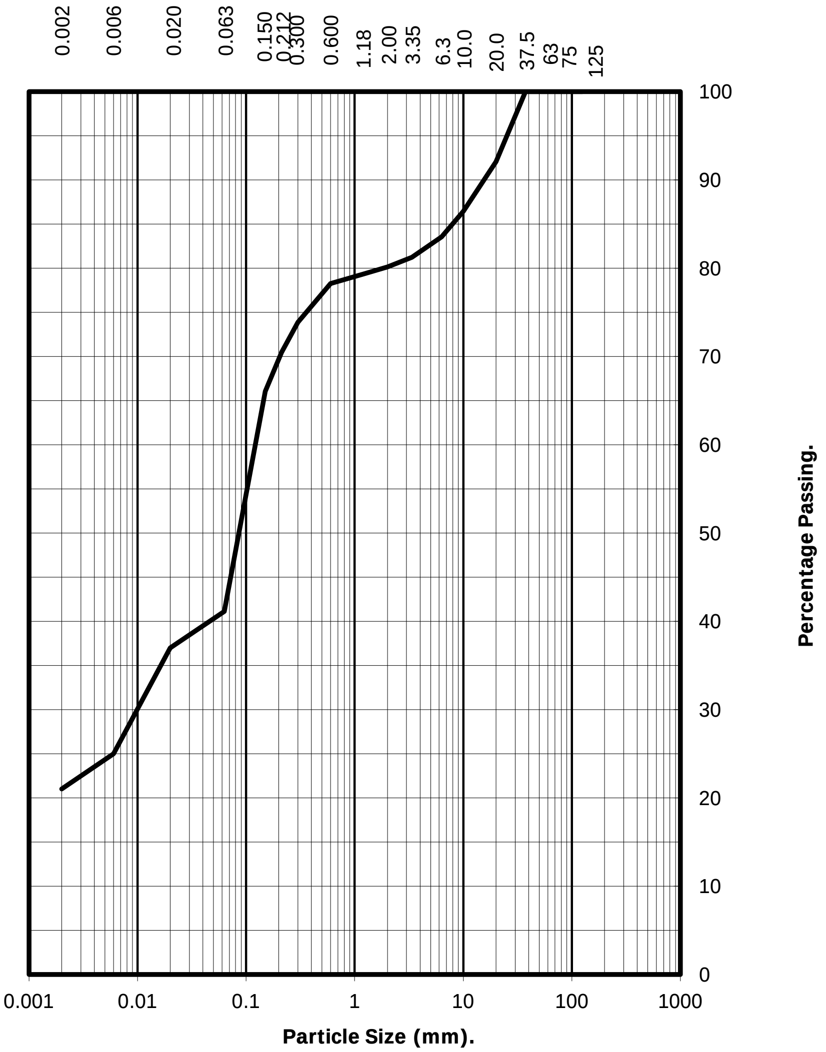
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402A**
Sample Number:	**44**
Depth from (m):	**20.00**
Depth to (m):	**20.43**
Description:	**Brown gravelly (fine-coarse) silty clayey SAND**
Sample Type:	**D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	86
6.3	84
3.35	81
2.00	80
1.18	79
0.60	78
0.300	74
0.212	70
0.150	66
0.063	41

Particle Diameter	Percentage Passing
0.02	37
0.006	25
0.002	21



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
21	**20**	**39**	**20**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

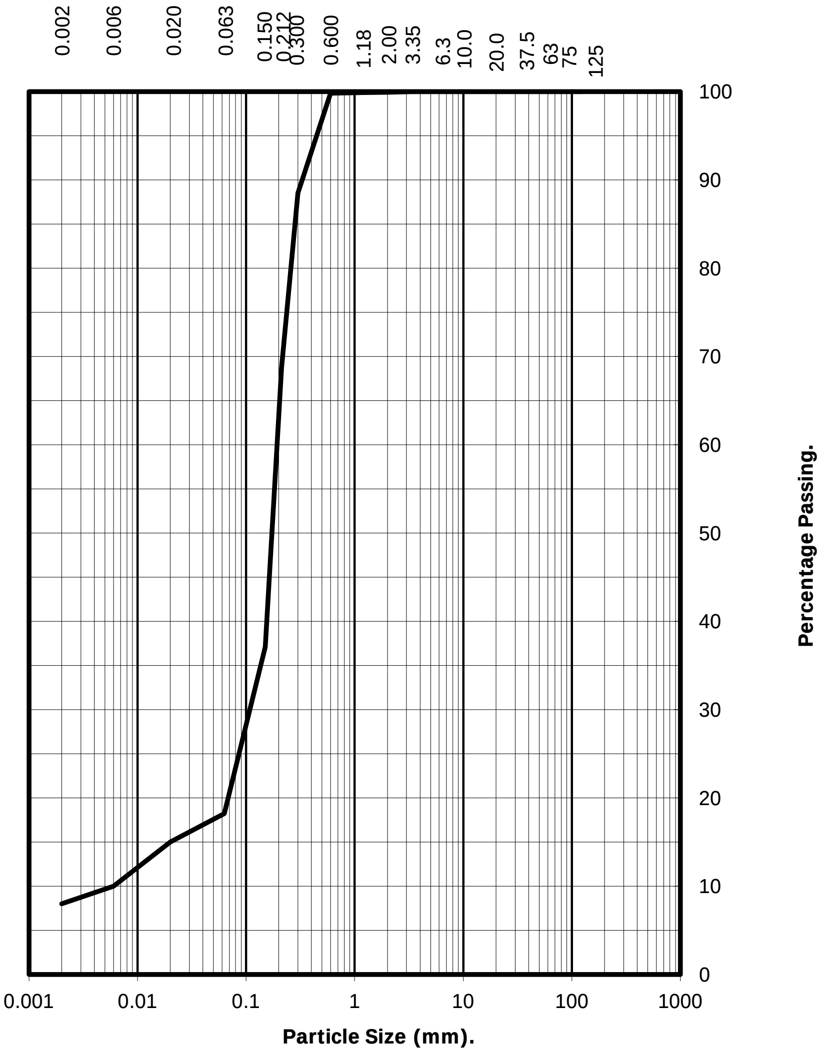
Date: 22.1.15

UKAS TESTING 2788

Test Report:	**Particle Size Distribution Test**
	BS 1377 Part 2:1990.
	Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4
Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402A**
Sample Number:	**48**
Depth from (m):	**22.10**
Depth to (m):	**22.50**
Description:	**Brown clayey silty SAND**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2.00	100
1.18	100
0.60	100
0.300	89
0.212	69
0.150	37
0.063	18

Particle Diameter	Percentage Passing
0.02	15
0.006	10
0.002	8



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
8	**10**	**82**	**0**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

Test Report: **Particle Size Distribution Test**

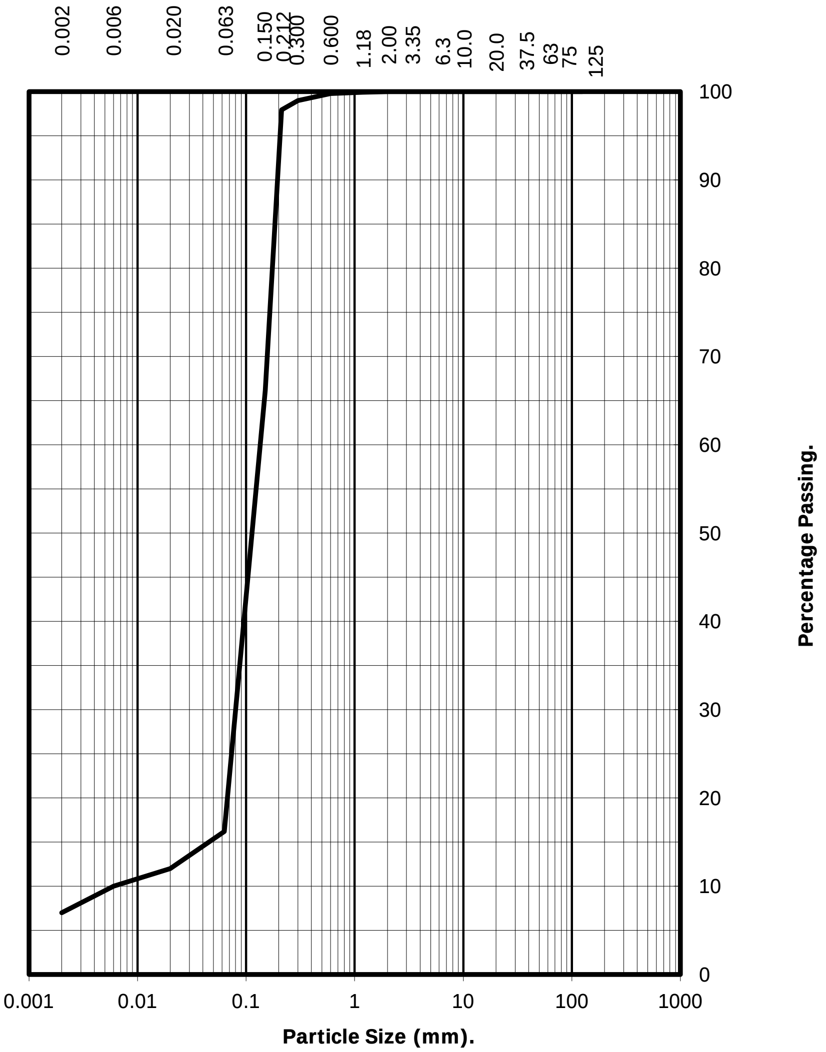
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH402A**
Sample Number:	**52**
Depth from (m):	**24.50**
Depth to (m):	**24.87**
Description:	**Brown clayey silty SAND**
Sample Type:	**D**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2.00	100
1.18	100
0.60	100
0.300	99
0.212	98
0.150	66
0.063	16

Particle Diameter	Percentage Passing
0.02	12
0.006	10
0.002	7



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
7	**9**	**84**	**0**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

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Test Report: **Particle Size Distribution Test**

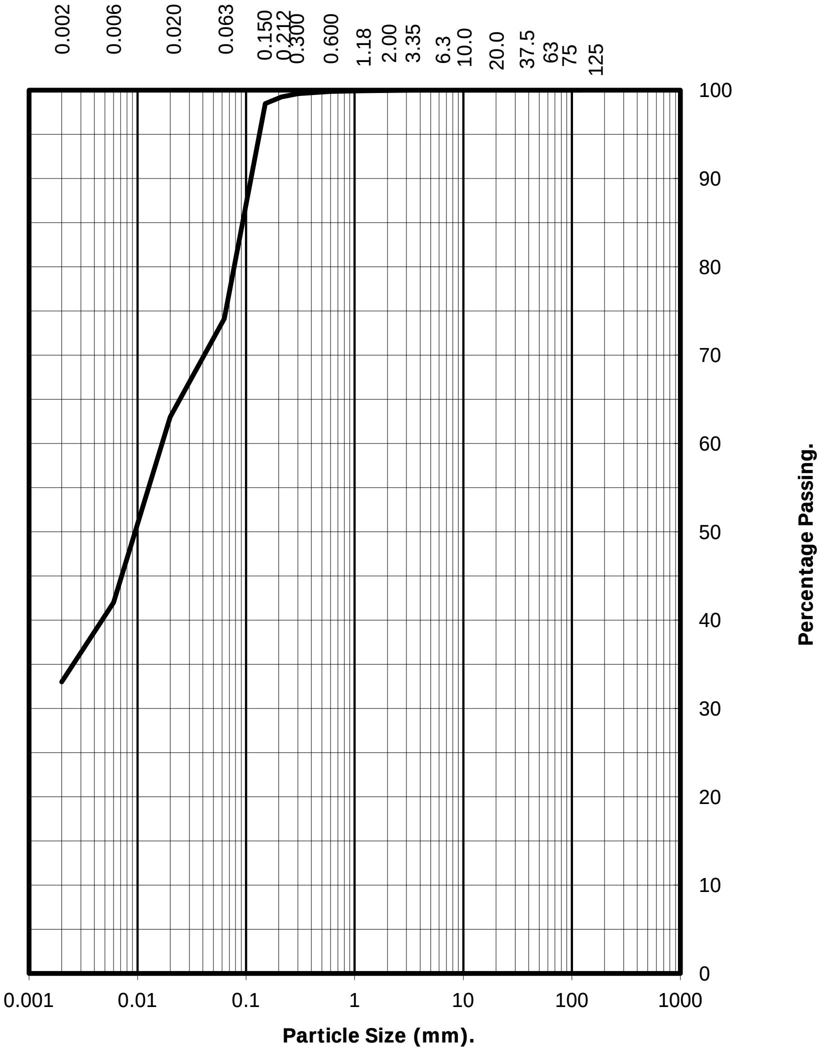
BS 1377 Part 2:1990.

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number:	**BH404A**
Sample Number:	**15**
Depth from (m):	**17.00**
Depth to (m):	**17.20**
Description:	**Brown sandy clayey SILT**
Sample Type:	**B**

BS Test Sieve	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2.00	100
1.18	100
0.60	100
0.300	100
0.212	99
0.150	98
0.063	74

Particle Diameter	Percentage Passing
0.02	63
0.006	42
0.002	33



Clay	Silt	Sand	Gravel	Cobbles	Soil Fraction
33	**41**	**26**	**0**	**0**	Total Percentage

Remarks:

Cl 9.4.8 - Sample has not been pretreated

For and behalf of GEO Site & Testing Services Ltd

GSTL
GEO SITE & TESTING SERVICES LTD

Authorised By: **Jonathan Tatam (Office/Quality Assistant)**

Date: 22.1.15

UKAS TESTING 2788

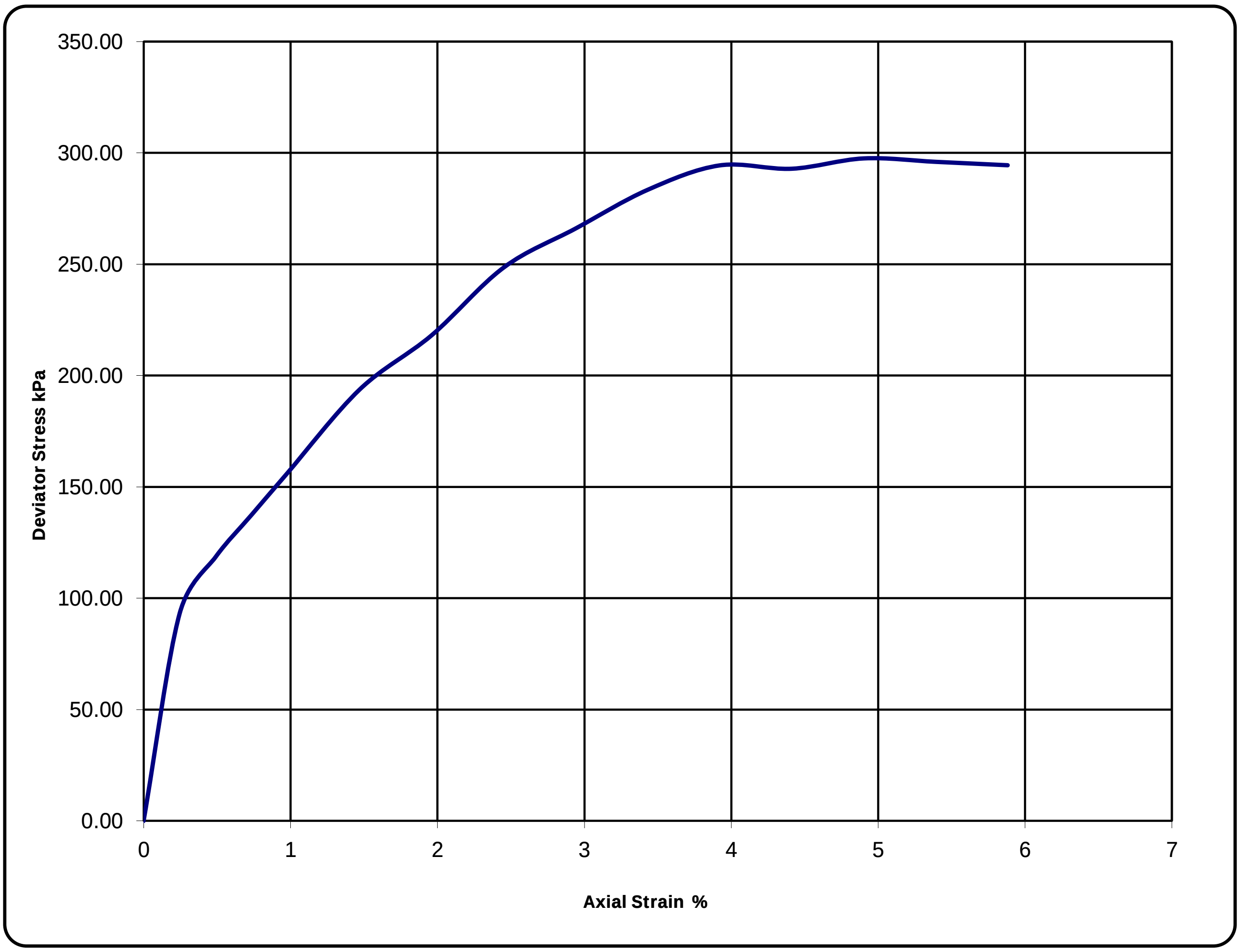
Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test

without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**23**
Depth (m) :	**8.50 - 8.95**
Sample Type :	**UT**
Sample Description :	**Firm brown silty CLAY**



Diameter (mm):		104	Height (mm):		204	Test:	UT 104 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28	1.91	1.50	100	297	149	4.9	Compound	Latex Membrane used 0.2 mm thickness

Checked By:
Jonathan Tatam (Office/Quality Assistant)
JTatam

Approved By:
Paul Evans (Quality Manager)
DP Evans

Date Approved: 22/1/15

UKAS TESTING 2788

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**23**
Depth (m) :	**8.50 - 8.95**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):		104	Height (mm):		204	Test:	UT 104 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28	1.91	1.50	100	297	149	4.9	Compound	Latex Membrane used 0.2 mm thickness

GSTL
GEO Site & Testing Services Limited

Checked By:
Jonathan Tatam (Office/Quality Assistant)

Tatam

Approved By:
Paul Evans (Quality Manager)

DP Evans

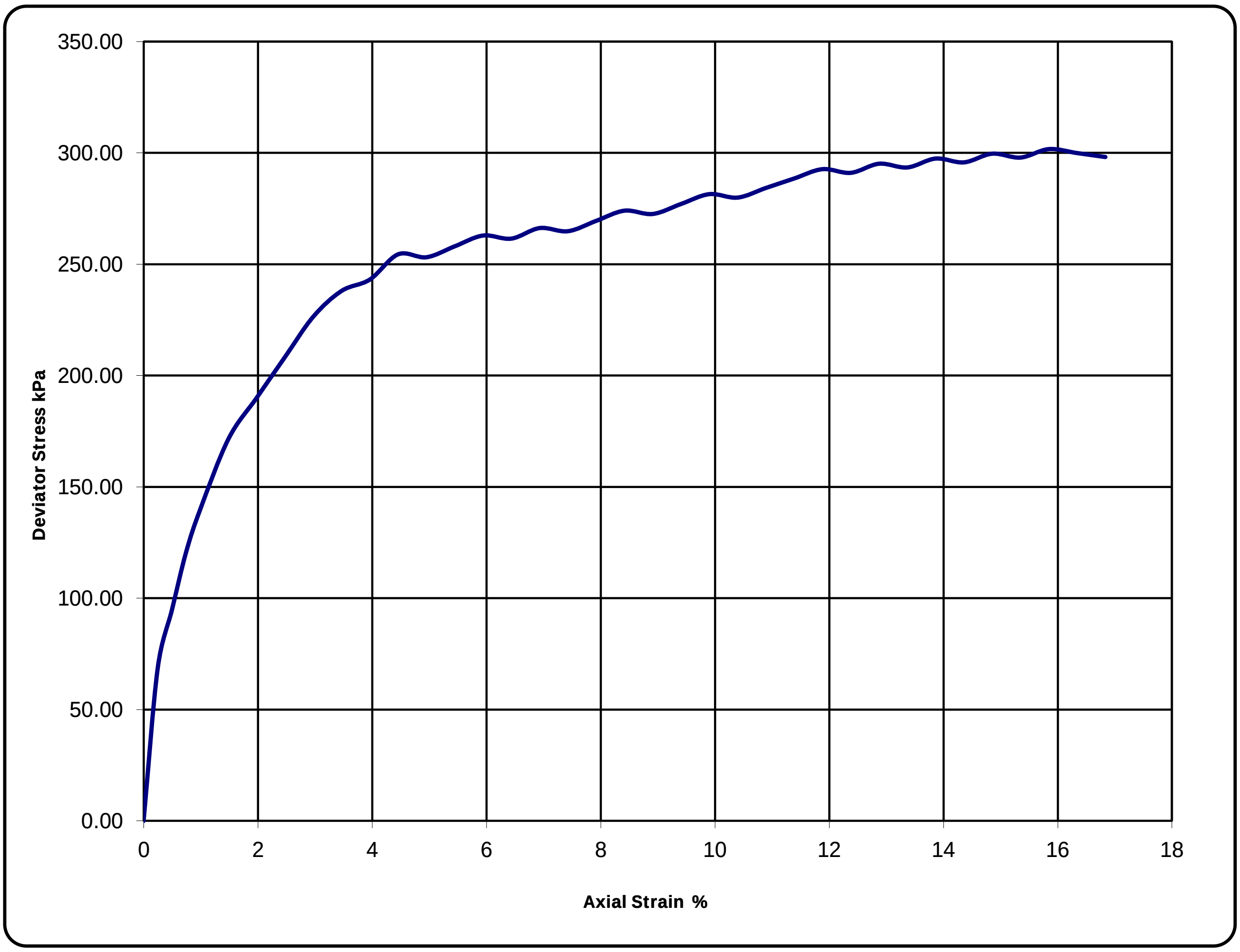
UKAS
TESTING
2788

Date Approved: 22/1/15

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**27**
Depth (m) :	**11.00 - 11.45**
Sample Type :	**UT**
Sample Description :	**Firm brown gravelly (fine) silty CLAY**



Diameter (mm):	103	Height (mm):		202	Test:	UT 103 mm Single Stage.			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	24	2.06	1.66	100	302	151	15.8	Compound	Latex Membrane used 0.2 mm thickness

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Checked By:
Jonathan Tatam (Office/Quality Assistant)
Tatam

Approved By:
Paul Evans (Quality Manager)
D P Evans

Date Approved: 22/1/15

UKAS TESTING 2788

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**27**
Depth (m) :	**11.00 - 11.45**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):	103	Height (mm):	202	Test:	UT 103 mm Single Stage.				
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	24	2.06	1.66	100	302	151	15.8	Compound	Latex Membrane used 0.2 mm thickness

Checked By:
Jonathan Tatam (Office/Quality Assistant)

Approved By:
Paul Evans (Quality Manager)

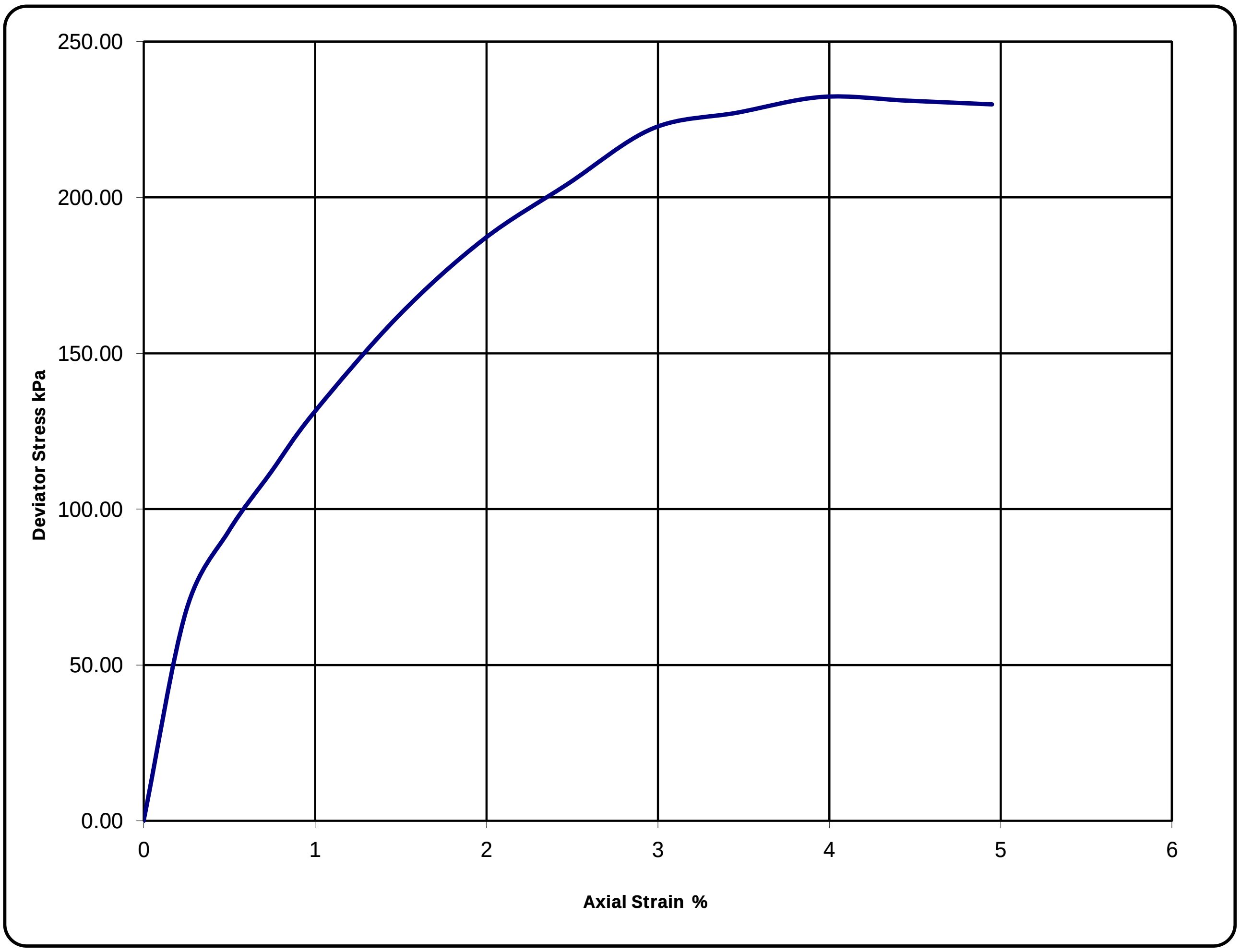
DP Evans

Date Approved: 22/1/15

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**32**
Depth (m) :	**14.00 - 14.45**
Sample Type :	**UT**
Sample Description :	**Firm brown silty CLAY**



Diameter (mm):	104	Height (mm):	202	Test:	UT 104 mm Single Stage.				
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28	1.94	1.51	150	232	116	4.0	Compound	Latex Membrane used 0.2 mm thickness

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Checked By:
Jonathan Tatam (Office/Quality Assistant)
Katam

Approved By:
Paul Evans (Quality Manager)
DP Evans

Date Approved: 22/1/15

UKAS TESTING 2788

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH401A**
Sample Number:	**32**
Depth (m) :	**14.00 - 14.45**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):	104	Height (mm):	202	Test:	UT 104 mm Single Stage.				
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	28	1.94	1.51	150	232	116	4.0	Compound	Latex Membrane used 0.2 mm thickness

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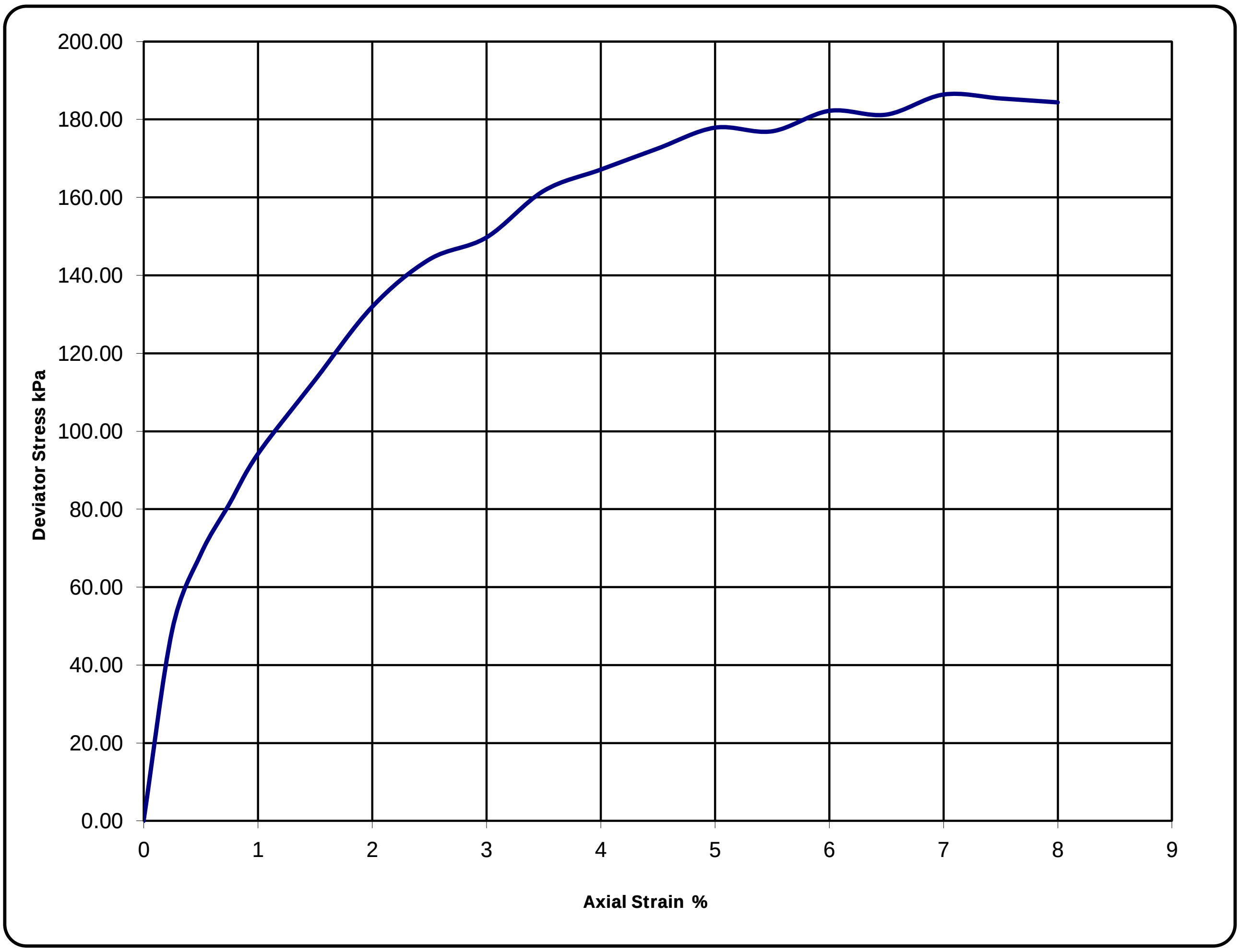
Date Approved: 22/1/15

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402**
Sample Number:	**21**
Depth (m) :	**7.50 - 7.95**
Sample Type :	**UT**
Sample Description :	**Stiff brown silty CLAY**



Diameter (mm):	103	Height (mm):	200	Test:	UT 103 mm Single Stage.				
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	31	1.98	1.52	80	186	93	7.0	Compound	Latex Membrane used 0.2 mm thickness

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Checked By:
Jonathan Tatam (Office/Quality Assistant)
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Approved By:
Paul Evans (Quality Manager)
DP Evans

Date Approved: 22/1/15

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Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test

without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402**
Sample Number:	**21**
Depth (m) :	**7.50 - 7.95**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):		103	Height (mm):		200	Test:	UT 103 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	31	1.98	1.52	80	186	93	7.0	Compound	Latex Membrane used 0.2 mm thickness

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Paul Evans (Quality Manager)
D P Evans

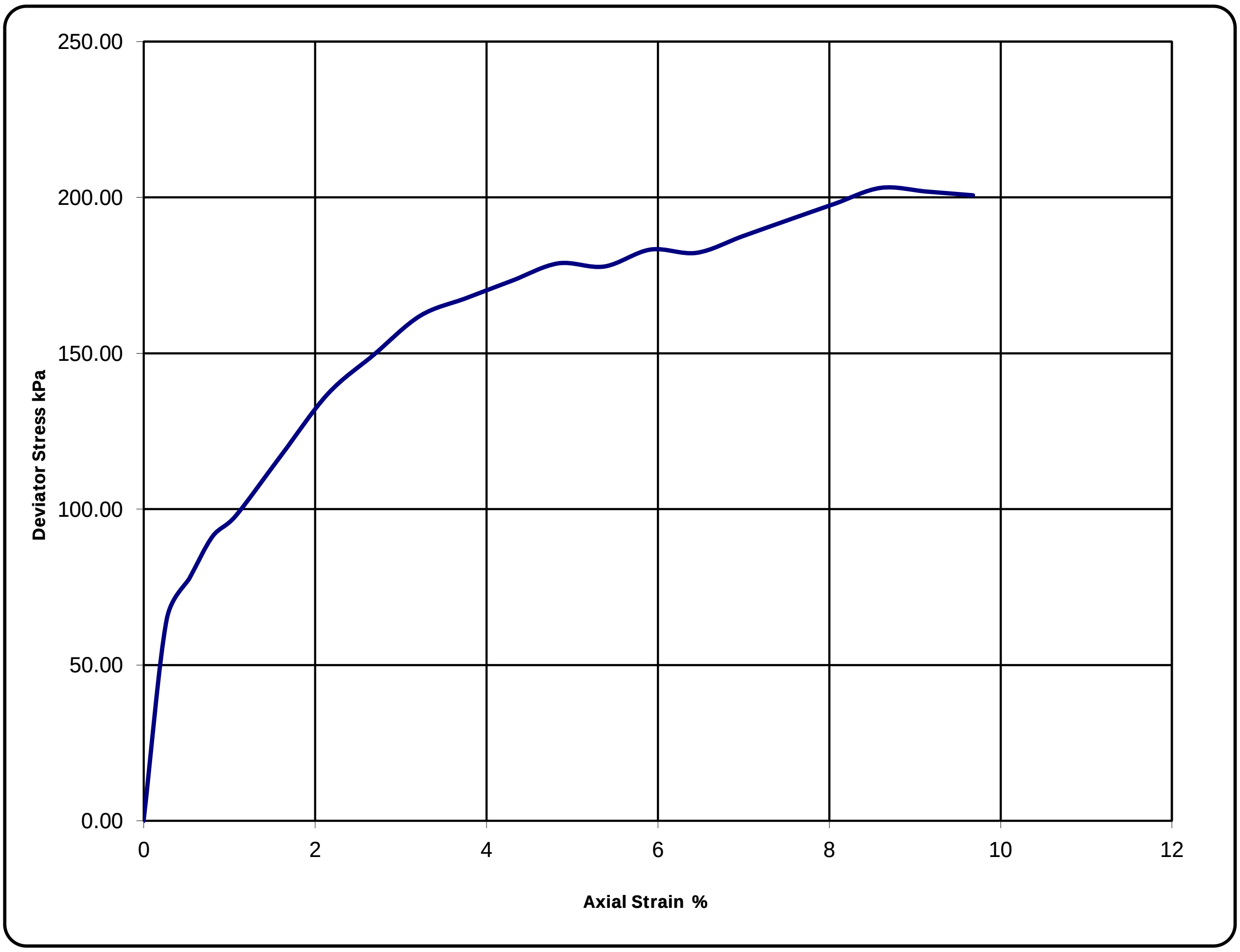
UKAS TESTING 2788

Date Approved: 22/1/15

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402A**
Sample Number:	**25**
Depth (m) :	**9.50 - 9.95**
Sample Type :	**UT**
Sample Description :	**Stiff brown silty CLAY**



Diameter (mm):	101	Height (mm):	186	Test:	UT 101 mm Single Stage.				
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	30	1.79	1.38	100	203	102	8.6	Compound	Latex Membrane used 0.2 mm thickness

GEO Site & Testing Services Limited

Checked By:
Jonathan Tatam (Office/Quality Assistant)
JTatam

Approved By:
Paul Evans (Quality Manager)
DP Evans

Date Approved: 22/1/15

UKAS TESTING 2788

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402A**
Sample Number:	**25**
Depth (m) :	**9.50 - 9.95**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):		101	Height (mm):		186	Test:	UT 101 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	30	1.79	1.38	100	203	102	8.6	Compound	Latex Membrane used 0.2 mm thickness

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GEO Site & Testing Services Limited

Checked By:
Jonathan Tatam (Office/Quality Assistant)

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Approved By:
Paul Evans (Quality Manager)

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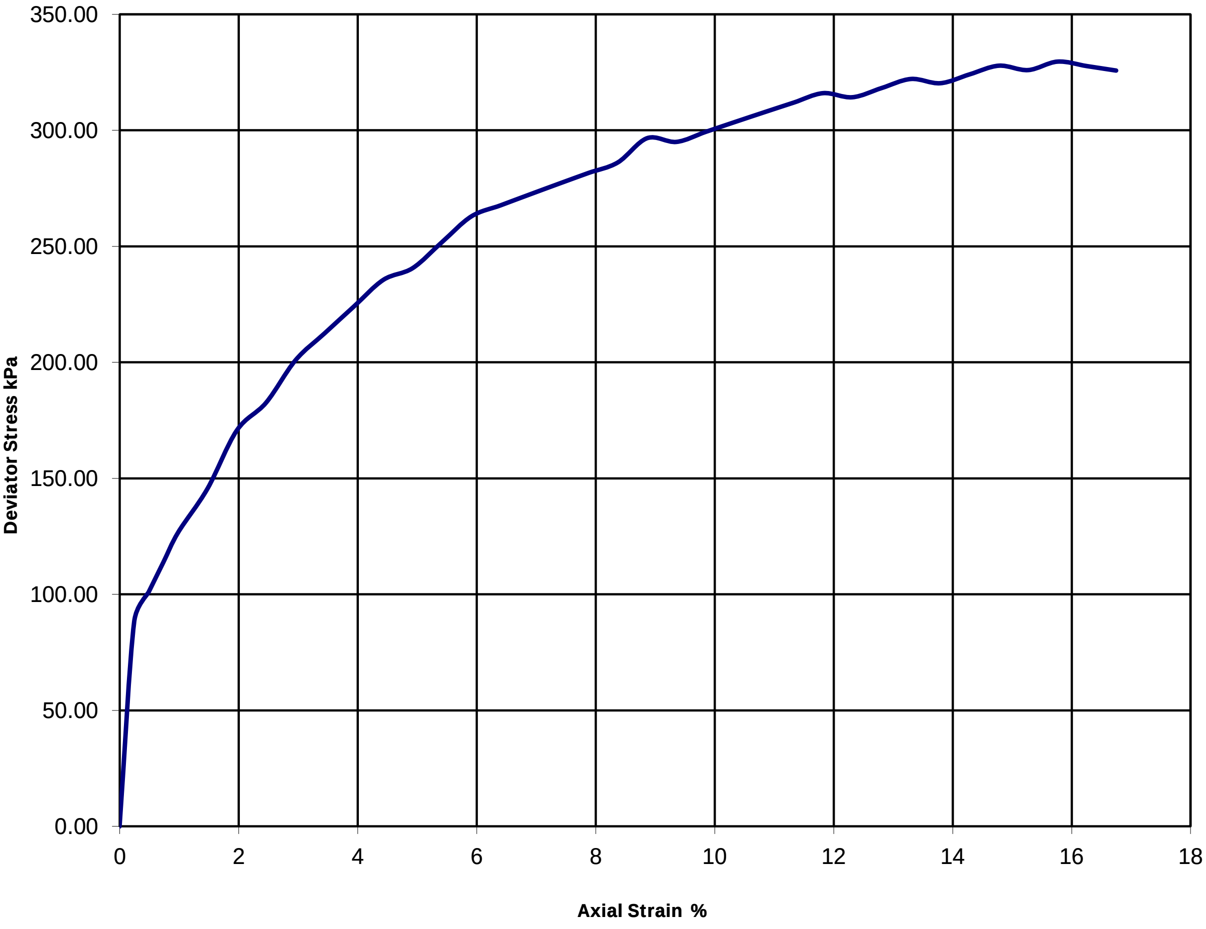
Date Approved: 22/1/15

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402A**
Sample Number:	**30**
Depth (m) :	**12.50 - 12.95**
Sample Type :	**UT**
Sample Description :	**Firm brown silty CLAY**



Diameter (mm):	103	Height (mm):		203	Test:	UT 103 mm Single Stage.			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	24	1.99	1.61	130	330	165	15.8	Compound	Latex Membrane used 0.2 mm thickness

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Checked By:
Jonathan Tatam (Office/Quality Assistant)
Katam

Approved By:
Paul Evans (Quality Manager)
P Evans

Date Approved: 22/1/15

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Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Single Stage Test
without measurement of Pore Pressure

Client ref:	**GTS-14-524**
Location:	**Edmonton Eco Park 2nd Phase**
Contract Number:	**25599-120115**
Hole Number	**BH402A**
Sample Number:	**30**
Depth (m) :	**12.50 - 12.95**
Sample Type :	**UT**

Post Test Specimen

Specimen Split

Diameter (mm):		103	Height (mm):		203	Test:	UT 103 mm Single Stage.		
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube Rate of strain = 2 %/min
A	24	1.99	1.61	130	330	165	15.8	Compound	Latex Membrane used 0.2 mm thickness

Checked By:
Jonathan Tatam (Office/Quality Assistant)

Approved By:
Paul Evans (Quality Manager)

DP Evans

Date Approved: 22/1/15

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH401A
Sample No.		36
Depth	m	17
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl silty stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1716.40
Dry Mass	g	1387.80
Density	Mg/m^3	1.96
Dry Density	Mg/m^3	1.59
Moisture Content	%	23.7
Voids Ratio		0.671
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	24.79
Density	Mg/m^3	2.11
Dry Density	Mg/m^3	1.69

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PPerm 8
Cell Number	CPerm 8

D P Ga

26/01/15

Checked and Approved By **Date**

Client Ref

GTS-14-524

GSTL
GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Contract No

UKAS TESTING 2788

25599

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH401A
Sample No.		36
Depth	m	17
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	50.00
Back Pressure Incr.	kPa	50.00
Differential Pressure	kPa	0.00
Final Cell Pressure	kPa	200.00
Final Pore Pressure	kPa	199.40
Final B Value		1.00

Consolidation

Effective Pressure	kPa	50.00
Cell Pressure	kPa	200.00
Back Pressure	kPa	150.00
Excess Pore Pressure	kPa	49.40
Pore Pressure at End	kPa	151.80
Consolidated Volume	cm^3	822.59
Consolidated Height	mm	102.91
Consolidated Area	mm^2	8000.23
Vol. Compressibility	m^2/MN	3.5081
Consolidation Coef.	m^2/yr.	1.2559
Final Voids Ratio		0.571

Permeability

Cell Pressure	kPa	200.00
Effective Cell Pressure	kPa	50.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00082
Average Temperature	'C	20

Vertical Permeability I m/s	**8.6 x 10-11**

Checked and Approved By

26/01/15
Date

GSTL
GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Client Ref

GTS-14-524

Contract No

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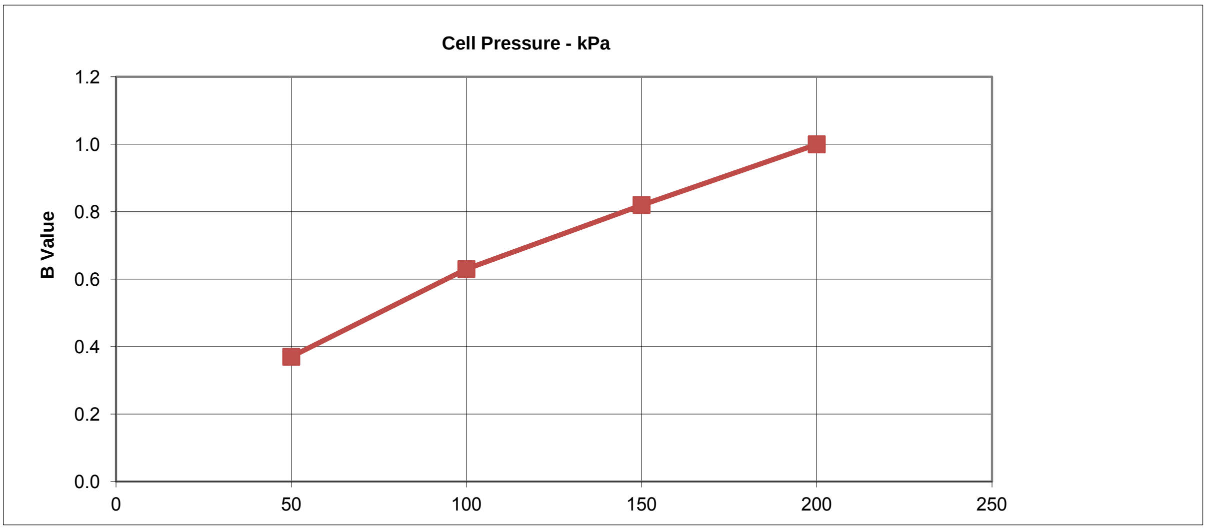
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

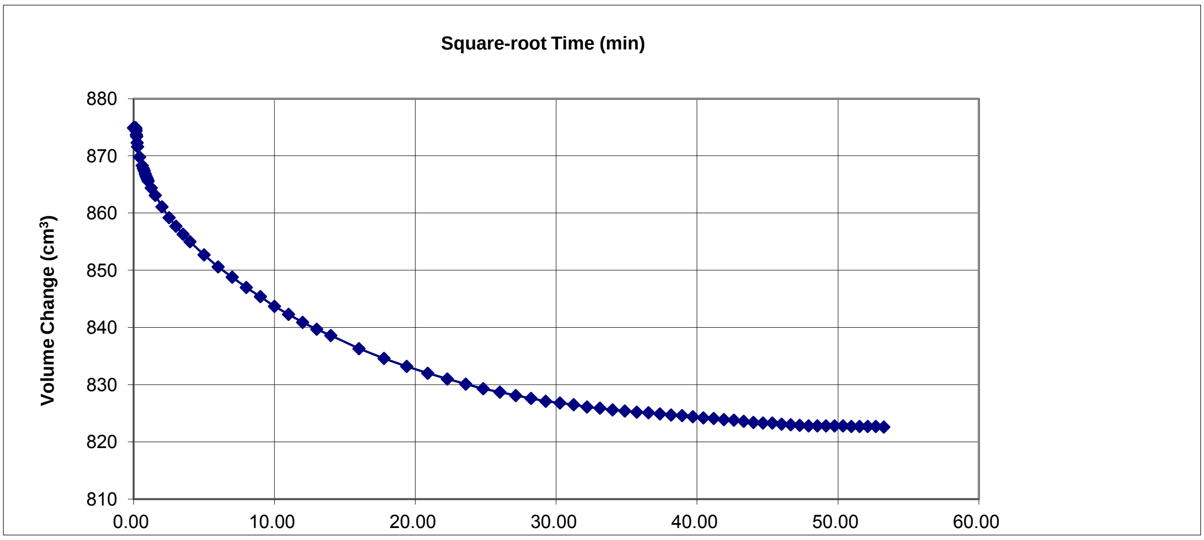
Specimen Details

Borehole		BH401A
Sample No.		36
Depth	m	17
Date		26/01/2015

Saturation Stage



Consolidation Stage



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26/01/15
Date

Client Ref

GTS-14-524

Contract No

25599

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Edmonton Eco Park 2nd Phase

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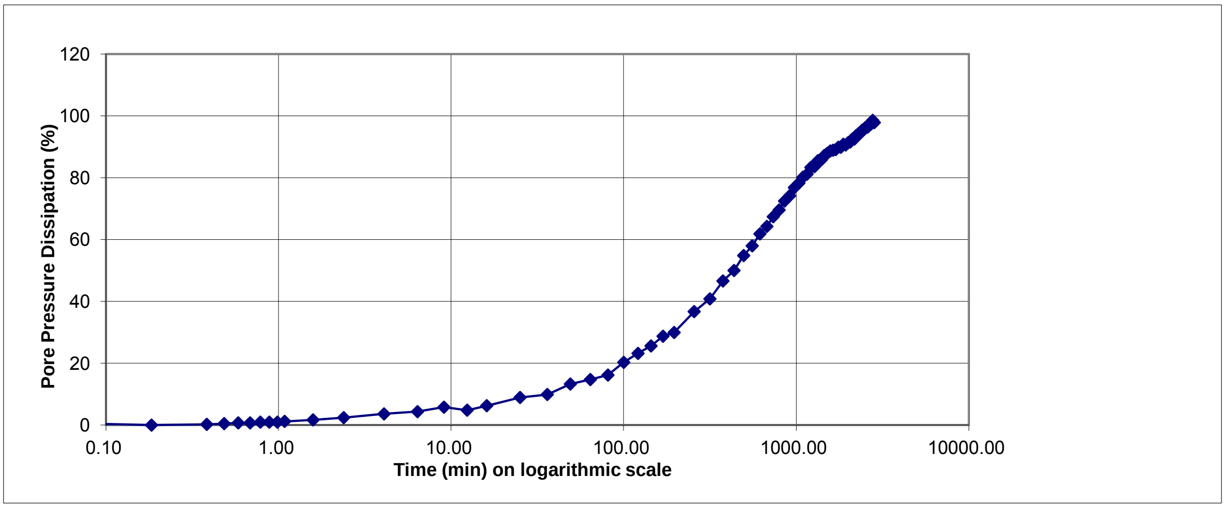
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

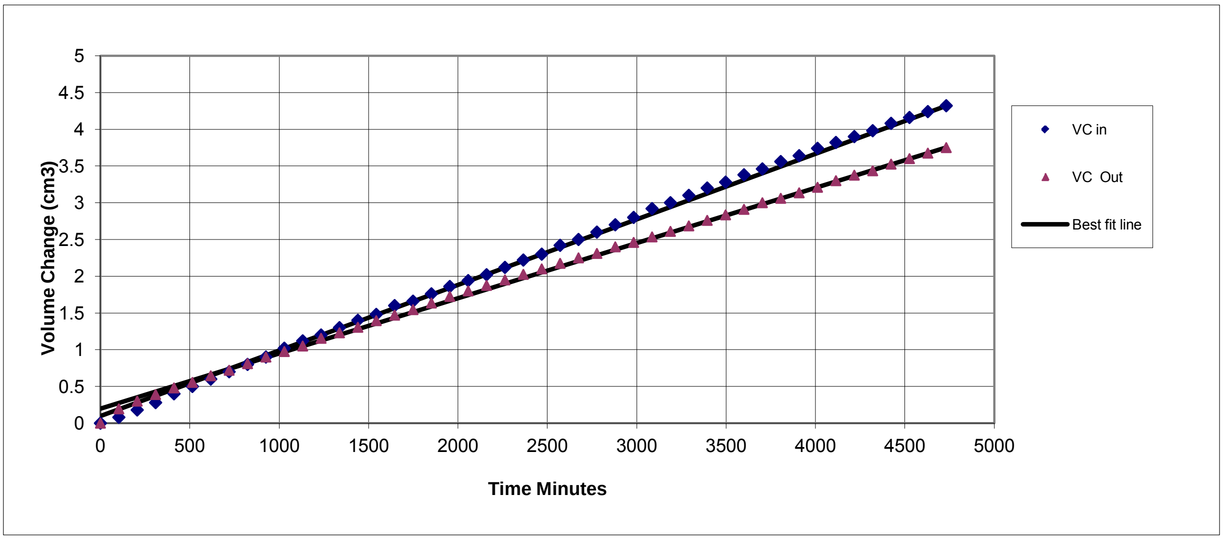
Specimen Details

Borehole		BH401A
Sample No.		36
Depth	m	17
Date		26/01/2015

Consolidation Stage



Permeability Stage



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26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH402A
Sample No.		35
Depth	m	15.5
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl silty stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1703.60
Dry Mass	g	1364.90
Density	Mg/m^3	1.95
Dry Density	Mg/m^3	1.56
Moisture Content	%	24.8
Voids Ratio		0.699
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	24.82
Density	Mg/m^3	2.09
Dry Density	Mg/m^3	1.67

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	P9
Cell Number	C9

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Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

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Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH402A
Sample No.		35
Depth	m	15.5
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	50.00
Back Pressure Incr.	kPa	48.00
Differential Pressure	kPa	2.00
Final Cell Pressure	kPa	300.00
Final Pore Pressure	kPa	289.00
Final B Value		0.96

Consolidation

Effective Pressure	kPa	50.00
Cell Pressure	kPa	300.00
Back Pressure	kPa	250.00
Excess Pore Pressure	kPa	50.00
Pore Pressure at End	kPa	250.00
Consolidated Volume	cm^3	815.89
Consolidated Height	mm	102.64
Consolidated Area	mm^2	7957.69
Vol. Compressibility	m^2/MN	2.5181
Consolidation Coef.	m^2/yr.	1.3487
Final Voids Ratio		0.584

Permeability

Cell Pressure	kPa	300.00
Effective Cell Pressure	kPa	50.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00058
Average Temperature	'C	20

Vertical Permeability I m/s	**6.06 x 10-11**

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Client Ref

GTS-14-524

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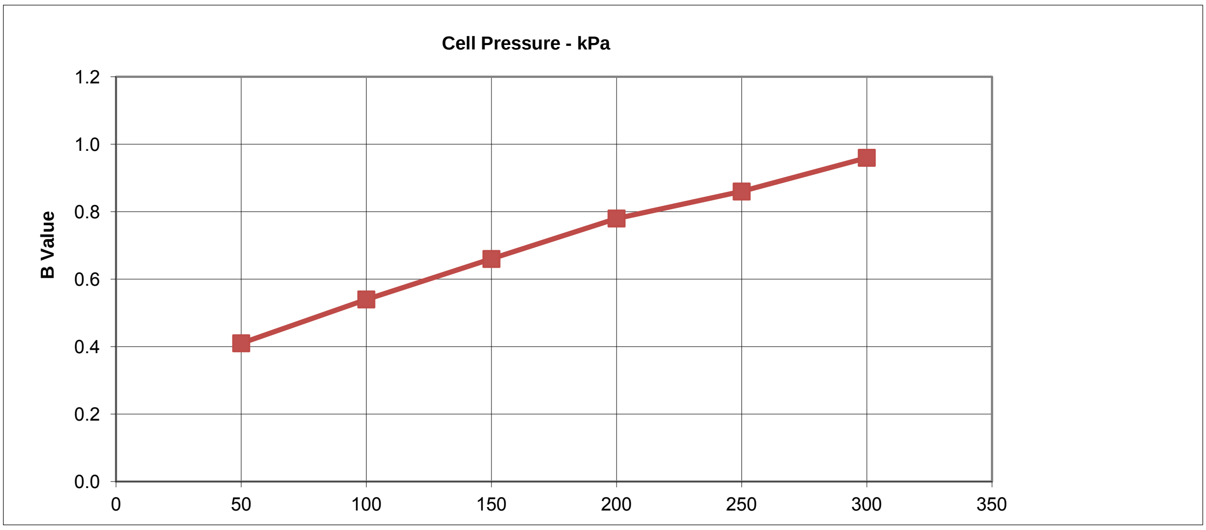
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

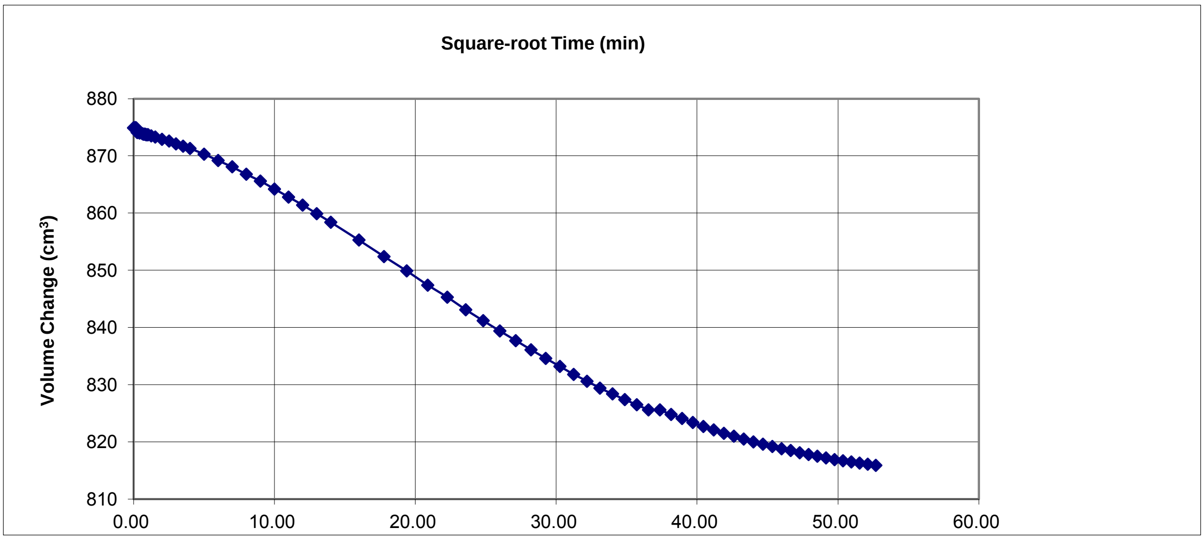
Specimen Details

Borehole		BH402A
Sample No.		35
Depth	m	15.5
Date		26/01/2015

Saturation Stage



Consolidation Stage



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Client Ref

GTS-14-524

Contract No

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Edmonton Eco Park 2nd Phase

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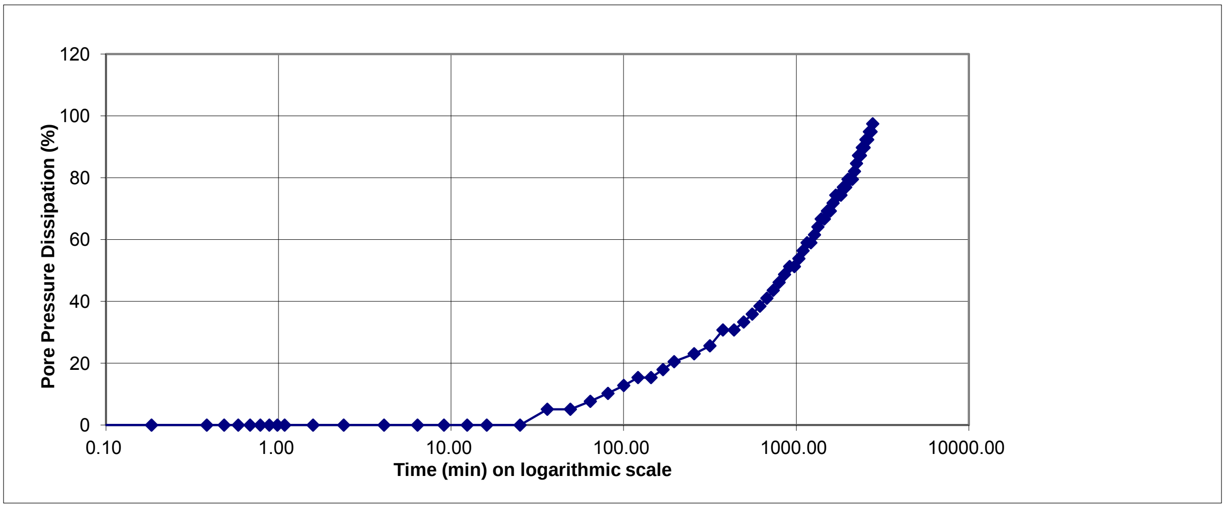
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

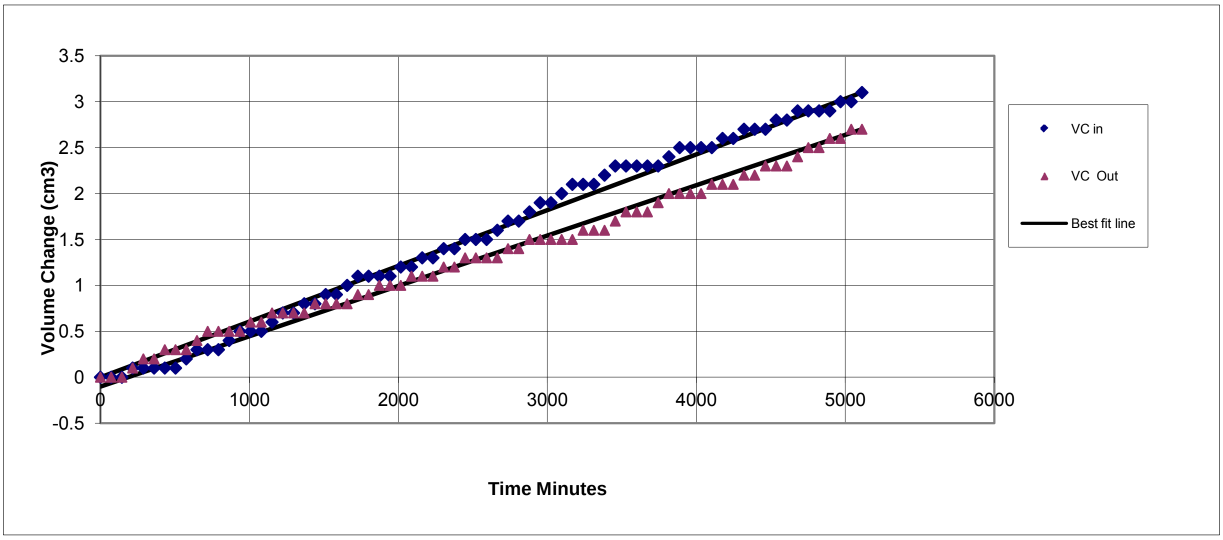
Specimen Details

Borehole		BH402A
Sample No.		35
Depth	m	15.5
Date		26/01/2015

Consolidation Stage



Permeability Stage



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Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

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Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH403
Sample No.		26
Depth	m	9.5
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl silty stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1785.10
Dry Mass	g	1444.20
Density	Mg/m^3	2.04
Dry Density	Mg/m^3	1.65
Moisture Content	%	23.6
Voids Ratio		0.605
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	24.62
Density	Mg/m^3	2.27
Dry Density	Mg/m^3	1.82

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PPerm 10
Cell Number	CPerm 10

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Client Ref

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Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH403
Sample No.		26
Depth	m	9.5
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	50.00
Back Pressure Incr.	kPa	47.50
Differential Pressure	kPa	2.50
Final Cell Pressure	kPa	150.00
Final Pore Pressure	kPa	247.10
Final B Value		0.95

Consolidation

Effective Pressure	kPa	50.00
Cell Pressure	kPa	250.00
Back Pressure	kPa	200.00
Excess Pore Pressure	kPa	50.00
Pore Pressure at End	kPa	200.00
Consolidated Volume	cm^3	792.89
Consolidated Height	mm	101.72
Consolidated Area	mm^2	7811.65
Vol. Compressibility	m^2/MN	1.9494
Consolidation Coef.	m^2/yr.	1.8745
Final Voids Ratio		0.455

Permeability

Cell Pressure	kPa	250.00
Effective Cell Pressure	kPa	50.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00080
Average Temperature	'C	20

Vertical Permeability I m/s	**8.52 x 10-11**

Checked and Approved By

26/01/15
Date

GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Client Ref

GTS-14-524

Contract No

25599

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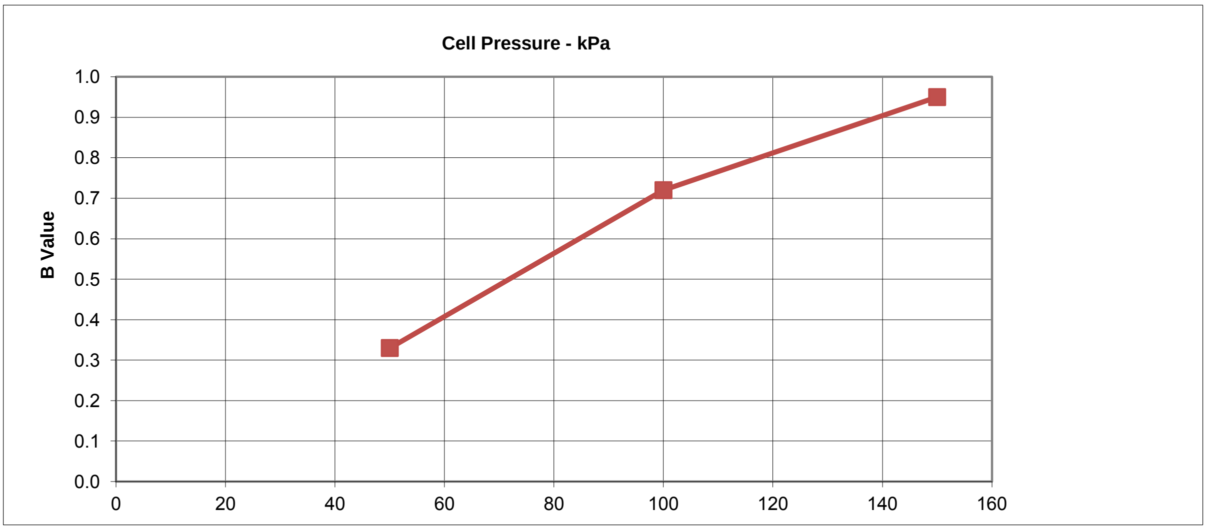
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

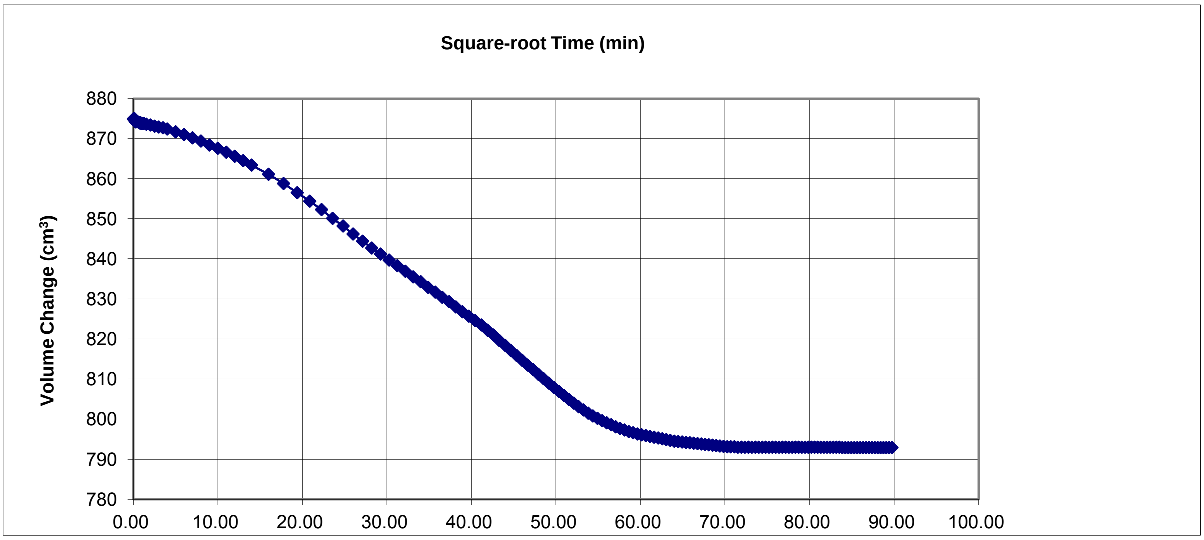
Specimen Details

Borehole		BH403
Sample No.		26
Depth	m	9.5
Date		26/01/2015

Saturation Stage



Consolidation Stage



DP Gong

Checked and Approved By

26/01/15
Date

GSTL
GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Client Ref

GTS-14-524

Contract No

25599

UKAS TESTING 2788

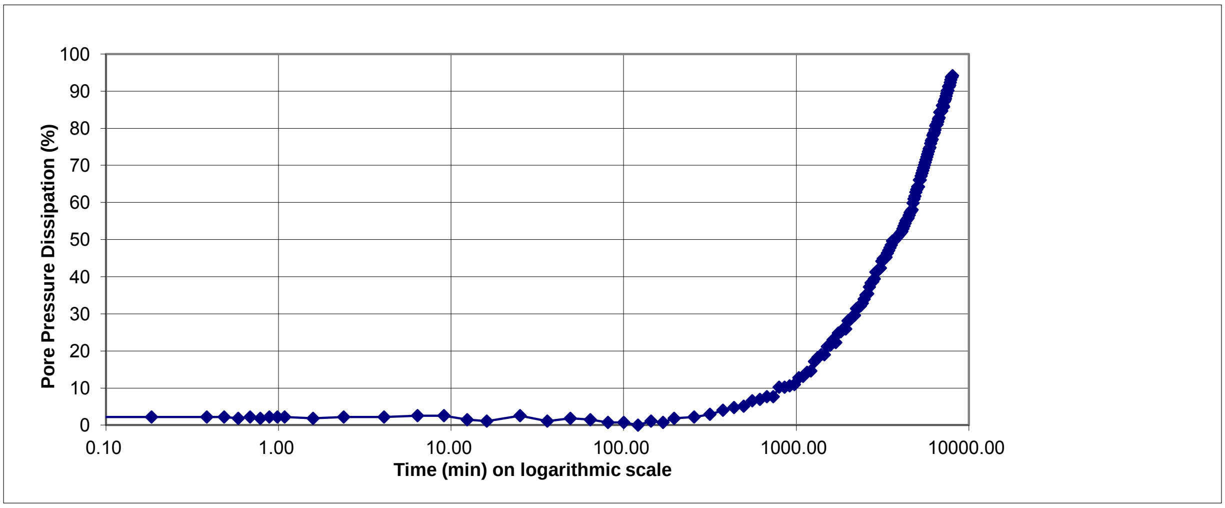
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

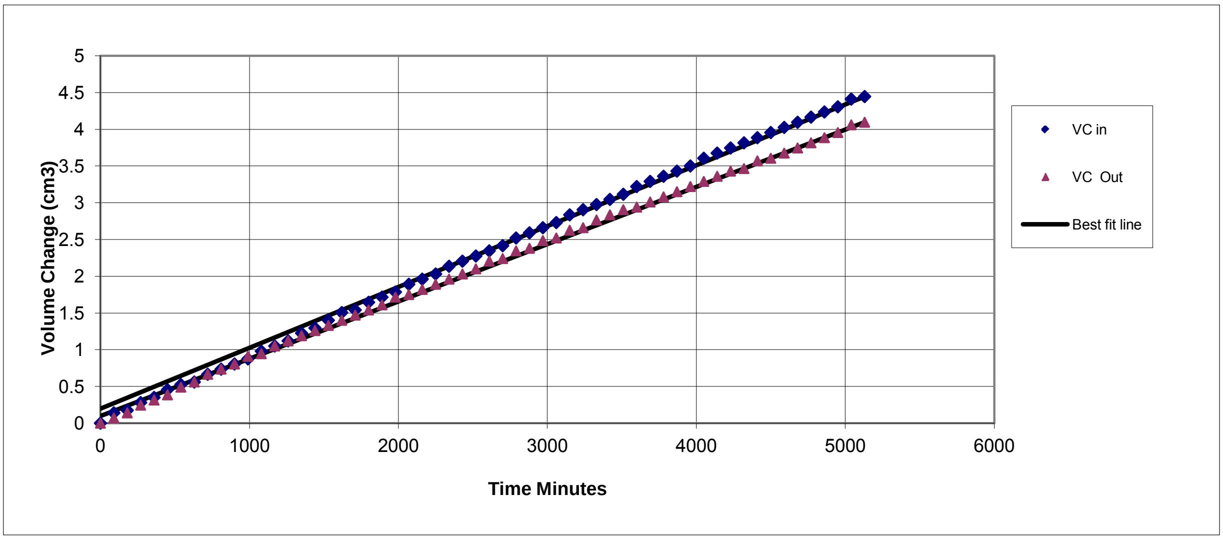
Specimen Details

Borehole		BH403
Sample No.		26
Depth	m	9.5
Date		26/01/2015

Consolidation Stage



Permeability Stage



D P Wang

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26/01/15
Date

GSTL
GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Client Ref

GTS-14-524

Contract No

25599

UKAS TESTING 2788

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		5
Depth	m	10
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl silty stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1771.40
Dry Mass	g	1438.40
Density	Mg/m^3	2.02
Dry Density	Mg/m^3	1.64
Moisture Content	%	23.2
Voids Ratio		0.612
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	24.39
Density	Mg/m^3	2.07
Dry Density	Mg/m^3	1.66

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PPerm 10
Cell Number	CPerm 10

Checked and Approved By

26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		5
Depth	m	10
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	35.00
Back Pressure Incr.	kPa	35.00
Differential Pressure	kPa	0.00
Final Cell Pressure	kPa	185.00
Final Pore Pressure	kPa	179.30
Final B Value		1.00

Consolidation

Effective Pressure	kPa	35.00
Cell Pressure	kPa	185.00
Back Pressure	kPa	150.00
Excess Pore Pressure	kPa	29.30
Pore Pressure at End	kPa	150.00
Consolidated Volume	cm^3	863.99
Consolidated Height	mm	104.56
Consolidated Area	mm^2	8263.08
Vol. Compressibility	m^2/MN	4.4264
Consolidation Coef.	m^2/yr.	0.4252
Final Voids Ratio		0.592

Permeability

Cell Pressure	kPa	185.00
Effective Cell Pressure	kPa	35.00
Back Pressure Diff.	kPa	10.00
Mean Rate of Flow	ml/min	0.00071
Average Temperature	'C	20

Vertical Permeability I m/s	**1.45 x 10-10**

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26/01/15
Date

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GTS-14-524

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2788

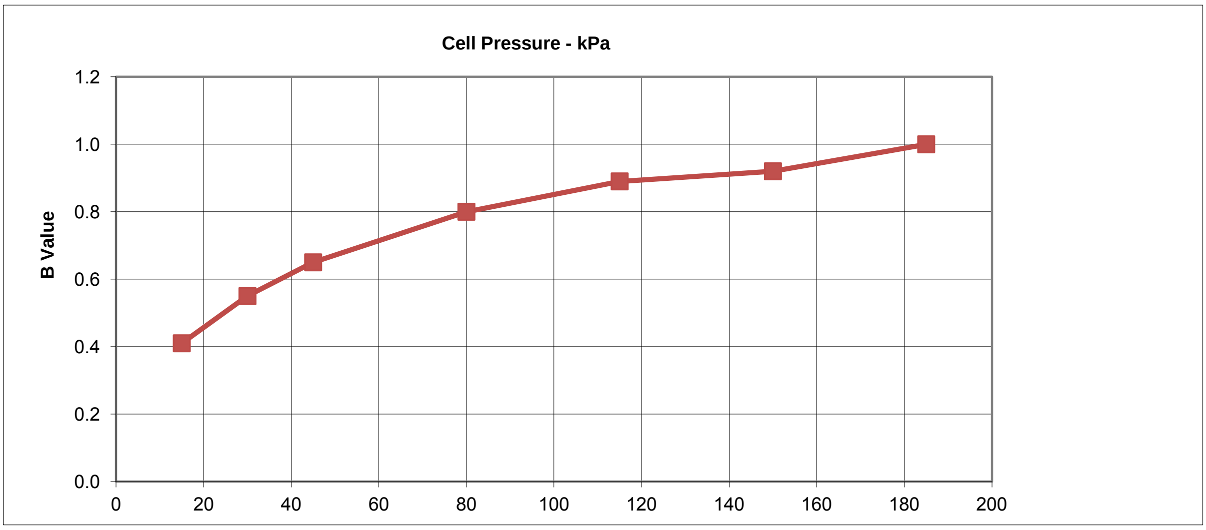
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

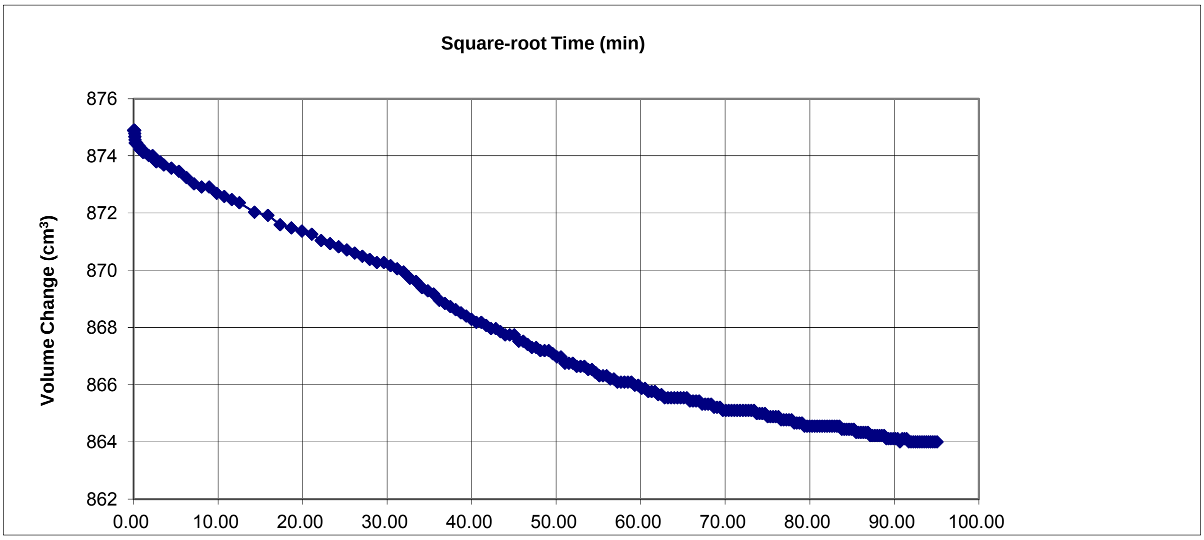
Specimen Details

Borehole		BH404A
Sample No.		5
Depth	m	10
Date		26/01/2015

Saturation Stage



Consolidation Stage



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Edmonton Eco Park 2nd Phase

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UKAS TESTING 2788

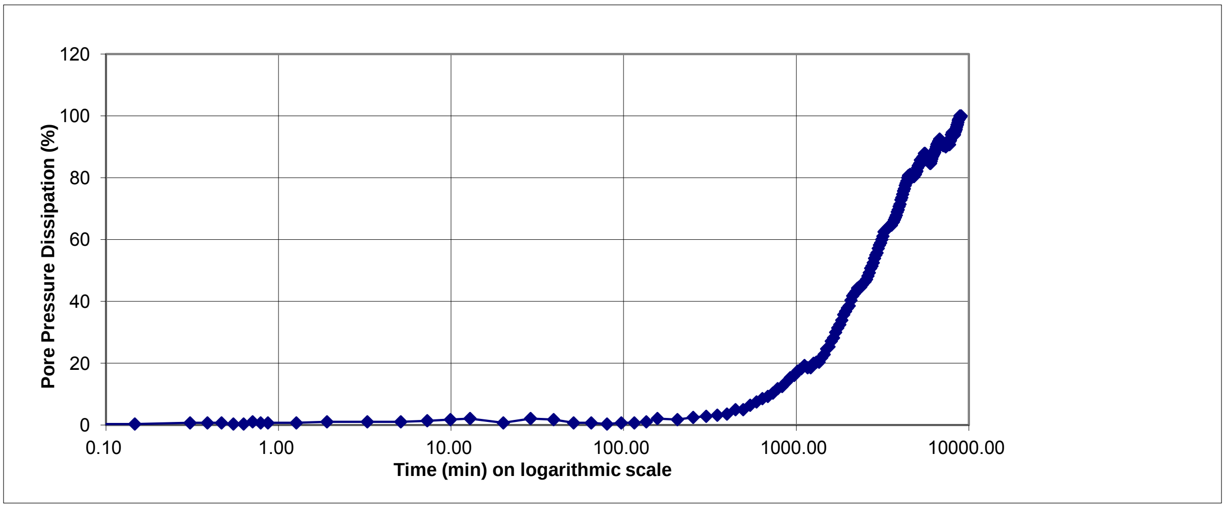
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

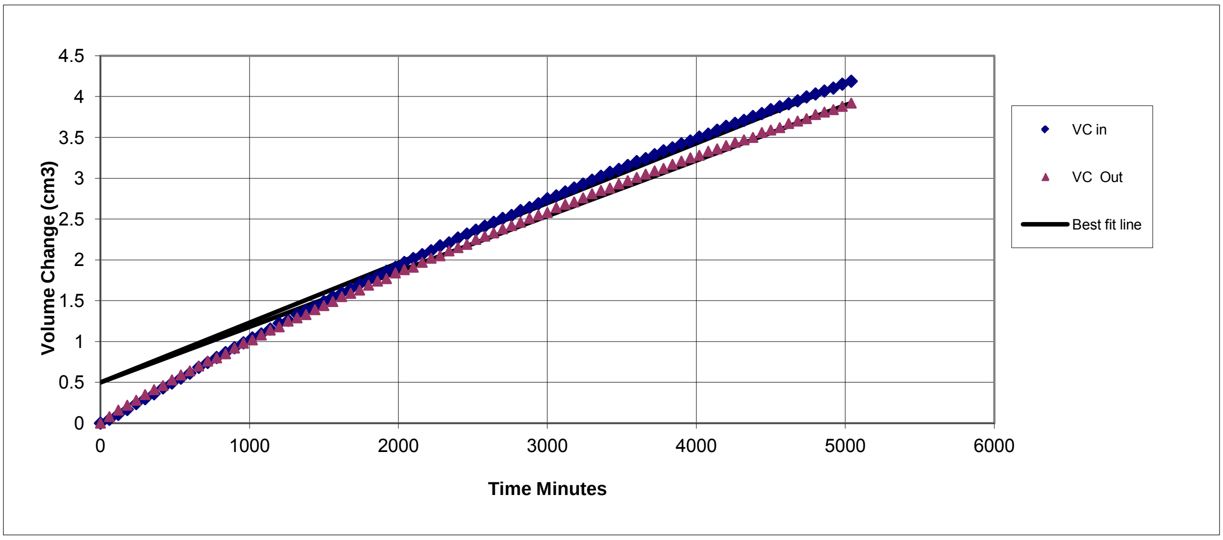
Specimen Details

Borehole		BH404A
Sample No.		5
Depth	m	10
Date		26/01/2015

Consolidation Stage



Permeability Stage



D P Gang

Checked and Approved By

26/01/15
Date

GSTL
GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

Client Ref

GTS-14-524

Contract No

25599

UKAS TESTING 2788

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		9
Depth	m	13
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1673.10
Dry Mass	g	1294.20
Density	Mg/m^3	1.91
Dry Density	Mg/m^3	1.48
Moisture Content	%	29.3
Voids Ratio		0.791
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	30.47
Density	Mg/m^3	2.00
Dry Density	Mg/m^3	1.54

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PPerm 12
Cell Number	CPerm 12

D P

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26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

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2788

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		9
Depth	m	13
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	100.00
Back Pressure Incr.	kPa	98.00
Differential Pressure	kPa	2.00
Final Cell Pressure	kPa	500.00
Final Pore Pressure	kPa	451.90
Final B Value		0.98

Consolidation

Effective Pressure	kPa	100.00
Cell Pressure	kPa	500.00
Back Pressure	kPa	400.00
Excess Pore Pressure	kPa	95.00
Pore Pressure at End	kPa	400.00
Consolidated Volume	cm^3	848.19
Consolidated Height	mm	103.93
Consolidated Area	mm^2	8162.77
Vol. Compressibility	m^2/MN	3.9250
Consolidation Coef.	m^2/yr.	0.3212
Final Voids Ratio		0.737

Permeability

Cell Pressure	kPa	500.00
Effective Cell Pressure	kPa	100.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00082
Average Temperature	'C	20

Vertical Permeability I m/s	**8.49 x 10-11**

D P Gians

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26/01/15
Date

Client Ref

GTS-14-524

Contract No

25599

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GEO Site & Testing Services Limited

Edmonton Eco Park 2nd Phase

UKAS
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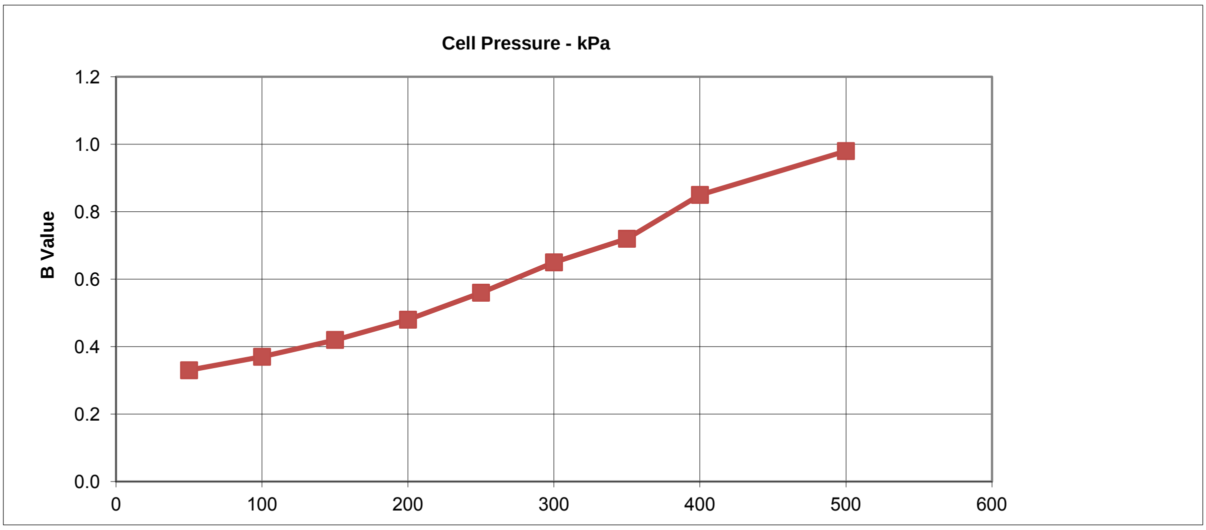
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

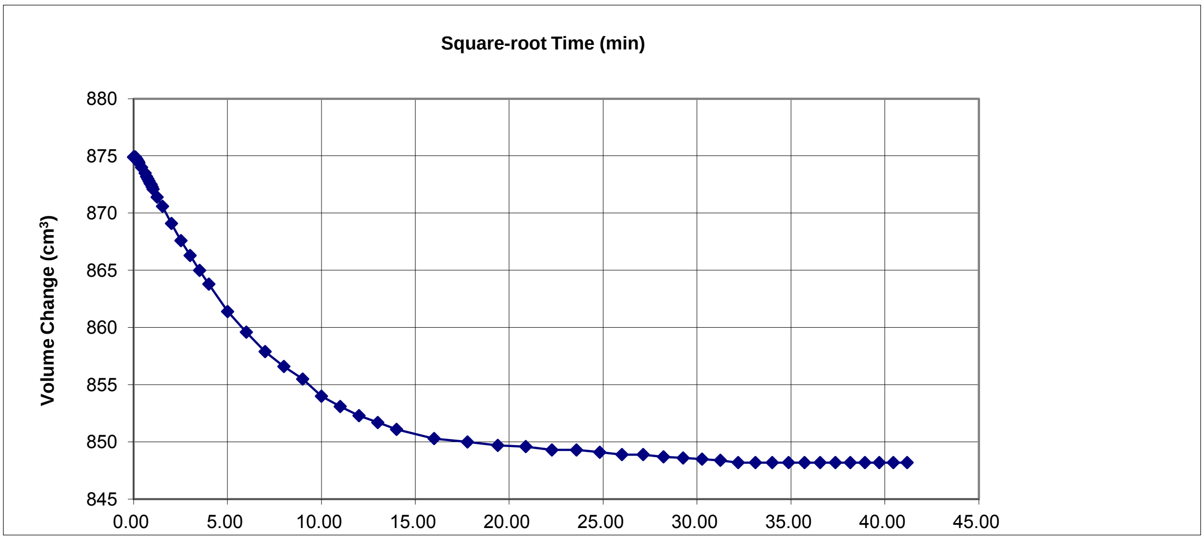
Specimen Details

Borehole		BH404A
Sample No.		9
Depth	m	13
Date		26/01/2015

Saturation Stage



Consolidation Stage



26/01/15

Checked and Approved By **Date**

Client Ref

GTS-14-524

Contract No

25599

Edmonton Eco Park 2nd Phase

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GEO Site & Testing Services Limited

UKAS TESTING 2788

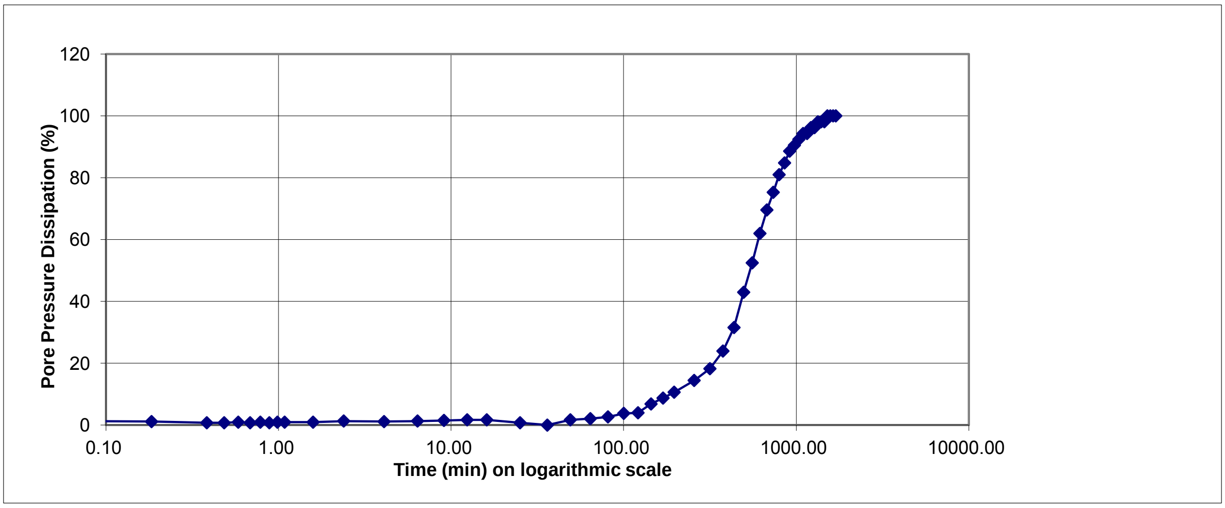
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

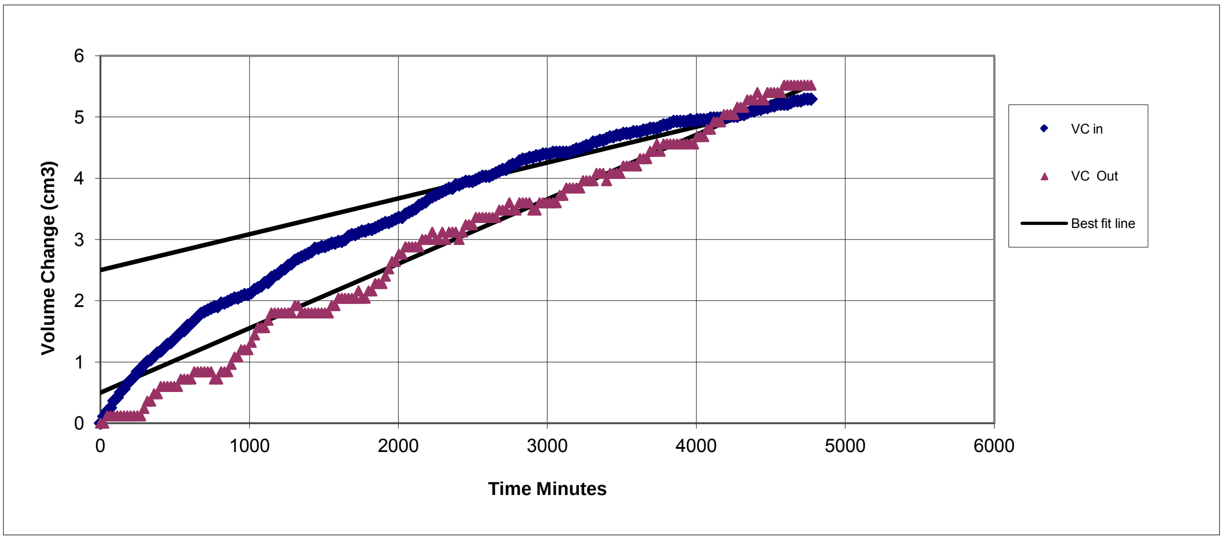
Specimen Details

Borehole		BH404A
Sample No.		9
Depth	m	13
Date		26/01/2015

Consolidation Stage



Permeability Stage



Checked and Approved By

26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

GEO Site & Testing Services Limited

UKAS TESTING 2788

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		13
Depth	m	16
Date		26/01/2015
Disturbed / Undisturbed		Undisturbed

Description of Specimen

Dark greyish brown sl stiff CLAY

Initial Specimen Conditions

Height	mm	105.00
Diameter	mm	103.00
Area	mm^2	8332.29
Volume	cm^3	874.89
Mass	g	1729.10
Dry Mass	g	1375.20
Density	Mg/m^3	1.98
Dry Density	Mg/m^3	1.57
Moisture Content	%	25.7
Voids Ratio		0.686
Specific Gravity	kN/m^3	2.65
(assumed/measured)		assumed

Final Specimen Conditions

Moisture Content	%	27.13
Density	Mg/m^3	2.03
Dry Density	Mg/m^3	1.59

Test Setup

Date started	13/01/2015
Date Finished	24/01/2015
Top Drain Used	y
Base Drain Used	y
Pressure System Number	PPerm 6
Cell Number	CPerm 6

D P

Checked and Approved By

26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

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UKAS TESTING 2788

Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details

Borehole		BH404A
Sample No.		13
Depth	m	16
Date		26/01/2015

Saturation

Cell Pressure Incr.	kPa	50.00
Back Pressure Incr.	kPa	50.00
Differential Pressure	kPa	0.00
Final Cell Pressure	kPa	300.00
Final Pore Pressure	kPa	274.00
Final B Value		1.00

Consolidation

Effective Pressure	kPa	50.00
Cell Pressure	kPa	300.00
Back Pressure	kPa	250.00
Excess Pore Pressure	kPa	24.00
Pore Pressure at End	kPa	252.00
Consolidated Volume	cm^3	862.89
Consolidated Height	mm	104.52
Consolidated Area	mm^2	8256.10
Vol. Compressibility	m^2/MN	0.7850
Consolidation Coef.	$m^2/yr.$	0.6235
Final Voids Ratio		0.663

Permeability

Cell Pressure	kPa	300.00
Effective Cell Pressure	kPa	50.00
Back Pressure Diff.	kPa	20.00
Mean Rate of Flow	ml/min	0.00096
Average Temperature	'C	20

Vertical Permeability l m/s	**9.87 x 10-11**

D P Giang

Checked and Approved By

26/01/15

Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

GSTL

GEO Site & Testing Services Limited

UKAS TESTING 2788

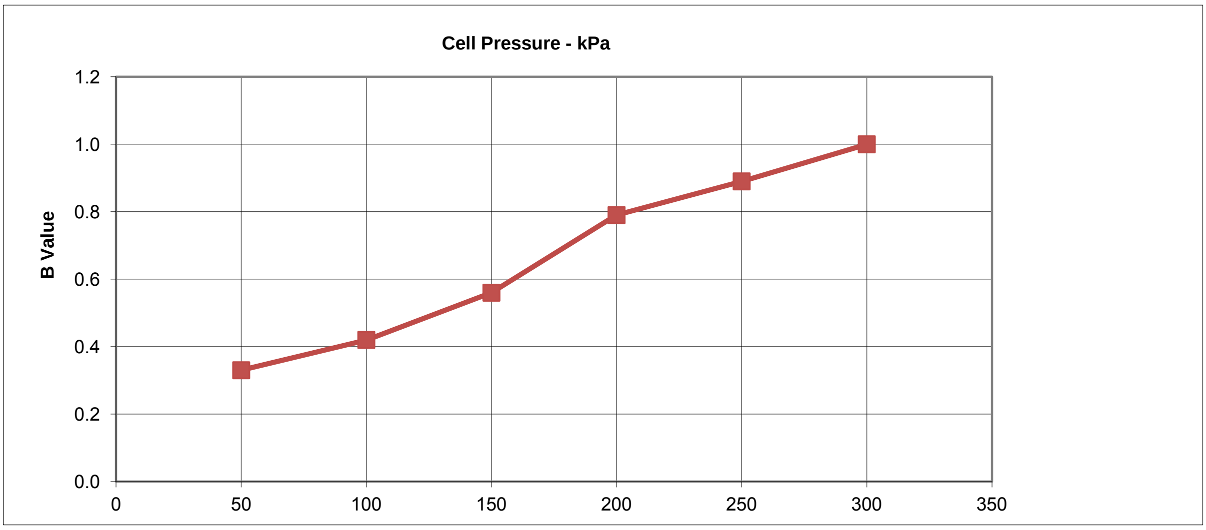
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

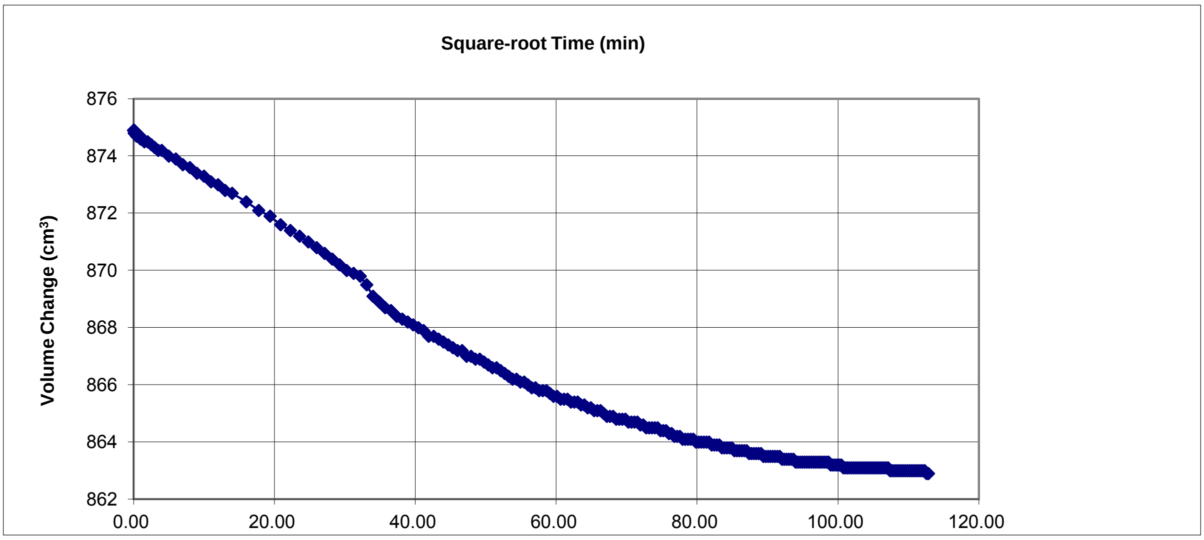
Specimen Details

Borehole		BH404A
Sample No.		13
Depth	m	16
Date		26/01/2015

Saturation Stage



Consolidation Stage



D P Gons

Checked and Approved By

26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

GEO Site & Testing Services Limited

UKAS TESTING 2788

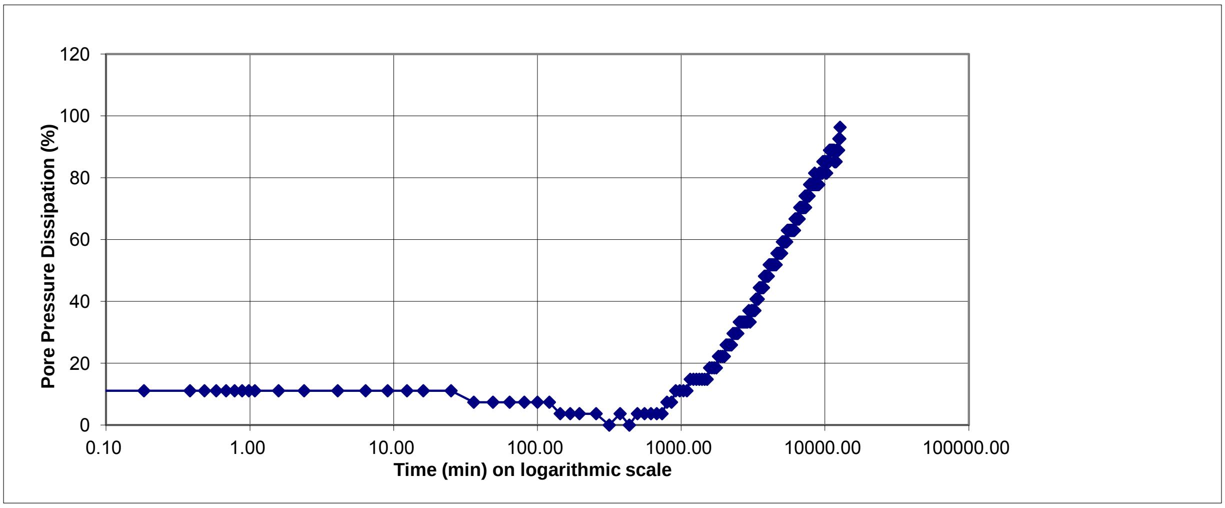
Permeability in a Triaxial Cell

BS 1377 : Part 6 : 1990 Clause 6

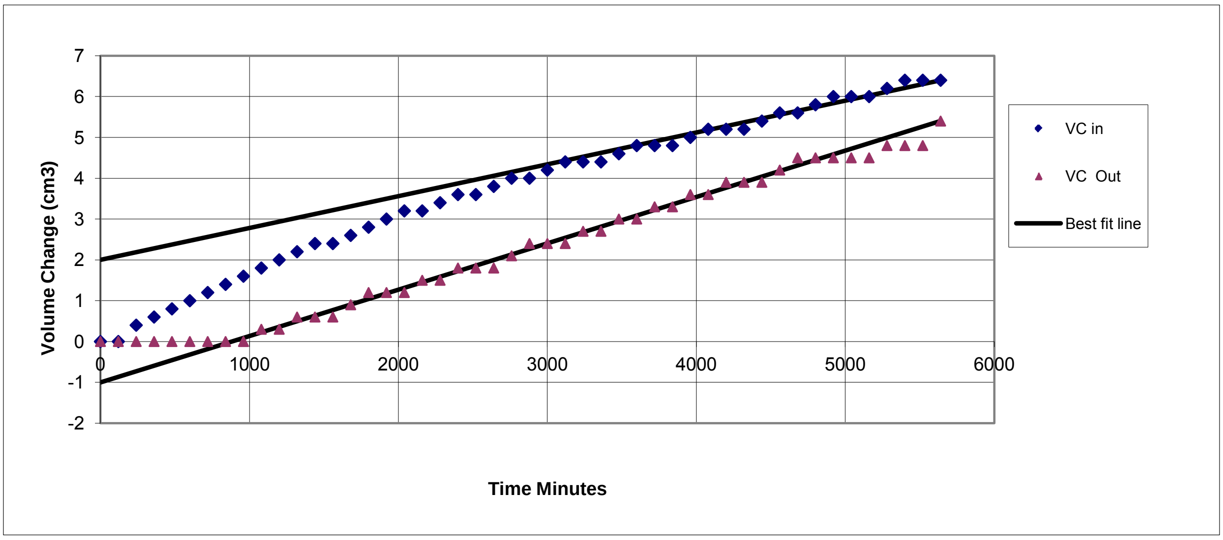
Specimen Details

Borehole		BH404A
Sample No.		13
Depth	m	16
Date		26/01/2015

Consolidation Stage



Permeability Stage



D P Evans

Checked and Approved By

26/01/15
Date

Client Ref

GTS-14-524

Edmonton Eco Park 2nd Phase

Contract No

25599

GEO Site & Testing Services Limited

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2183

Chemtest
The right chemistry to deliver results

Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.co.uk

Final Report

Report Number:	15-00437 Issue-1		
Initial Date of Issue:	15-Jan-15		
Client:	Ground Technology Services		
Client Address:	Maple Road King's Lynn Norfolk PE34 3AF		
Contact(s):	Paul Lewin		
Project:	GTS-14-524 - Edmonton Ecopark Phase 2		
Quotation No.:		**Date Received:**	12-Jan-15
Order No.:	GTS 3504	**Date Instructed:**	12-Jan-15
No. of Samples:	14	**Results Due:**	16-Jan-15
Turnaround: (Weekdays)	5		
Date Approved:	15-Jan-15		
Approved By:			

K T Jones

Details:	Keith Jones, Technical Manager

Results Summary - Soil

Project: GTS-14-524 - Edmonton Ecopark Phase 2

Client: Ground Technology Services	**Chemtest Job No.:**				15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437	15-00437
Quotation No.:	**Chemtest Sample ID.:**				87973	87974	87975	87976	87977	87978	87979	87980	87981	87982	87983	87984	87985	87986
Order No.: GTS 3504	Client Sample Ref.:				BH401	BH401	BH401A	BH401A	BH402	BH402	BH402A	BH403	BH403	BH403	BH404	BH404	BH404A	BH404A
	Client Sample ID.:				5	20	34	47	6	20	33	8	21	25	7	16	5	12
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.5	6.8	15.5	21.5	1.5	7	14	2.1	6.5	8.6	2.5	5.9	10	14.5
	Bottom Depth(m):				1.95	7	16	22	2	7.2	14.5	2.3	7	9	2.95	6.1	10.45	15
	Date Sampled:																	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**														
Moisture	N	2030	%	0.02	35	20	18	17	34	12	21	17	18	21	19	20	18	18
Stones	N	2030	%	0.02	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020	< 0.020
pH	U	2010			8.0	8.3	8.2	9.4	7.6	8.4	8.6	7.8	10.6	8.6	8.3	9.3	8.5	8.2
Magnesium (Water Soluble)	N	2120	g/l	0.01	< 0.010	< 0.010	0.063	0.015	0.014	< 0.010	0.023	0.010	< 0.010	0.020	0.041	< 0.010	0.020	0.052
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.01	0.027	0.18	0.83	0.22	0.48	0.12	0.34	0.44	0.64	0.50	0.70	0.71	0.35	0.80
Chloride (Extractable)	U	2220	g/l	0.01	0.012	0.029	0.076	0.023	0.033	0.015	0.028	0.062	0.16	0.030	0.070	0.11	0.036	0.063
Nitrate (Extractable)	N	2220	g/l	0.01	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVCOs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at our Coventry laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container

Sample Retention and Disposal

All soil samples will be retained for a period of 60 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.co.uk

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GROUND TECHNOLOGY
Maple Road, Kings Lynn
Norfolk, PE34 3AF
Tel: 01553 817657
www.groundtechnology.co.uk

Borehole Record

BH301

Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

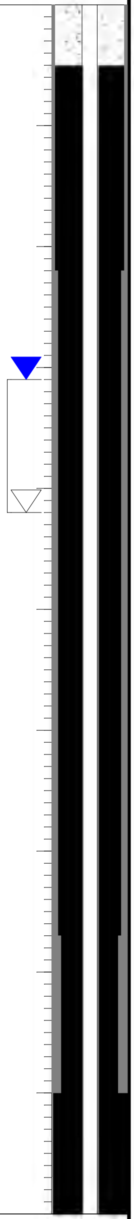
Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.747mAOD

Coordinates: 535589.78E
192810.73N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Tarmac		0.20	11.55							
MADE GROUND: Brownish grey sandy GRAVEL. Gravel is subangular to subrounded fine to medium flint and tarmac		0.50	11.25	D1	0.30-0.35					
MADE GROUND: Orangish brown sandy GRAVEL. Gravel is angular to subangular fine to medium flint and tarmac.		0.70	11.05	D2	0.50-0.55					
MADE GROUND: Dark brownish black slightly sandy GRAVEL. Gravel is angular to subangular fine to medium red brick, slate, charcoal and concrete with rare angular coarse concrete fragments.		0.80	10.95	D3	0.70-0.80					
MADE GROUND: Firm orangish brown mottled black CLAY, with rare angular fine gravel sized red brick fragments. Between 1.50m and 1.60mbgl becoming black. From 1.60mbgl gravel is fine to medium flint.		2.20	9.55	D4 D5 B6 D7 B8	0.90-1.00 1.00-1.20 1.00-1.50 1.50-1.60 1.60-2.20					
Soft brown mottled grey CLAY. (ALLUVIUM)		3.20	8.55	B10 D9	2.20-2.60 2.20-2.25					
Very soft dark grey mottled brown CLAY. (ALLUVIUM)		4.00	7.75	D11 B12 D13	3.20-3.30 3.20-3.60 3.70-3.80					
Medium dense brownish grey slightly sandy GRAVEL. Gravel is angular to subangular fine to medium, rarely coarse flint. Sand is fine to coarse. (KEMPTON PARK GRAVEL FORMATION)		6.00	5.75	S D14 B15 S D16	4.00-4.45 4.00-4.45 4.50-5.50 5.50-5.95 5.50-5.95	4.00 5.50	 (3.20)	N=30 (2,6,7,7,8,8) N=17 (2,4,4,4,4,5)		
Medium dense greyish brown fine to coarse SAND and GRAVEL. Gravel is subangular to subrounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)		7.50	4.25	B17 S D18	6.00-7.00 7.00-7.45 7.00-7.45	7.00	(3.20)	N=13 (2,3,2,3,4,4)		
Firm dark bluish grey slightly silty CLAY. (LONDON CLAY FORMATION)		8.95	2.80	D19 B20 S D21 B22	7.50-7.60 7.60-8.50 8.50-8.95 8.50-8.95 8.50-9.00	7.70		N=13 (2,2,3,3,3,4)		
Very stiff medium to high strength locally thinly laminated brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION) Borehole continued...										



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	2.60	2.20			
200	8.50	7.70			
150	20.95	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	4.20	20	3.10	4.00	7.70
05/06/14	19.30	20	14.00	9.00	-

Dates:	04/06/2014-05/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.20m and 19.30mbgl, rising to 3.10m and 9.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH301

Sheet 2 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.747mAOD

Coordinates: 535589.78E
192810.73N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium to high strength locally thinly laminated brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				U23	10.00-10.45			34 blows		
				D24	10.45-10.50			PP=200.0kPa		
				S D25 B26	11.50-11.95 11.50-11.95 11.50-12.00	9.00		N=23 (3,4,5,5,6,7) PP=220.0kPa		
				S D27 B28	13.00-13.45 13.00-13.45 13.00-13.50	9.00		N=27 (3,4,6,6,7,8)		
Very stiff high strength thinly laminated brownish grey CLAY. (LONDON CLAY FORMATION)		14.50	-2.75	S D29 B30	14.50-14.95 14.50-14.95 14.50-15.00	9.00		N=27 (3,4,6,6,7,8) PP=165.0kPa		
Very stiff high strength brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		15.00	-3.25							
				U31	16.00-16.45			50 blows		
				D32	16.45-16.50					
				S D33 B34	17.50-17.95 17.50-17.95 17.50-18.00	9.00		N=29 (3,4,5,6,9,9) PP=220.0kPa		
Very stiff high strength locally thinly laminated brownish grey with rare greenish grey silty CLAY, with some thin fine sand bands and rare shell fragments. (LAMBETH GROUP UNDIFFERENTIATED)		18.30	-6.55	B35	18.30-18.50					
								PP=160.0kPa		
				B36	18.80-20.00					
				S D37	19.00-19.43 19.00-19.43	9.00	(13.00)	50/275mm (6,14,12,14,15,9) PP=250.0kPa		
Dense to very dense brownish grey silty fine to medium SAND, with some sandy clay bands. Borehole continued...		19.30	-7.55	B38	19.30-19.50					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.60	2.20
200	8.50	7.70
150	20.95	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	4.20	20	3.10	4.00	7.70
05/06/14	19.30	20	14.00	9.00	-

Dates:	04/06/2014-05/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.20m and 19.30mbgl, rising to 3.10m and 9.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.747mAOD
Coordinates: 535589.78E
192810.73N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
(LAMBETH GROUP UNDIFFERENTIATED)				B39	20.00-20.50					
Stiff medium strength light greenish grey with rare yellowish grey CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		20.50	-8.75	S D40	20.50-20.95 20.50-20.95	9.00	(13.20)	N=25 (3,4,4,5,7,9)		
		20.95	-9.20							
Borehole Complete at 20.95 m										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.60	2.20
200	8.50	7.70
150	20.95	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	4.20	20	3.10	4.00	7.70
05/06/14	19.30	20	14.00	9.00	-

Dates: 04/06/2014-05/06/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.20m and 19.30mbgl, rising to 3.10m and 9.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH302

Sheet 1 of 3

Project: Edmonton Ecopark

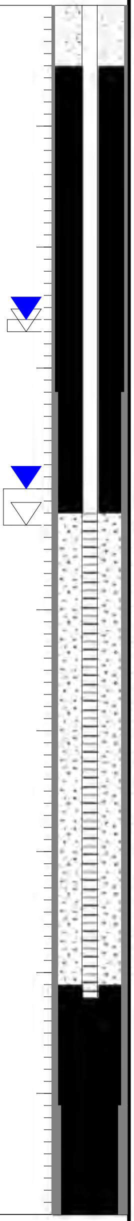
Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.397mAOD
Coordinates: 535599.10E
192853.80N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Tarmacadam		0.20	12.20	D1	0.20-0.25					
MADE GROUND: Black sandy GRAVEL. Gravel is angular to subangular fine to medium flint and tarmac.		0.45	11.95	D2	0.40-0.45					
MADE GROUND: Soft slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse flint and brick.		1.30	11.10	D3 B4 D5	0.60-0.65 0.60-1.00 1.20-1.30					
MADE GROUND: Soft dark brownish black mottled black very silty very gravelly CLAY. Gravel is angular to subangular fine to coarse concrete, tile, brick and flint. At 2.2mbgl - One cobble sized subangular concrete fragment.		2.70	9.70	D6 B7 D8 B9	1.50-1.60 1.60-2.10 2.10-2.20 2.20-2.70					
MADE GROUND: Soft to very soft dark brownish grey slightly gravelly CLAY. No gravel description recorded.		3.30	9.10	B10 D11	2.70-3.00 3.00-3.10					
Very soft dark bluish grey and brown CLAY. (ALLUVIUM)		4.00	8.40	B12	3.30-4.00					
Soft low strength dark brownish black slightly silty CLAY, with occasional rootlets organic material and rare fine flint and wood. (ALLUVIUM)		4.50	7.90	S D13	4.00-4.45 4.00-4.45	3.20		N=6 (1,1,1,1,2,2)		
Loose dark brown sandy GRAVEL. Gravel is subangular to subrounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)		5.95	6.45	B14 S D15	4.50-5.50 5.50-5.95 5.50-5.95	5.50	(4.20)	N=8 (1,2,2,2,2,2)		
Dark yellowish brown slightly gravelly fine to coarse SAND. Gravel is angular to subangular fine flint. (KEMPTON PARK GRAVEL FORMATION)		7.00	5.40	B16	6.00-7.00					
Firm medium strength dark brown slightly gravelly slightly sandy CLAY. Gravel is angular to subangular fine to medium flint. (LONDON CLAY FORMATION)		8.10	4.30	S D17 B18	7.00-7.45 7.00-7.45 7.00-8.00	7.00	(4.80)	N=18 (3,3,4,4,5,5)		
Firm medium strength brownish grey slightly micaceous CLAY. (LONDON CLAY FORMATION)		8.95	3.45	D19 S D20	8.10-8.20 8.50-8.95 8.50-8.95	8.50		N=14 (2,2,3,3,4,4)		
Stiff high to very high strength locally closely fissured and or thinly laminated brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. Borehole continued...				B21	9.10-9.50					



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.20	3.20			
200	9.10	9.10			
150	21.40	10.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
29/05/14	2.70	20	2.60	2.20	3.00
29/05/14	4.30	20	4.00	4.00	8.50
02/06/14	20.70	20	19.10	10.00	-

Dates:	02/06/2014-03/06/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Water observed at 2.70m, 4.30m and 20.70mbgl rising to 2.60m, 4.00m and 19.10mbgl after 20 minutes standing.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.397mAOD
Coordinates: 535599.10E
192853.80N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
(LONDON CLAY FORMATION)				U22	10.00-10.45			21 blows		
				D23	10.45-10.60					
From 11.50mbgl becomes very stiff				S D24 B25	11.50-11.95 11.50-11.95 11.50-12.00	10.00		N=20 (3,4,4,5,5,6) PP=170.0kPa		
				S D26 B27	13.00-13.45 13.00-13.45 13.00-13.50	10.00		N=21 (3,3,4,5,6,6) PP=160.0kPa		
				B28	13.80-14.20			PP=175.0kPa		
				U29	14.50-14.95			22 blows		
				D30	14.95-15.10					
Very stiff medium strength locally thinly laminated brownish grey CLAY, with occasional thin greenish grey bands and rare bioturbation. (LONDON CLAY FORMATION)		16.00	-3.60	S D31 B33	16.00-16.45 16.00-16.45 16.00-16.50	10.00		N=25 (3,4,6,6,6,7) PP=200.0kPa		
				S D32 B34	17.50-17.95 17.50-17.95 17.50-19.00	10.00		N=28 (5,5,5,7,7,9) PP=160.0kPa		
Very stiff medium strength brownish grey slightly silty CLAY, with occasional gravel sized pyritic nodules and rare bioturbation. (LAMBETH GROUP UNDIFFERENTIATED)		18.70	-6.30							
				S D35 B36	19.00-19.45 19.00-19.45 19.00-19.50	10.00		N=29 (3,5,5,7,7,10) PP=220.0kPa		▼
Borehole continued...										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.20	3.20			
200	9.10	9.10			
150	21.40	10.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
29/05/14	2.70	20	2.60	2.20	3.00
29/05/14	4.30	20	4.00	4.00	8.50
02/06/14	20.70	20	19.10	10.00	-

Dates:	02/06/2014-03/06/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Water observed at 2.70m, 4.30m and 20.70mbgl rising to 2.60m, 4.00m and 19.10mbgl after 20 minutes standing.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.397mAOD
Coordinates: 535599.10E
192853.80N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium strength brownish grey slightly silty CLAY, with occasional gravel sized pyritic nodules and rare bioturbation. (LAMBETH GROUP UNDIFFERENTIATED)		20.30	-7.90	B38	20.30-20.50					
Very stiff greyish brown slightly sandy CLAY, with some thin brown and greenish grey fine sand bands. (LAMBETH GROUP UNDIFFERENTIATED)		20.50	-8.10	S D37 B39	20.50-20.93 20.50-20.93 20.50-21.00	10.00		50/275mm (5,7,9,13,17,11)		▽
Very dense brownish grey silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)		21.40	-9.00							
Borehole Complete at 21.40 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.20	3.20			
200	9.10	9.10			
150	21.40	10.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
29/05/14	2.70	20	2.60	2.20	3.00
29/05/14	4.30	20	4.00	4.00	8.50
02/06/14	20.70	20	19.10	10.00	-

Dates: 02/06/2014-03/06/2014
Plant: Dando 2000
Drilled By: T York
Logged By: G Day
Checked By: P Lewin

Remarks:
1. Inspection pit dug from ground level to 1.20mbgl.
2. Water observed at 2.70m, 4.30m and 20.70mbgl rising to 2.60m, 4.00m and 19.10mbgl after 20 minutes standing.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.915mAOD
Coordinates: 535654.88E
192933.92N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Reinforced Concrete.		0.30	11.62							
MADE GROUND: Hardcore (DRILLERS DESCRIPTION).		0.50	11.42	B1	0.50-0.60					
MADE GROUND: Yellowish brown slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.		1.10	10.82	B2 B3	0.90-1.00 1.10-1.20					
MADE GROUND: Stiff grey CLAY.		1.40	10.52							
MADE GROUND: Yellowish grey clayey gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse flint.		1.90	10.02	B4	1.90-2.00					
MADE GROUND: Stiff brownish grey CLAY.		2.10	9.82	B5	2.10-2.20					
MADE GROUND: Yellowish brown clayey gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint.		2.70	9.22	B6	2.70-3.00					
MADE GROUND: Firm grey peaty CLAY with some flint, brick, gravel and wood fragments.		3.40	8.52	B7	3.40-3.60					
Soft dark brown very peaty CLAY. (ALLUVIUM)		3.80	8.12	B8	3.80-3.90					
Soft yellowish grey sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint. (ALLUVIUM)		4.00	7.92	S D10 B9	4.00-4.45 4.00-4.45 4.00-4.50	4.00	(3.80)	N=8 (1,2,2,2,2,2)		
Loose grey silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)		5.50	6.42	S D11 B12	5.50-5.95 5.50-5.95 5.50-6.00	5.50	(3.80)	N=9 (1,2,2,2,2,3)		
Loose grey fine to coarse SAND and GRAVEL. Gravel is subangular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)		6.80	5.12							
Stiff medium to high strength locally thinly laminated brownish grey with rare greenish grey slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				S D13 B14	7.00-7.45 7.00-7.45 7.00-7.50	7.00		N=11 (2,2,2,3,3,3)		
				S D15 B16	8.50-8.95 8.50-8.95 8.50-9.00	8.50		N=17 (2,3,3,4,5,5) PP=110.0kPa		

Borehole continued...

Hole Diameter Detail Diameter (mm)	Depth (m)	Casing Depth (m)	Chiseling Details From (m)	To (m)	Time (hhmm)
250	3.50	3.50			
200	7.50	7.50			
150	21.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/06/14	4.00	20	3.80	4.00	7.50
23/06/14	18.00	20	18.00	9.00	-
23/06/14	20.70	20	18.50	9.00	-

Dates: 30/05/2014-23/06/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.00m, 18.00m and 20.70mbgl, rising to 3.80m, 18.00m and 18.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.915mAOD
Coordinates: 535654.88E
192933.92N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff medium to high strength locally thinly laminated brownish grey with rare greenish grey slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				U17	10.00-10.45			30 blows		
				D18	10.45-10.50			PP=220.0kPa		
				S D19 B20	11.50-11.95 11.50-11.95 11.50-12.00	9.00		N=21 (3,4,5,5,5,6)		
				S D21 B22	13.00-13.45 13.00-13.45 13.00-13.50	9.00		N=22 (2,5,5,5,5,7) PP=160.0kPa		
				S D23 B24	14.50-14.95 14.50-14.95 14.50-15.00	9.00		N=26 (3,5,5,5,8,8) PP=200.0kPa		
				U25	16.00-16.45			PP=220.0kPa 31 blows		
		16.45	-4.54	D26	16.45-16.50					
Very stiff high strength thinly laminated brownish grey slightly silty CLAY, with some sandy clay bands. (LONDON CLAY FORMATION)								PP=220.0kPa		
				S D27 B28	17.50-17.95 17.50-17.95 17.50-18.00	9.00		N=26 (3,4,5,6,7,8)		
				S D29 B30	19.00-19.45 19.00-19.45 19.00-19.50	9.00	(19.00)	N=40 (3,4,6,9,11,14) PP=220.0kPa		
		19.60	-7.69	B31	19.60-19.80			PP=160.0kPa		
Borehole continued...										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.50	3.50			
200	7.50	7.50			
150	21.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/06/14	4.00	20	3.80	4.00	7.50
23/06/14	18.00	20	18.00	9.00	-
23/06/14	20.70	20	18.50	9.00	-

Dates: 30/05/2014-23/06/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.00m, 18.00m and 20.70mbgl, rising to 3.80m, 18.00m and 18.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH303

Sheet 3 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.915mAOD
Coordinates: 535654.88E
192933.92N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff very high strength brownish grey silty CLAY, with some greenish grey sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)				B32	20.20-20.40					
				S	20.50-20.84	9.00	(18.00)	50/190mm (4,14,15,17,18)		
				D33	20.50-20.84					
From 20.70mbgl becomes greenish grey silty fine sand.		20.84	-8.93							
Borehole Complete at 20.84 m										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.50	3.50
200	7.50	7.50
150	21.00	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
23/06/14	4.00	20	3.80	4.00	7.50
23/06/14	18.00	20	18.00	9.00	-
23/06/14	20.70	20	18.50	9.00	-

Dates:	30/05/2014-23/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.00m, 18.00m and 20.70mbgl, rising to 3.80m, 18.00m and 18.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

Sheet 1 of 3

BH304

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ryan Cridlin

Ground Level: 12.679mAOD
Coordinates: 535776.71E
192835.36N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Tarmacadam.		0.30	12.38							
MADE GROUND: Reddish brown slightly silty very sandy GRAVEL. Gravel is angular fine to coarse granite.		0.45	12.23	B1 B2	0.30-0.45 0.45-1.10					
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint.		1.10	11.58							
MADE GROUND: Stiff brownish grey and greyish brown slightly silty CLAY.		2.70	9.98	B3 B4	1.10-1.30 2.30-2.50			PP=110.0kPa		
MADE GROUND: Greyish brown silty fine to coarse SAND and GRAVEL. Gravel is rounded fine to coarse flint.		3.30	9.38	B5	2.80-3.30					
MADE GROUND: Firm greenish grey with rare yellowish grey and dark grey CLAY.		4.20	8.48	B6	3.30-3.80			PP=50.0kPa		
MADE GROUND: Firm low strength dark brown sandy organic SILT, with some silty fine sand bands and occasional brick fragments.		5.70	6.98	S D7 B8	4.50-4.95 4.50-4.95 4.50-5.00	4.00		N=4 (1,0,1,1,1,1) PP=25.0kPa		
Medium dense grey slightly silty very sandy GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S B10 D9	6.00-6.45 6.00-6.50 6.00-6.45	6.00	(4.00)	N=12 (1,2,2,3,3,4)		
From 7.50mbgl becomes SAND and GRAVEL.		8.40	4.28	S D11 B12	7.50-7.95 7.50-7.95 7.50-8.00	7.50	(4.50)	N=12 (1,2,3,3,3,3)		
Stiff medium to high strength locally thinly laminated brownish grey CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				B13	8.40-9.00			PP=75.0kPa		
				S D14	9.00-9.45 9.00-9.45	9.00	(6.40)	N=17 (2,3,4,5,4,4)		
Borehole continued...										

Hole Diameter Detail Diameter (mm)	Hole Diameter Detail Depth (m)	Hole Diameter Detail Casing Depth (m)	Chiseling Details From (m)	Chiseling Details To (m)	Chiseling Details Time (hhmm)
250	4.20	4.20			
200	9.00	9.00			
150	21.40	10.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/05/14	4.80	20	4.10	4.50	-
15/05/14	20.80	20	19.30	10.20	-

Dates: 13/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.80m and 20.80mbgl, rising to 4.10m and 19.30mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH304

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ryan Cridlin

Ground Level: 12.679mAOD
Coordinates: 535776.71E
192835.36N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff medium to high strength locally thinly laminated brownish grey CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		10.20	2.48	B15	10.20-10.50			PP=110.0kPa		
				UT16	10.50-10.95			25 blows		
Stiff brownish grey slightly silty CLAY. (LONDON CLAY FORMATION)		10.95	1.73	D17	10.95-11.10			PP=165.0kPa		
Very stiff locally stiff medium strength locally thinly laminated brownish grey silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION)								PP=160.0kPa		
				S D18 B19	12.00-12.45 12.00-12.45 12.00-12.50	10.20		N=21 (2,4,5,5,5,6) PP=165.0kPa		
				S D20 B21	13.50-13.95 13.50-13.95 13.50-14.00	10.20		N=30 (3,4,7,7,7,9) PP=125.0kPa		
				UT22	15.00-15.45			25 blows		
				D23	15.45-15.60			PP=165.0kPa		
				S D24 B25	16.50-16.95 16.50-16.95 16.50-17.00	10.20		N=26 (3,4,7,6,6,7) PP=100.0kPa		
Very stiff medium strength locally thinly laminated brownish grey slightly silty slightly sandy CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		18.00	-5.32	S D26 B27	18.00-18.45 18.00-18.45 18.00-18.50	10.20		N=29 (3,4,7,7,7,8) PP=150.0kPa		
				S D28 B29	19.50-19.95 19.50-19.95 19.50-20.00	10.20		N=28 (2,3,6,7,7,8)		
Borehole continued...										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	4.20	4.20
200	9.00	9.00
150	21.40	10.20

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/05/14	4.80	20	4.10	4.50	-
15/05/14	20.80	20	19.30	10.20	-

Dates: 13/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.80m and 20.80mbgl, rising to 4.10m and 19.30mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH304

Sheet 3 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

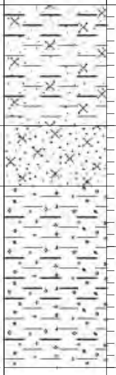
Engineer : Ryan Cridlin

Ground Level: 12.679mAOD

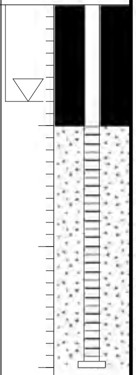
Coordinates: 535776.71E
192835.36N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Very stiff medium strength locally thinly laminated brownish grey slightly silty slightly sandy CLAY, with rare bioturbation. (LONDON CLAY FORMATION)	21.00	-8.32	S D30	21.00-21.39 21.00-21.39	10.20	(19.30)	50/235mm (7,8,12,14,19,5)	
Very dense yellowish grey silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)	21.50	-8.82						
Stiff light greenish grey with rare yellowish grey and reddish brown slightly gravelly CLAY. Gravel is subangular to rounded fine to medium flint. Some black staining on gravel. (LAMBETH GROUP UNDIFFERENTIATED)	23.00	-10.32					PP=140.0kPa	
Borehole Complete at 23.00 m								

Legend



Installations



Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
14/05/14	4.80	20	4.10	4.50	-
15/05/14	20.80	20	19.30	10.20	-

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	4.20	4.20			
200	9.00	9.00			
150	21.40	10.20			

Dates:	13/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.80m and 20.80mbgl, rising to 4.10m and 19.30mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH305 Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

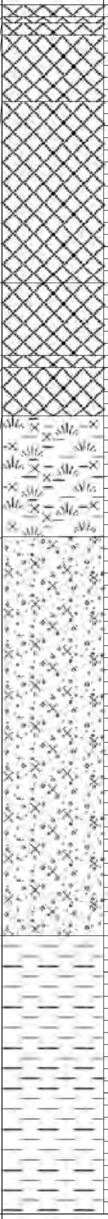
Client : AMEC E & I UK Limited

Engineer : Ben Smith

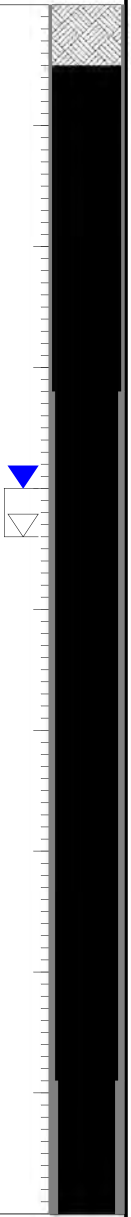
Ground Level: 12.007mAOD
Coordinates: 535808.17E
192835.36N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Brick paving.	0.10	11.91						
MADE GROUND: Dark yellowish brown fine to coarse SAND.	0.15	11.86						
MADE GROUND: Tarmacadam.	0.25	11.76	B1	0.25-0.80				
MADE GROUND: Brownish grey and greyish brown slightly clayey very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint and granite.	0.80	11.21	B2	0.80-1.20				
			B3	1.80-2.20				
MADE GROUND: Stiff brownish grey CLAY.	2.30	9.71	B4	2.30-2.80				
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to rounded fine to coarse flint.	2.90	9.11						
MADE GROUND: Concrete.	3.00	9.01	B5	3.00-3.40			PP=45.0kPa	
MADE GROUND: Firm brownish grey and brown slightly silty slightly gravelly CLAY, with rare wood and shell fragments. Gravel is angular fine to medium brick and flint.	3.40	8.61	B6	3.40-3.60				
Firm low strength brown and grey peaty CLAY. (ALLUVIUM)	4.40	7.61	S D7 B8	4.20-4.65 4.20-4.65 4.20-4.70	4.00		N=9 (1,2,2,2,3,2)	
Loose to medium dense grey silty very sandy GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)			S B10 D9	5.70-6.15 5.70-6.20 5.70-6.15	5.70	(3.80)	N=29 (3,4,7,7,8,7)	
			S D11 B12	7.20-7.65 7.20-7.65 7.20-7.70	7.20	(4.50)	N=9 (1,2,2,2,2,3)	
Stiff medium to high strength locally closely fissured brownish grey CLAY, with rare bioturbation. (LONDON CLAY FORMATION)	7.70	4.31	B13	7.70-8.20			PP=100.0kPa	
			S D14 B15	8.70-9.15 8.70-9.15 8.70-9.10	8.50	(7.70)	N=15 (1,2,3,4,4,4) PP=110.0kPa	
Borehole continued...								

Legend



Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.60	3.20			
200	8.90	8.90			
150	23.07	10.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	4.40	20	4.00	4.00	-
20/05/14	22.40	20	15.00	10.20	-

Dates: 14/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.40m and 22.40mbgl, rising to 4.00m and 15.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH305

Sheet 2 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 12.007mAOD
Coordinates: 535808.17E
192835.36N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff medium to high strength locally closely fissured brownish grey CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				UT16	10.20-10.65			21 blows		
				D17	10.65-10.80			PP=200.0kPa		
				S	11.70-12.15	10.20	(11.60)	N=25 (3,5,6,7,6,6)		
				D18	11.70-12.15					
				B19	11.70-12.20					
				S	13.20-13.65	10.20		N=27 (4,5,6,7,7,7)		
				D20	13.20-13.65			PP=145.0kPa		
				B21	13.20-13.70					
				UT22	14.70-15.15			19 blows		
Very stiff high strength brownish grey slightly silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		15.00	-2.99					PP=200.0kPa		▼
				D23	15.15-15.30					
				S	16.70-17.15	10.20	(16.30)	N=28 (4,5,7,7,7,7)		
				D24	16.70-17.15			PP=150.0kPa		
				B25	16.70-17.20					
Stiff high strength brownish grey silty sandy CLAY, with some silty sand bands. (LONDON CLAY FORMATION)		17.60	-5.59							
				S	18.20-18.65	10.20	(18.00)	N=30 (4,5,8,7,8,7)		
				D26	18.20-18.65			PP=120.0kPa		
				B27	18.20-18.70					
				S	19.70-20.15	10.20	(19.30)	N=29 (3,5,5,8,8,8)		
				D28	19.70-20.15					
				D29	19.70-20.20					

Borehole continued...

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.60	3.20			
200	8.90	8.90			
150	23.07	10.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	4.40	20	4.00	4.00	-
20/05/14	22.40	20	15.00	10.20	-

Dates:	14/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.40m and 22.40mbgl, rising to 4.00m and 15.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH305

Sheet 3 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 12.007mAOD
Coordinates: 535808.17E
192835.36N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff high strength brownish grey silty sandy CLAY, with some silty sand bands. (LONDON CLAY FORMATION)		21.20	-9.19							
Very stiff high strength greenish grey and brownish grey slightly silty slightly sandy CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		22.40	-10.39	S D30 B31	21.20-21.65 21.20-21.65 21.20-21.70	10.20	(20.80)	N=46 (5,7,8,12,14,12)		
Greyish brown silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)		22.70	-10.69							
Very dense brownish grey silty fine SAND, with some sandy clay bands. (LAMBETH GROUP UNDIFFERENTIATED)		23.07	-11.06	S D32	22.70-23.07 22.70-23.07	10.20	(15.00)	48/215mm - Abandoned		
Borehole Complete at 23.07 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.60	3.20			
200	8.90	8.90			
150	23.07	10.20			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	4.40	20	4.00	4.00	-
20/05/14	22.40	20	15.00	10.20	-

Dates:	14/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 4.40m and 22.40mbgl, rising to 4.00m and 15.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH306

Sheet 1 of 3

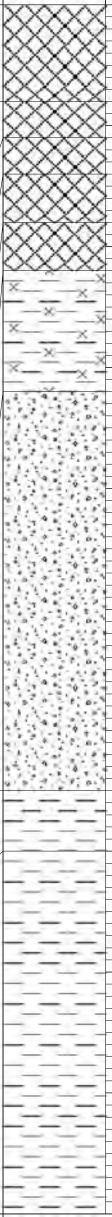
Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ryan Cridlin

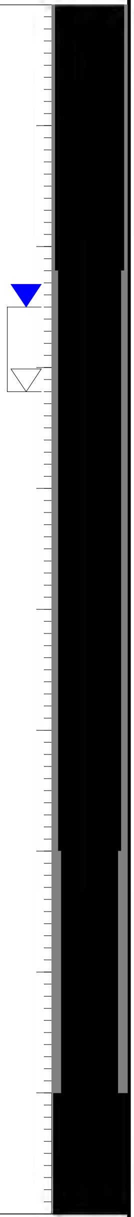
Ground Level: 11.018mAOD
Coordinates: 535857.33E
192853.39N



Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
MADE GROUND: Brown fine to coarse SAND and GRAVEL (Drillers description).	0.80	10.22	B1	0.80-1.10				
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to medium flint and plastic.	1.10	9.92	B2	1.10-1.40				
MADE GROUND: Firm brown slightly gravelly CLAY. Gravel is angular to subangular fine to medium flint.	1.40	9.62	B3	1.40-1.80				
MADE GROUND: Greyish brown silty fine to coarse SAND and GRAVEL. Gravel is subangluar to subrounded fine to coarse flint.	1.80	9.22	B4	1.80-2.20				
MADE GROUND: Yellowish brown silty fine to coarse SAND and GRAVEL. Gravel is rounded fine to coarse flint and brick.	2.20	8.82	B5	2.20-2.60				
Soft grey and yellowish grey silty CLAY, with rare semi decayed plant debris. (ALLUVIUM)	3.20	7.82	B6	3.20-3.60				
			S D7 B8	4.00-4.45 4.00-4.45 4.00-4.50	4.00	(2.50)	N=16 (2,2,4,3,4,5)	
			S	5.50-5.95	5.50	(2.50)	N=14 (1,1,3,3,4,4)	
			B9	6.00-6.50				
Medium dense grey slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)	6.50	4.52	B10	6.50-7.00				
Stiff brownish grey CLAY, with rare gravel sized nodules of weak mudstone. (LONDON CLAY FORMATION)	7.00	4.02	S D11 B12	7.00-7.45 7.00-7.45 7.00-7.50	7.00	(6.00)	N=15 (2,3,3,3,4,5)	
Firm medium to high strength brownish grey CLAY. (LONDON CLAY FORMATION)			S D13 B14	8.50-8.95 8.50-8.95 8.50-9.00	8.00		N=14 (1,2,3,3,4,4)	

Borehole continued...

Installations



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	2.20	2.20			
200	7.00	7.00			
150	24.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	3.20	20	2.50	3.20	-
28/05/14	23.20	20	11.50	9.00	-

Dates: 21/05/2014-28/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: G Day
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 3.20m and 23.20mbgl, rising to 2.50m and 11.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH306

Sheet 2 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ryan Cridlin

Ground Level: 11.018mAOD
Coordinates: 535857.33E
192853.39N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Firm medium to high strength brownish grey CLAY. (LONDON CLAY FORMATION)				U15	10.00-10.50			35 blows		
Firm to stiff medium strength dark brown mottled yellowish brown silty CLAY, with rare bioturbation (LONDON CLAY FORMATION)		10.45	0.57	D16	10.45-10.50					
				S D17 B18	12.00-12.45 12.00-12.45 12.00-12.50	9.00		N=23 (2,3,5,5,6,7)		
				S D19	13.50-13.95 13.50-13.95	9.00		N=24 (3,4,5,6,6,7)		
				B20	14.00-15.00					
Stiff to very stiff medium strength dark brownish grey silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		15.00	-3.98	S D21	15.00-15.45 15.00-15.45	9.00	(14.90)	N=18 (2,3,4,4,5,5)		
				B22	15.60-16.60					
				S D23	16.60-17.05 16.60-17.05	9.00	(16.40)	N=19 (2,3,4,4,5,6)		
				B24	17.00-18.00					
				S D25	18.00-18.45 18.00-18.45	9.00	(17.60)	N=26 (3,4,6,6,6,8)		
				B26	18.50-19.50					
Stiff high strength dark brownish grey mottled		19.50	-8.48	S D27	19.50-19.95 19.50-19.95	9.00	(19.00)	N=33 (4,6,8,8,8,9)		

Borehole continued...

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	2.20	2.20			
200	7.00	7.00			
150	24.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	3.20	20	2.50	3.20	-
28/05/14	23.20	20	11.50	9.00	-

Dates:	21/05/2014-28/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 3.20m and 23.20mbgl, rising to 2.50m and 11.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ryan Cridlin

Ground Level: 11.018mAOD

Coordinates: 535857.33E
192853.39N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP	(Recovery)	PID (ppm)	Installations
yellowish brown slightly sandy silty CLAY. (LONDON CLAY FORMATION)				B28	20.00-21.00						
				S	21.00-21.45	9.00	(20.10)	N=34 (4,6,8,8,9,9)			
				D29	21.00-21.45						
				U30	21.50-21.95			75 blows			
				D31	21.95-22.10						
		22.10	-11.08								
Firm to stiff high strength dark brownish grey mottled yellowish brown silty sandy CLAY. (LAMBETH GROUP UNDIFFERENTIATED)											
				S	23.00-23.40	9.00	(20.90)	50/250mm (8,12,12,12,14,12)			▽
				D32	23.00-23.40						
				B33	23.00-24.00						
		24.00	-12.98								
Borehole Complete at 24.00 m											

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	2.20	2.20			
200	7.00	7.00			
150	24.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	3.20	20	2.50	3.20	-
28/05/14	23.20	20	11.50	9.00	-

Dates:	21/05/2014-28/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 3.20m and 23.20mbgl, rising to 2.50m and 11.50mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 10.887mAOD
Coordinates: 535884.67E
192852.81N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Concrete.		0.40	10.49	B1	0.40-0.60					
MADE GROUND: Reddish grey sandy medium GRAVEL. Gravel is angular medium granite.		0.60	10.29	B2	0.60-0.90					
MADE GROUND: Yellowish brown very gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint.		0.90	9.99	B3	0.90-1.00					
MADE GROUND: Soft grey slightly sandy slightly gravelly CLAY. No gravel description recorded.		1.00	9.89	B4	1.00-1.40					
MADE GROUND: Yellowish brown gravelly fine to coarse SAND. Gravel is angular fine to coarse flint. From 1.40mbgl with some brick				B5	1.40-1.90					
		1.90	8.99	B6	1.90-2.30					
Soft brownish grey sandy CLAY. (ALLUVIUM)		2.20	8.69	B7	2.30-2.50					
Soft brownish grey sandy SILT. (ALLUVIUM)		3.10	7.79	B8	3.20-3.70					
Medium dense grey very sandy GRAVEL. Gravel is angular to subrounded coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S B10	4.00-4.45 4.00-4.50	4.00	(2.30)	N=13 (2,2,3,3,3,4)		
		5.10	5.79	B9	5.10-5.40					
Stiff medium to high strength brownish grey CLAY, with rare fine and medium flint gravel. (LONDON CLAY FORMATION)				S D11 B12	5.50-5.95 5.50-5.95 5.50-6.00	5.40	(4.00)	N=12 (2,2,3,3,3,3) PP=80.0kPa		
				U13	7.00-7.45			16 blows		
				D14	7.45-7.60			PP=175.0kPa		
		8.20	2.69	D15	8.20-8.40					
Grey MUDSTONE. (LONDON CLAY FORMATION)		8.40	2.49							
Very stiff medium to high strength closely fissured locally thinly laminated brownish grey CLAY. (LONDON CLAY FORMATION)				S D16 B17	8.50-8.95 8.50-8.95 8.50-9.00	7.00		N=17 (2,2,3,4,5,5) PP=130.0kPa		
Borehole continued...		9.90	0.99							

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.20	2.20
200	6.20	6.20
150	7.00	7.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/06/14	23.00	20	12.90	7.00	-

Dates:	03/06/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 23.00m, rising to 12.90m after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 10.887mAOD
Coordinates: 535884.67E
192852.81N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium strength brownish grey with rare greenish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				S D18 B19	10.00-10.45 10.00-10.45 10.00-10.50	7.00		N=19 (2,3,4,4,5,6) PP=180.0kPa		
				S D20 B21	11.50-11.95 11.50-11.95 11.50-12.00	7.00		N=20 (2,4,4,4,5,7) PP=180.0kPa		
				S D22 B23	13.00-13.45 13.00-13.45 13.00-13.50	7.00		N=23 (3,4,5,5,6,7) PP=180.0kPa		▼
From 14.50mbgl with some silty fine sand bands and greenish grey mottling.				S D24 B25	14.50-14.95 14.50-14.95 14.50-15.00	7.00		N=22 (3,4,5,5,6,6) PP=150.0kPa		
				S D26 B27	16.00-16.45 16.00-16.45 16.00-16.50	7.00		N=20 (2,4,4,5,5,6) PP=150.0kPa		
Stiff high strength thinly laminated brownish grey CLAY. (LONDON CLAY FORMATION)		17.50	-6.61	S D28 B29	17.50-17.95 17.50-17.95 17.50-18.00	7.00		N=21 (3,3,4,5,6,6) PP=140.0kPa		
Very stiff medium to high strength brownish grey slightly silty CLAY, with some greenish grey sandy mottling. (LONDON CLAY FORMATION) Borehole continued...		19.00	-8.11	S D30 B31	19.00-19.45 19.00-19.45 19.00-19.50	7.00		N=27 (6,6,7,7,7,6) PP=160.0kPa		

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	2.20	2.20			
200	6.20	6.20			
150	7.00	7.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/06/14	23.00	20	12.90	7.00	-

Dates: 03/06/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 23.00m, rising to 12.90m after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 10.887mAOD
Coordinates: 535884.67E
192852.81N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium to high strength brownish grey slightly silty CLAY, with some greenish grey sandy mottling. (LONDON CLAY FORMATION)				U32	20.50-20.95			46 blows		
				D33	20.95-21.10			PP=250.0kPa		
				S	22.00-22.45	7.00		N=38 (6,7,8,10,10,10)		
				D34	22.00-22.45					
				B35	22.30-22.70					
Brownish grey silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)		22.90	-12.01	D36	23.00-23.20					
Borehole Complete at 23.20 m		23.20	-12.31							

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	2.20	2.20
200	6.20	6.20
150	7.00	7.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
05/06/14	23.00	20	12.90	7.00	-

Dates:	03/06/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Groundwater observed at 23.00m, rising to 12.90m after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.185mAOD

Coordinates: 535732.67E 192841.85N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Concrete										
MADE GROUND: Black sandy GRAVEL. Gravel is angular to subangular fine to medium tarmac, granite and red brick.		0.30	11.89	B1	0.30-0.50					
MADE GROUND: Soft very gravelly CLAY, with rare rootlets. Gravel is subangluar to subrounded fine to medium concrete, brick and glass.		0.60	11.59	B2	0.60-0.80					
				B3	1.00-1.20					
MADE GROUND: Firm, locally soft orangish brown and yellowish brown slightly gravelly CLAY. Gravel is subangular fine brick and concrete.		1.40	10.79	B4	1.40-1.60					
				B5	2.20-2.30					
				B6	2.90-3.00					
Firm orangish brown mottled black slightly gravelly CLAY. Gravel is angular to subangular concrete and charcoal. (ALLUVIUM)		3.10	9.09	B7	3.10-3.40					
Soft, locally firm dark brownish black very organic peaty CLAY, with abundant rootlets and wood fragments. (ALLUVIUM)		3.40	8.79	B8	3.40-3.60					
Medium dense brownish grey sandy GRAVEL. Gravel is subangluar to subrounded fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)		3.70	8.49							
				S B10 D9	4.00-4.45 4.00-4.50 4.00-4.45	4.00	(3.80)	N=18 (3,4,3,3,6,6)		
				S D11 B12	5.50-5.95 5.50-5.95 5.50-6.00	5.50	(5.00)	N=9 (2,3,2,2,2,3)		
				S D13 B14	7.00-7.45 7.00-7.45 7.00-7.30	7.00	(4.10)	N=9 (2,2,2,2,2,3)		
Stiff becoming very stiff medium to high strength brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		7.30	4.89	B15	7.30-7.50					
				U16	8.00-8.45			30 blows		
				D17	8.45-8.50					
Borehole continued...										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.30	3.30
200	7.30	7.30
150	21.00	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	3.80	20	3.50	3.80	7.80
03/06/14	16.70	20	16.70	9.00	-
03/06/14	20.60	20	18.00	9.00	-

Dates: 29/05/2014-03/06/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: G Day
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 3.80m, 16.70m and 20.60m, rising to 3.50m, 16.70m and 18.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.185mAOD
Coordinates: 535732.67E
192841.85N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Stiff becoming very stiff medium to high strength brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)			S D18 B19	10.00-10.45 10.00-10.45 10.00-10.50	9.00		N=18 (3,4,4,4,5,5) PP=110.0kPa	
Very stiff thickly laminated slightly greenish grey slightly silty CLAY. (LONDON CLAY FORMATION)	11.30	0.89	B20	11.30-11.50			PP=140.0kPa	
Very stiff medium strength slightly micaceous thinly laminated brownish grey slightly silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION)	11.50	0.69	S D21 B22	11.50-11.95 11.50-11.95 11.50-12.00	9.00		N=21 (3,4,4,5,5,7) PP=160.0kPa	
			S D23 B24	13.00-13.45 13.00-13.45 13.00-13.50	9.00		N=22 (2,3,4,5,6,7) PP=160.0kPa	
Very stiff medium strengththinly laminated brownish grey slightly silty CLAY, with rare bioturbation and rare pyrite nodules. (LONDON CLAY FORMATION)	14.00	-1.82	B25	14.00-14.20			PP=220.0kPa	
			S D26 B27	14.50-14.95 14.50-14.95 14.50-15.00	9.00		N=19 (2,3,3,4,5,7)	
			U28	16.00-16.45			50 blows	
From 16.45mbgl with some thin silty fine sand bands.			D29	16.45-16.50			PP=220.0kPa	
			S D30 B31	17.50-17.95 17.50-17.95 17.50-18.00	9.00	(17.50)	N=23 (3,3,4,5,6,8) PP=160.0kPa	
			S D32 B33	19.00-19.45 19.00-19.45 19.00-19.50	9.00	(19.00)	N=31 (3,6,6,8,8,9) PP=150.0kPa	
Very stiff medium strength thinly interlaminated brownish grey with rare greenish grey slightly silty slightly micaceous CLAY, with rare	19.10	-6.92						

Borehole continued...

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.30	3.30			
200	7.30	7.30			
150	21.00	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	3.80	20	3.50	3.80	7.80
03/06/14	16.70	20	16.70	9.00	-
03/06/14	20.60	20	18.00	9.00	-

Dates:	29/05/2014-03/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 3.80m, 16.70m and 20.60m, rising to 3.50m, 16.70m and 18.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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BH308

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 12.185mAOD
Coordinates: 535732.67E
192841.85N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
bioturbation and shell fragments. (LONDON CLAY FORMATION)		20.20	-8.02	B34	20.20-20.40					
Very dense brownish grey silty fine SAND, with some silty clay bands. (LONDON CLAY FORMATION)		20.60	-8.42	S D35	20.50-20.83 20.50-20.83	9.00	(15.20)	50/182mm (4,6,12,23,15)		▽
Very dense brownish grey mottled greenish grey slightly gravelly silty fine SAND, with rare shell fragments. Gravel is angular to subangular fine to medium flint. (LAMBETH GROUP UNDIFFERENTIATED)		20.83	-8.65							
Borehole Complete at 20.83 m										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.30	3.30
200	7.30	7.30
150	21.00	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
30/05/14	3.80	20	3.50	3.80	7.80
03/06/14	16.70	20	16.70	9.00	-
03/06/14	20.60	20	18.00	9.00	-

Dates:	29/05/2014-03/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 3.80m, 16.70m and 20.60m, rising to 3.50m, 16.70m and 18.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH309

Sheet 1 of 2

Project: Edmonton Ecopark

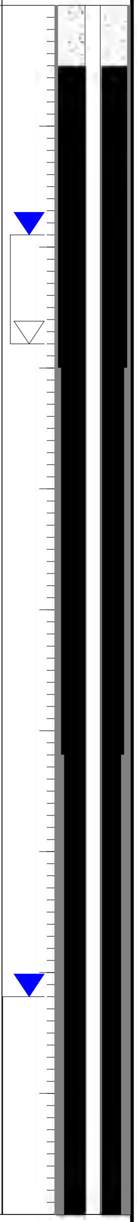
Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 10.746mAOD
Coordinates: 535673.36E
192794.55N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Sandy GRAVEL. Gravel is angular to subangular fine to coarse brick and concrete.				B1	0.10-0.20					
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint.		0.30	10.45	B2	0.30-1.20					
MADE GROUND: Firm to stiff grey and brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse flint, brick and concrete.		1.30	9.45	B3	1.30-1.50					
MADE GROUND: Firm dark grey grey and brown slightly silty CLAY, with occasional decayed rootlets and slight organic odour.		1.70	9.05	B4	1.70-2.20					
Soft light grey and brownish grey sandy slightly gravelly SILT, with some dark brown organic silt pockets and fine decayed roots. Gravel is subrounded fine to medium flint. (ALLUVIUM)		2.80	7.95	B5	2.80-3.10					
Medium dense to loose grey silty very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)		3.10	7.65	B6	3.10-3.50					
				S D7 B8	4.00-4.45 4.00-4.45 4.00-4.50	4.00	(3.00)	N=10 (1,2,3,3,2,2)		
From 5.50mbgl with some sandy clay bands				S B10 D9	5.50-5.95 5.50-5.90 5.50-5.95	5.50	(2.50)	N=9 (2,2,2,2,2,3)		
Stiff medium strength slightly greenish grey silty slightly micaceous CLAY. (LONDON CLAY FORMATION)		5.90	4.85	B11	5.90-6.40					
								PP=75.0kPa		
				U12	7.50-7.95			20 blows		
				D13	7.95-8.05					
Very stiff medium strength locally thinly laminated brownish grey silty slightly micaceous CLAY, some sandy clay bands and rare bioturbation. (LONDON CLAY FORMATION)		8.90	1.85	S D14 B15	9.00-9.45 9.00-9.45 9.00-9.50	7.50		N=18 (1,2,4,5,4,5) PP=175.0kPa		
Borehole continued...										



Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.00	3.00			
200	6.90	6.20			
150	19.91	10.70			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
20/05/14	2.80	20	1.90	2.00	-
22/05/14	10.40	20	10.40	7.50	10.70
22/05/14	18.00	20	8.20	10.70	-

Dates: 20/05/2014-23/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 2.80m, 10.40m and 18.00mbgl, rising to 1.90m, 10.40m and 8.20mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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BH309

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 10.746mAOD
Coordinates: 535673.36E
192794.55N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium strength locally thinly laminated brownish grey silty slightly micaceous CLAY, some sandy clay bands and rare bioturbation. (LONDON CLAY FORMATION)				S	10.50-10.95	7.50	(10.45)	N=27 (3,4,5,8,7,7)		
				D16	10.50-10.95					
				B17	10.50-11.00					
								PP=200.0kPa		
Stiff medium strength brownish grey slightly silty slightly sandy CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		11.70	-0.95	B18	11.70-12.00					
				S	12.00-12.45	10.70		N=24 (3,4,5,6,7,6)		
				D19	12.00-12.45			PP=180.0kPa		
				B20	12.00-12.50					
Medium dense greenish grey clayey fine to medium SAND. (LONDON CLAY FORMATION)		13.50	-2.75	S	13.50-13.95	10.50		N=28 (4,5,7,7,7,7)		
				D21	13.50-13.60					
Very stiff brownish grey slightly silty slightly sandy CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		13.60	-2.85	D22	13.50-13.95			PP=180.0kPa		
				B23	13.60-14.10					
				U24	15.10-15.55			36 blows		
				D25	15.55-15.65					
Very stiff high strength greenish grey sandy glauconitic CLAY, with rare bioturbation and fine and medium gravel sized pyrite. (LONDON CLAY FORMATION)		16.50	-5.75	S	16.50-16.95	10.70		N=36 (3,5,8,10,9,9)		
				D26	16.50-16.95			PP=200.0kPa		
				B27	16.50-17.00					
Very stiff thinly laminated greyish brown sandy SILT, with some fine sand bands. (LONDON CLAY FORMATION)		17.40	-6.65	B28	17.40-17.80					
Medium dense grey silty fine SAND, with some glauconitic specks. (LAMBETH GROUP UNDIFFERENTIATED)		18.00	-7.25	S	18.00-18.45	10.70		N=18 (3,3,3,3,3,9)		
				D29	18.00-18.45					
				B30	18.00-18.70					
Stiff light grey, reddish brown and yellowish grey slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse flint. Some black staining on gravel. (LAMBETH GROUP UNDIFFERENTIATED)		18.70	-7.95	B31	18.70-19.30			PP=120.0kPa		
		19.30	-8.55	S	19.50-19.91	10.70	(7.50)	50/260mm (5,10,12,14,15,9)		
				D32	19.50-19.91					
Borehole continued...				B33	19.50-19.80					

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.00	3.00
200	6.90	6.20
150	19.91	10.70

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
20/05/14	2.80	20	1.90	2.00	-
22/05/14	10.40	20	10.40	7.50	10.70
22/05/14	18.00	20	8.20	10.70	-

Dates:	20/05/2014-23/05/2014
Plant:	Dando 2000
Drilled By:	T York
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 2.80m, 10.40m and 18.00mbgl, rising to 1.90m, 10.40m and 8.20mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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BH309

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 10.746mAOD
Coordinates: 535673.36E
192794.55N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Stiff very high strength light greenish grey reddish brown and yellowish brown CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		20.00	-9.25							
Borehole Complete at 20.00 m										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.00	3.00
200	6.90	6.20
150	19.91	10.70

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
20/05/14	2.80	20	1.90	2.00	-
22/05/14	10.40	20	10.40	7.50	10.70
22/05/14	18.00	20	8.20	10.70	-

Dates: 20/05/2014-23/05/2014
Plant: Dando 2000
Drilled By: T York
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 2.80m, 10.40m and 18.00mbgl, rising to 1.90m, 10.40m and 8.20mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH310

Sheet 1 of 2

Project: Edmonton Ecopark

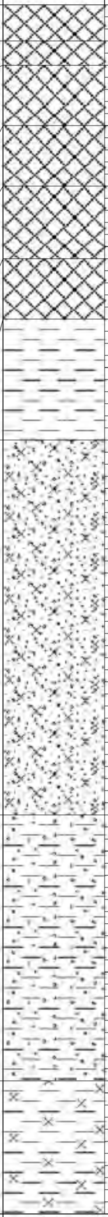
Project ID: GTS-14-403

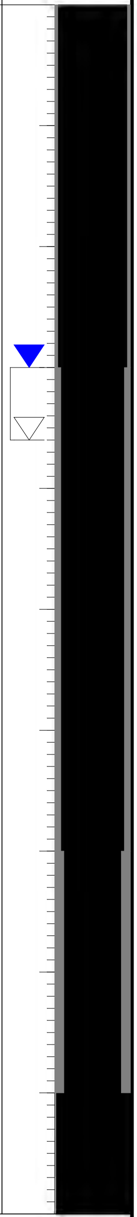
Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.644mAOD

Coordinates: 535715.26E
192805.94N





Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Tarmacadam.		0.30	11.34							
MADE GROUND: Hardcore (DRILLERS DESCRIPTION).		0.50	11.14							
MADE GROUND: Orangish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint.		1.00	10.64	B1	0.50-0.80					
MADE GROUND: Stiff brownish grey slightly gravelly CLAY. Gravel is subrounded fine to medium flint.		1.50	10.14	B2	1.00-1.50					
MADE GROUND: Greyish brown silty fine to coarse SAND and GRAVEL. Gravel is angular to rounded fine to coarse flint.		2.10	9.54	B3	1.50-2.10					
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL, with occasional cobbles. Gravel is angular fine to coarse brick and flint.		2.60	9.04	B4	2.10-2.60					
Firm grey and yellowish grey CLAY. (ALLUVIUM)		3.60	8.04	B5	2.60-3.00					
Medium dense grey slightly silty very gravelly fine to coarse SAND. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S D6 B7	4.00-4.45 4.00-4.45 4.00-4.50	4.00	(3.00)	N=17 (2,3,4,4,5,4)		
From 5.50mbgl becomes SAND and GRAVEL.		6.70	4.94	S B8	5.50-5.95 5.50-6.00	5.50	(3.00)	N=20 (2,3,4,5,5,6)		
Stiff medium strength greyish brown slightly gravelly CLAY. Gravel is angular fine to medium flint. (LONDON CLAY FORMATION)				B9 S D10 B11	6.70-7.00 7.00-7.45 7.00-7.45 7.00-7.50	7.00	(5.50)	N=15 (2,3,3,4,4,4)		
		8.90	2.74	UT12	8.50-8.95			35 blows		
Very stiff medium to high strength locally thinly laminated brownish grey slightly silty CLAY, with some thin brown silt bands and rare bioturbation. (LONDON CLAY FORMATION)				D13	8.95-9.00			PP=200.0kPa		
Borehole continued...										

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	3.00	3.00
200	7.00	7.00
150	19.90	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
04/06/14	3.60	20	3.00	3.60	-
06/06/14	15.00	20	15.00	9.00	-
06/06/14	19.80	20	17.80	9.00	-

Dates:	05/06/2014-06/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Water observed at 3.60m, 15.00m and 19.80mbgl, rising to 3.00m, 15.00m and 17.80mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH310

Sheet 2 of 2

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Joanne Gavigan

Ground Level: 11.644mAOD
Coordinates: 535715.26E
192805.94N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff medium to high strength locally thinly laminated brownish grey slightly silty CLAY, with some thin brown silt bands and rare bioturbation. (LONDON CLAY FORMATION)				S D14 B15	10.00-10.45 10.00-10.45 10.00-10.50	9.00		N=17 (1,3,3,4,4,6) PP=160.0kPa		
Stiff medium strength brownish grey slightly silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		11.50	0.14	S D16 B17	11.50-11.95 11.50-11.95 11.50-12.00	9.00		N=21 (2,3,4,5,6,6) PP=150.0kPa		
				S D18 B19	13.00-13.45 13.00-13.95 13.00-13.50	9.00		N=22 (3,4,4,5,6,7) PP=160.0kPa		
				S D20 B21	14.50-14.95 14.50-14.95 14.50-15.00	9.00		N=24 (3,4,5,5,7,7) PP=165.0kPa		▼
				UT22	16.00-16.45			45 blows		
				D23	16.45-16.50					
				S D24 B25	17.50-17.95 17.50-17.95 17.50-17.80	9.00	(17.50)	N=33 (3,4,7,7,8,11) PP=165.0kPa		▼
Very stiff high strength greyish brown CLAY, with some greenish grey sandy clay bands. (LONDON CLAY FORMATION)		17.80	-6.16	B26	17.80-18.00			PP=170.0kPa		
				B27	18.20-18.40			PP=170.0kPa		
Very dense greyish brown silty fine SAND. (LAMBETH GROUP UNDIFFERENTIATED)		18.80	-7.16	B28	18.80-19.00					
				S D29	19.50-19.85 19.50-19.85	9.00	(18.00)	50/198mm (7,10,13,17,20)		▽
Borehole Complete at 19.90 m		19.90	-8.26							

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	3.00	3.00			
200	7.00	7.00			
150	19.90	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
04/06/14	3.60	20	3.00	3.60	-
06/06/14	15.00	20	15.00	9.00	-
06/06/14	19.80	20	17.80	9.00	-

Dates:	05/06/2014-06/06/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Water observed at 3.60m, 15.00m and 19.80mbgl, rising to 3.00m, 15.00m and 17.80mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH311

Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 13.587mAOD
Coordinates: 535816.20E
192810.19N

Description
MADE GROUND: Brick Weave
MADE GROUND: Concrete
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint.
MADE GROUND: Grey slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to cobble sized flint, brick and concrete.
MADE GROUND: Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular fine to medium flint and brick.
MADE GROUND: Firm to stiff greyish brown CLAY.
MADE GROUND: Brownish grey slightly silty very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint and quartz.
MADE GROUND: Yellowish brown fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to coarse flint.
MADE GROUND: Grey clayey fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to coarse flint, brick and concrete.
MADE GROUND: Soft greyish brown and brownish grey CLAY, with some black sandy gravelly pockets, slight organic odour.
Firm grey with rare brown CLAY, with some roots and rootlets. (ALLUVIUM)
Soft dark brown amorphous PEAT, locally an organic silt. (ALLUVIUM)
Very soft high strength brownish grey silty CLAY, with some dark brown silty organic pockets. Gravel is angular to subrounded fine to coarse flint. (LONDON CLAY FORMATION)
Medium dense yellowish grey slightly silty very gravelly fine to coarse SAND. Gravel is angular to subrounded fine to coarse flint. (LONDON CLAY FORMATION)
Firm brownish grey CLAY. (LONDON CLAY FORMATION)
Borehole continued...

Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
0.05	13.54						
0.25	13.34						
0.35	13.24	B1	0.35-0.50				
		B2	0.90-1.20				
1.30	12.29	B3	1.30-1.50				
2.50	11.09	B4	2.50-2.70				
		B5	3.50-3.70			PP=75.0kPa	
3.80	9.79	B6	3.80-4.00				
4.00	9.59	S	4.00-4.37	4.00		50/215mm (2,6,12,14,18,6)	
		D7	4.00-4.37				
4.30	9.29	B8	4.00-4.50				
		B9	4.30-4.50				
4.50	9.09	B10	4.50-4.70				
4.70	8.89	B11	4.70-5.00				
						PP=50.0kPa	
5.10	8.49	B12	5.10-5.30				
5.30	8.29	B13	5.30-5.50				
		S	5.50-5.95	5.50	(5.30)	N=31 (5,7,8,8,8,7)	
		D14	5.50-5.95			PP=10.0kPa	
5.70	7.89	B15	5.70-6.00				
		S	7.00-7.45	7.00	(4.20)	N=22 (1,3,5,5,6,6)	
		D16	7.00-7.45				
7.70	5.89	B17	7.70-7.90				
7.90	5.69						
		UT18	8.50-8.95			25 blows	
		D19	8.95-9.00				

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	8.00	8.00
150	25.42	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
22/05/14	5.70	20	5.50	5.50	-
28/05/14	19.10	20	19.10	9.00	-
28/05/14	25.00	20	12.00	9.00	-

Dates:	22/05/2014-29/05/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 5.70m, 19.10m and 25.00m, rising to 5.50m, 19.10m and 12.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

BH311

Sheet 2 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 13.587mAOD
Coordinates: 535816.20E
192810.19N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Firm to stiff medium to high strength dark bluish grey CLAY. (LONDON CLAY FORMATION) From 10.00mbgl with rare brownish black mottling.			S D20 B21	10.00-10.45 10.00-10.45 10.00-10.50	9.00		N=17 (2,2,2,4,5,6)	
Firm to stiff high strength thinly laminated dark brownish grey CLAY with occasional silt. (LONDON CLAY FORMATION) From 11.50mbgl with occasional selenite crystals.	10.60	2.99	B22	10.60-10.80				
			S D23 B24	11.50-11.95 11.50-11.95 11.50-12.00	9.00		N=16 (2,3,3,3,4,6)	
			S D25 B26	13.00-13.45 13.00-13.45 13.00-13.50	9.00		N=21 (3,3,4,5,5,7)	
Firm high strength dark brownish grey mottled brownish grey slightly silty sandy CLAY. (LONDON CLAY FORMATION)	14.00	-0.41	S D27	14.00-14.45 14.00-14.45	9.00		N=19 (3,3,4,5,5,5)	
			B28	14.50-15.00				
			S D29 B30	16.00-16.45 16.00-16.45 16.00-16.50	9.00		N=23 (3,3,5,5,6,7)	
			UT31	17.50-17.95			60 blows	
			D32	17.95-18.00				
			S D33 B34	19.00-19.45 19.00-19.45 19.00-19.50	9.00		N=21 (2,5,6,5,5,5)	
Borehole continued...								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
200	8.00	8.00
150	25.42	9.00

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
22/05/14	5.70	20	5.50	5.50	-
28/05/14	19.10	20	19.10	9.00	-
28/05/14	25.00	20	12.00	9.00	-

Dates:	22/05/2014-29/05/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 5.70m, 19.10m and 25.00m, rising to 5.50m, 19.10m and 12.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Sheet 3 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 13.587mAOD
Coordinates: 535816.20E
192810.19N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Firm high strength dark brownish grey mottled brownish grey slightly silty sandy CLAY. (LONDON CLAY FORMATION)		20.50	-6.91	S D35 B36	20.50-20.95 20.50-20.95 20.50-21.00	9.00	(20.50)	N=23 (2,5,5,5,6,7)		
Stiff medium strength dark brownish grey and yellowish brown slightly silty slightly sandy CLAY, with some black organic specks. (LONDON CLAY FORMATION)		22.00	-8.41	S D37 B38	22.00-22.45 22.00-22.45 22.00-22.50	9.00	(22.00)	N=27 (3,5,5,7,7,8)		
Firm to stiff medium strength dark brownish grey mottled black silty sandy CLAY. (LONDON CLAY FORMATION)				S D39 B40	23.50-23.95 23.50-23.95 23.50-24.00	9.00	(23.50)	N=42 (4,6,7,9,11,15)		
		23.80	-10.21							
Firm to stiff high strength dark brownish grey and yellowish brown sandy silty CLAY with occasional pockets of dark green organic silt. (LAMBETH GROUP UNDIFFERENTIATED)		24.30	-10.71	B41	24.30-24.60					
Soft yellowish brown and greyish brown very sandy CLAY. (LAMBETH GROUP UNDIFFERENTIATED)		25.00	-11.41	S D42	25.00-25.42 25.00-25.42	9.00	(12.00)	54/265mm (8,14,14,7,12,21)		▽
Very dense yellowish brown mottled black fine slightly clayey SAND. (LAMBETH GROUP UNDIFFERENTIATED)		25.42	-11.83							
Borehole Complete at 25.42 m										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
200	8.00	8.00			
150	25.42	9.00			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
22/05/14	5.70	20	5.50	5.50	-
28/05/14	19.10	20	19.10	9.00	-
28/05/14	25.00	20	12.00	9.00	-

Dates:	22/05/2014-29/05/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	G Day
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 5.70m, 19.10m and 25.00m, rising to 5.50m, 19.10m and 12.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 15.866mAOD
Coordinates: 535831.85E
192790.82N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Reinforced concrete		0.50	15.37	B1	0.50-1.00					
MADE GROUND: Medium dense yellowish brown slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subrounded fine to coarse flint.				S D2	4.00-4.45 4.00-4.45	4.00	(3.70)	N=12 (6,6,4,3,3,2)		
		4.50	11.37	B3	4.50-5.00					
MADE GROUND: Firm low strength brownish grey slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse flint and brick.				S D4	5.50-5.95 5.50-5.95	5.20		N=8 (2,2,2,2,2,2)		
		6.60	9.27	B5	6.70-7.00					
MADE GROUND: Firm medium strength greyish brown slightly gravelly CLAY. Gravel is angular to subangular fine to cobble sized flint and brick.				S D6 W7	7.00-7.45 7.00-7.45 7.20	5.20		N=16 (2,3,5,4,4,3)		
		7.50	8.37	B9	7.50-8.00					
Medium dense grey slightly silty very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S D8	8.50-8.95 8.50-8.95	8.50	(7.70)	N=12 (2,2,3,3,3,3)		
Borehole continued...										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	8.20	8.20			
200	11.50	11.50			
150	13.50	13.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	7.60	20	7.20	7.50	0.00
19/05/14	20.20	20	20.20	13.50	-
20/05/14	28.50	20	16.00	13.50	-

Dates: 19/05/2014-21/05/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 7.60m, 20.20m and 28.50mbgl, rising to 7.20m, 20.20m and 16.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 15.866mAOD
Coordinates: 535831.85E
192790.82N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Medium dense grey slightly silty very sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S	10.00-10.45	10.00	(7.50)	N=16 (2,2,4,4,4,4)		
				D10	10.00-10.45					
				B11	10.00-10.50					
		10.50	5.37	B12	10.50-11.00			PP=100.0kPa		
Stiff medium to high strength locally closely fissured and or thinly laminated brownish grey CLAY. (LONDON CLAY FORMATION)										
				S	12.00-12.45	12.00	(10.00)	N=10 (1,1,1,2,3,4)		
				D1	12.00-12.45			PP=90.0kPa		
				B2	12.00-12.50					
				UT3	13.50-13.95			50 blows		
				D4	13.95-14.00			PP=140.0kPa		
Very stiff medium strength thinly laminated brownish grey slightly silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION)		14.00	1.87							
				S	15.00-15.45	13.50		N=24 (2,4,5,6,6,7)		
				D5	15.00-15.45			PP=150.0kPa		
				B6	15.00-15.50					
				D7	16.00-16.10			PP=140.0kPa		▼
				UT8	16.50-16.95			60 blows		
				D9	16.95-17.00					
				S	18.00-18.45	13.50		N=28 (3,5,6,6,8,8)		
				D10	18.00-18.45			PP=200.0kPa		
				B11	18.50-19.00					
				S	19.50-19.95	13.50		N=21 (3,4,5,5,5,6)		
				D12	19.50-19.95			PP=160.0kPa		
				B13	19.50-20.00					
Borehole continued...										

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	8.20	8.20			
200	11.50	11.50			
150	13.50	13.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	7.60	20	7.20	7.50	0.00
19/05/14	20.20	20	20.20	13.50	-
20/05/14	28.50	20	16.00	13.50	-

Dates: 19/05/2014-21/05/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 7.60m, 20.20m and 28.50mbgl, rising to 7.20m, 20.20m and 16.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Sheet 3 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 15.866mAOD

Coordinates: 535831.85E
192790.82N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
Very stiff medium strength thinly laminated brownish grey slightly silty CLAY, with rare bioturbation. (LONDON CLAY FORMATION) From 20.30mbgl with some greenish grey bands.	20.70	-4.83	B14	20.00-20.30			PP=130.0kPa	
Stiff medium strength brownish grey silty CLAY, with some sandy bands and rare selenite crystals. (LONDON CLAY FORMATION)	22.00	-6.13	S D15 B16	21.00-21.45 21.00-21.45 21.00-21.50	13.50	(20.90)	N=26 (3,5,6,6,7,7) PP=130.0kPa	
Stiff medium strength brownish grey CLAY. (LONDON CLAY FORMATION)	24.00	-8.13	S D17 B18	22.50-22.95 22.50-22.95 22.50-23.00	13.50	(22.30)	N=24 (3,3,5,5,6,8) PP=100.0kPa	
Very stiff medium strength locally thinly laminated brownish grey silty CLAY, with some sandy bands, rare bioturbation and selenite crystals. (LONDON CLAY FORMATION)	25.30	-9.43	S D19 B20	24.00-24.45 24.00-24.45 24.00-24.50	13.50	(23.80)	N=27 (4,5,6,6,7,8)	
Very high strength locally thinly laminated brownish grey with rare greenish grey slightly sandy slightly gravelly CLAY, with rare bioturbation. Gravel is angular to subangular fine to medium flint. (LAMBETH GROUP UNDIFFERENTIATED)	27.10	-11.23	B21 S D22 B23 B24	25.30-25.40 25.50-25.95 25.50-25.95 25.50-26.00 26.70-26.80	13.50	(23.80)	PP=200.0kPa N=31 (6,7,7,7,8,9) PP=150.0kPa	
Stiff very high strength brownish grey sandy slightly gravelly SILT, with occasional shell fragments. Gravel is angular to subangular fine to medium flint. (LAMBETH GROUP UNDIFFERENTIATED)	28.50	-12.63	S D25 B26	27.00-27.42 27.00-27.42 27.50-28.00	13.50	(25.90)	50/270mm (5,9,11,13,15,11)	
Very dense brownish grey silty slightly gravelly fine SAND. Gravel is angular to subangular fine to medium flint. (LAMBETH GROUP UNDIFFERENTIATED)	29.30	-13.43	S D27 B28	28.50-28.87 28.50-28.87 28.50-29.00	13.50	(16.00)	50/220mm (8,16,15,18,17)	
Borehole Complete at 29.30 m								

Hole Diameter Detail

Diameter (mm)	Depth (m)	Casing Depth (m)
250	8.20	8.20
200	11.50	11.50
150	13.50	13.50

Chiseling Details

From (m)	To (m)	Time (hhmm)

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
15/05/14	7.60	20	7.20	7.50	0.00
19/05/14	20.20	20	20.20	13.50	-
20/05/14	28.50	20	16.00	13.50	-

Dates: 19/05/2014-21/05/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl.
2. Water observed at 7.60m, 20.20m and 28.50mbgl, rising to 7.20m, 20.20m and 16.00mbgl after 20 minutes standing time.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Borehole Record

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Sheet 1 of 3

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 14.459mAOD
Coordinates: 535874.34E
192766.48N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
MADE GROUND: Brick weave		0.05	14.41							
		0.25	14.21	B1	0.25-0.40					
MADE GROUND: Rienforced concrete		0.40	14.06	B2	0.40-0.60					
MADE GROUND: Reddish brown silty fine to coarse SAND and GRAVEL. Gravel is angular fine to coarse granite.										
		1.00	13.46	B3	1.00-1.20					
		1.20	13.26	B4	1.20-1.50					
MADE GROUND: Orangish brown slightly clayey fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to coarse flint.										
MADE GROUND: Yellowish brown slightly silty fine to coarse SAND. Gravel is subangluar to subrounded fine to coarse flint.				B5	2.00-2.50					
								PP=110.0kPa		
MADE GROUND: Firm to stiff brownish grey silty CLAY.										
				B6	3.50-3.70			PP=140.0kPa		
				S D7 B8	4.00-4.45 4.00-4.45 4.00-4.50	3.00		N=11 (1,1,2,2,3,4) PP=80.0kPa		
		4.50	9.96	B9	4.50-4.80					
MADE GROUND: Yellowish brown slightly silty very sandy GRAVEL. Gravel is angular to rounded fine to coarse flint.										
		5.10	9.36	B10	5.10-5.50					
MADE GROUND: Loose yellowish grey slightly silty fine to coarse SAND and GRAVEL. Gravel is angular to subangular fine to coarse flint, brick and wood.				S D11 B12	5.50-5.95 5.50-5.95 5.50-5.70	5.50	(5.10)	N=8 (8,8,3,3,1,1)		
		5.70	8.76	B13	5.70-6.00					
Soft low strength dark grey and grey slightly gravelly silty CLAY, with rare semi decayed plant debris. Gravel is angular fine to coarse flint. Organic odour. (ALLUVIUM)										
		6.40	8.06	B14	6.40-6.70					
		6.70	7.76	B15	6.70-7.00					
Soft dark greyish brown sandy slightly gravelly SILT, with some roots and rootlets. Gravel is rounded fine to coarse flint and chalk. (ALLUVIUM)		7.00	7.46	S D16 B17	7.00-7.45 7.00-7.45 7.00-7.50	7.00	(6.70)	N=22 (2,3,4,5,6,7)		
		7.60	6.86	B18	7.60-7.90					
Grey silty gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium flint. (KEMPTON PARK GRAVEL FORMATION)		7.90	6.56	B19	7.90-8.20					
Medium dense grey silty very sandy GRAVEL. Gravel is angular to rounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION)				S	8.50-8.95	8.00	(5.80)	N=14 (2,2,2,3,4,5)		
		8.60	5.86	D20 B21	8.50-8.95 8.70-9.00			PP=75.0kPa		
Spongy dark brown slightly sandy slightly gravelly amorphous PEAT. Gravel is angular to subangular fine to medium flint. (ALLUVIUM)										
Borehole continued...										

Hole Diameter Detail Diameter (mm)	Hole Diameter Detail Depth (m)	Hole Diameter Detail Casing Depth (m)	Chiseling Details From (m)	Chiseling Details To (m)	Chiseling Details Time (hhmm)
250	6.00	6.00			
200	9.00	9.00			
150	28.30	10.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	1.00	20	0.95	0.00	-
21/05/14	6.70	20	6.40	6.70	-
27/05/14	13.60	20	13.55	10.50	-
27/05/14	27.80	20	16.50	10.50	-

Dates:	21/05/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 1.00m, 6.70m , 13.60m, 27.80m, rising to 0.95m, 6.40m, 13.55m and 16.50mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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GROUND TECHNOLOGY
Maple Road, Kings Lynn
Norfolk, PE34 3AF
Tel: 01553 817657
www.groundtechnology.co.uk

Borehole Record

Sheet 2 of 3

BH313

Project: Edmonton Ecopark

Project ID: GTS-14-403

Client : AMEC E & I UK Limited

Engineer : Ben Smith

Ground Level: 14.459mAOD
Coordinates: 535874.34E
192766.48N

Description	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)
7.90m - 8.60m : Medium dense grey sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (KEMPTON PARK GRAVEL FORMATION) 8.60m - 16.00m : Stiff medium strength brownish grey CLAY. (LONDON CLAY FORMATION)			J22	10.00-10.45			65 blows	
			D23	10.45-10.50				
			S	11.50-11.95	10.50		N=18 (2,2,3,4,5,6)	
			D24	11.50-11.95			PP=110.0kPa	
			B25	11.50-12.00				
			S	13.00-13.45	10.50		N=21 (2,3,4,5,5,7)	
			D26	13.00-13.45			PP=170.0kPa	
			B27	13.00-13.50				
			D28	14.95-15.00				
Very stiff high strength brownish grey locally greenish grey silty slightly micaceous CLAY. (LONDON CLAY FORMATION)	16.00	-1.54	S	16.00-16.45	10.50	(15.95)	N=24 (3,5,6,5,6,7)	
			D29	16.00-16.45				
			B30	16.00-16.50				
							PP=140.0kPa	
Very stiff high strength brownish grey silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)	17.50	-3.04	S	17.50-17.95	10.50	(17.35)	N=26 (4,6,6,6,6,8)	
			D31	17.50-17.95			PP=140.0kPa	
			B32	17.50-18.00				
			S	19.00-19.45	10.50	(18.80)	N=27 (4,4,6,6,7,8)	
			D33	19.00-19.45			PP=165.0kPa	
			B34	19.00-19.50				

Borehole continued...

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	6.00	6.00			
200	9.00	9.00			
150	28.30	10.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	1.00	20	0.95	0.00	-
21/05/14	6.70	20	6.40	6.70	-
27/05/14	13.60	20	13.55	10.50	-
27/05/14	27.80	20	16.50	10.50	-

Dates: 21/05/2014
Plant: Dando 2000
Drilled By: A Elsoff
Logged By: J Tomalin
Checked By: P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 1.00m, 6.70m , 13.60m, 27.80m, rising to 0.95m, 6.40m, 13.55m and 16.50mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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GROUND TECHNOLOGY Maple Road, Kings Lynn Norfolk, PE34 3AF Tel: 01553 817657 www.groundtechnology.co.uk	**Borehole Record**	Sheet 3 of 3 **BH313**
	Project: Edmonton Ecopark Project ID: GTS-14-403	
Client : AMEC E & I UK Limited	Engineer : Ben Smith	Ground Level: 14.459mAOD Coordinates: 535874.34E 192766.48N

Description	Legend	Depth (m)	O.D. Level (m)	Sample Test Type	Sample Test Depth (m)	SPT/CPT Casing Depth (m)	SPT/CPT Water Depth (m)	Remarks and Test Results SPT/HV/PP (Recovery)	PID (ppm)	Installations
Very stiff high strength brownish grey silty slightly micaceous CLAY, with rare bioturbation. (LONDON CLAY FORMATION)				S D35 B36	20.50-20.95 20.50-20.95 20.50-21.00	10.50	(20.30)	N=26 (3,4,5,6,7,8) PP=160.0kPa		
		21.00	-6.54							
Stiff to very stiff high strength dark bluish grey slightly sandy very silty CLAY. (LONDON CLAY FORMATION)				S D37 B38	22.00-22.45 22.00-22.45 22.00-22.50	10.50	(20.80)	N=19 (2,2,3,4,5,7)		
				S D39 B40	23.50-23.95 23.50-23.95 23.50-24.00	10.50	(23.30)	N=28 (3,5,6,7,7,8)		
				B41	24.40-24.60					
				S D42 B43	25.00-25.45 25.00-25.45 25.00-25.50	10.50	(22.60)	N=32 (3,4,6,8,8,10)		
				B44	26.20-26.40					
Firm probably very high strength dark brownish grey mottled yellowish brown silty very sandy CLAY, with occasional black organic specks. (LAMBETH GROUP UNDIFFERENTIATED)		26.50	-12.04	S D45 B46	26.50-26.94 26.50-26.94 26.50-27.00	10.50	(25.00)	50/290mm (6,9,10,11,14,15)		
Dark brownish grey mottled yellowish brown slightly silty very clayey fine to medium SAND. (LAMBETH GROUP UNDIFFERENTIATED)		27.80	-13.34	B47	27.80-28.30					
Borehole Complete at 28.30 m		28.30	-13.84							

Hole Diameter Detail			Chiseling Details		
Diameter (mm)	Depth (m)	Casing Depth (m)	From (m)	To (m)	Time (hhmm)
250	6.00	6.00			
200	9.00	9.00			
150	28.30	10.50			

Water Level Observations

Date	Water Strike (m)	Standing Time (mins)	Standing Level (m)	Casing Depth (m)	Depth Sealed (m)
21/05/14	1.00	20	0.95	0.00	-
21/05/14	6.70	20	6.40	6.70	-
27/05/14	13.60	20	13.55	10.50	-
27/05/14	27.80	20	16.50	10.50	-

Dates:	21/05/2014
Plant:	Dando 2000
Drilled By:	A Elsoff
Logged By:	J Tomalin
Checked By:	P Lewin

Remarks:
1. Inspection pit hand dug from ground level to 1.20mbgl
2. Groundwater observed at 1.00m, 6.70m , 13.60m, 27.80m, rising to 0.95m, 6.40m, 13.55m and 16.50mbgl.
3. Aquifer protection (environmental seals) installed at base of Made Ground / top of Alluvium and at base of the Kempton Park Gravels / top of the London Clay Formation.

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Laboratory Report

GSTL
GEO Site & Testing Services Ltd

Contract Number: 23719

Client's Reference: **GTS-14-403**

Report Date: **21-07-2014**

Client **Ground Technology Services**
Maple Road
Kings Lynn
Norfolk
PE34 3AF

Contract Title: **Edmonton Ecopark**
For the attention of: **Ben Armstrong**

Date Received: **26-06-2014**
Date Commenced: **26-06-2014**
Date Completed: **21-07-2014**

Test Description	Qty
Moisture Content 1377 : 1990 Part 2 : 3.2 - * UKAS	13
4 Point Liquid & Plastic Limit (LL/PL) 1377 : 1990 Part 2 : 4.3 & 5.3 - * UKAS	13
One-dimensional Consolidation 75mm or 50mm diameter specimens (5 days) 1377 : 1990 Part 5 : 3 - * UKAS	12
Quick Undrained Triaxial Compression Test - Multi-stage Loading of a single specimen (100mm diameter) 1377 : 1990 Part 7 : 9 - * UKAS	12

Notes: **Observations and Interpretations are outside the UKAS Accreditation**
*** - denotes test included in laboratory scope of accreditation**
 # - denotes test carried out by approved contractor
@ - denotes non accredited tests

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. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Approved Signatories:
Alex Wynn (Associate Director) - Benjamin Sharp (Contracts Manager) - D V Edwards (Managing Director)
Emma Williams (Office Manager) - Paul Evans (Quality/Technical Manager)

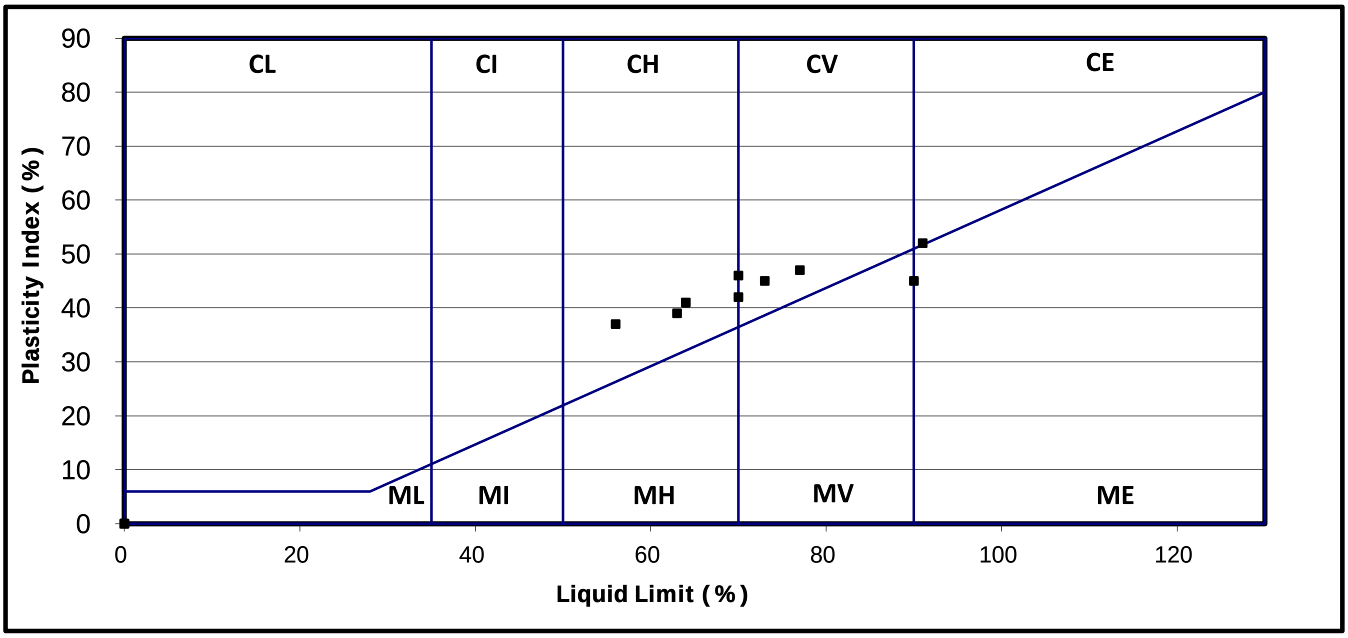
Test Report: **Method of the Determination of the plastic limit and plasticity index**
BS 1377 : Part 2 : 1990 Method 5

Client ref: **35180**
Location: **Edmonton Ecopark**
Contract Number: **23719**

Hole / Sample Number	Sample Type	Depth m	Moisture Content % Cl. 3.2	Liquid Limit % Cl. 4.3 / 4.4	Plastic Limit % Cl. 5.	Plasticity Index % Cl. 6.	% Passing .425mm	Remarks
BH301/11	D	3.20	67	91	39	52	100	CE Extremely High Plasticity
BH302/19	D	8.10	20	63	24	39	93	CH High Plasticity
BH303/13	D	7.00	25	56	19	37	70	CH High Plasticity
BH306/11	D	7.00	34	73	28	45	73	CV Very High Plasticity
BH307/11	D	5.50	36	77	30	47	100	CV Very High Plasticity
BH308/11	D	5.50	2.4		NP		21	
BH309/13	D	7.95	28	64	23	41	100	CH High Plasticity
BH310/10	D	7.00	32	70	24	46	100	CH/V High/High Plasticity
BH311/19	D	8.95	32	70	28	42	100	CH/V High/High Plasticity
BH313/11	D	5.50	58	90	45	45	68	MV/E Very/Extremely High Plasticity

Symbols: **NP : Non Plastic** **# : Liquid Limit and Plastic Limit Wet Sieved**

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.
BS 5930:1999+A2:2010



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GEO SITE & TESTING SERVICES LTD

For and behalf of GEO Site & Testing Services Ltd

Authorised By:
Ben Sharp (Contracts Manager)
Date: 17.7.14

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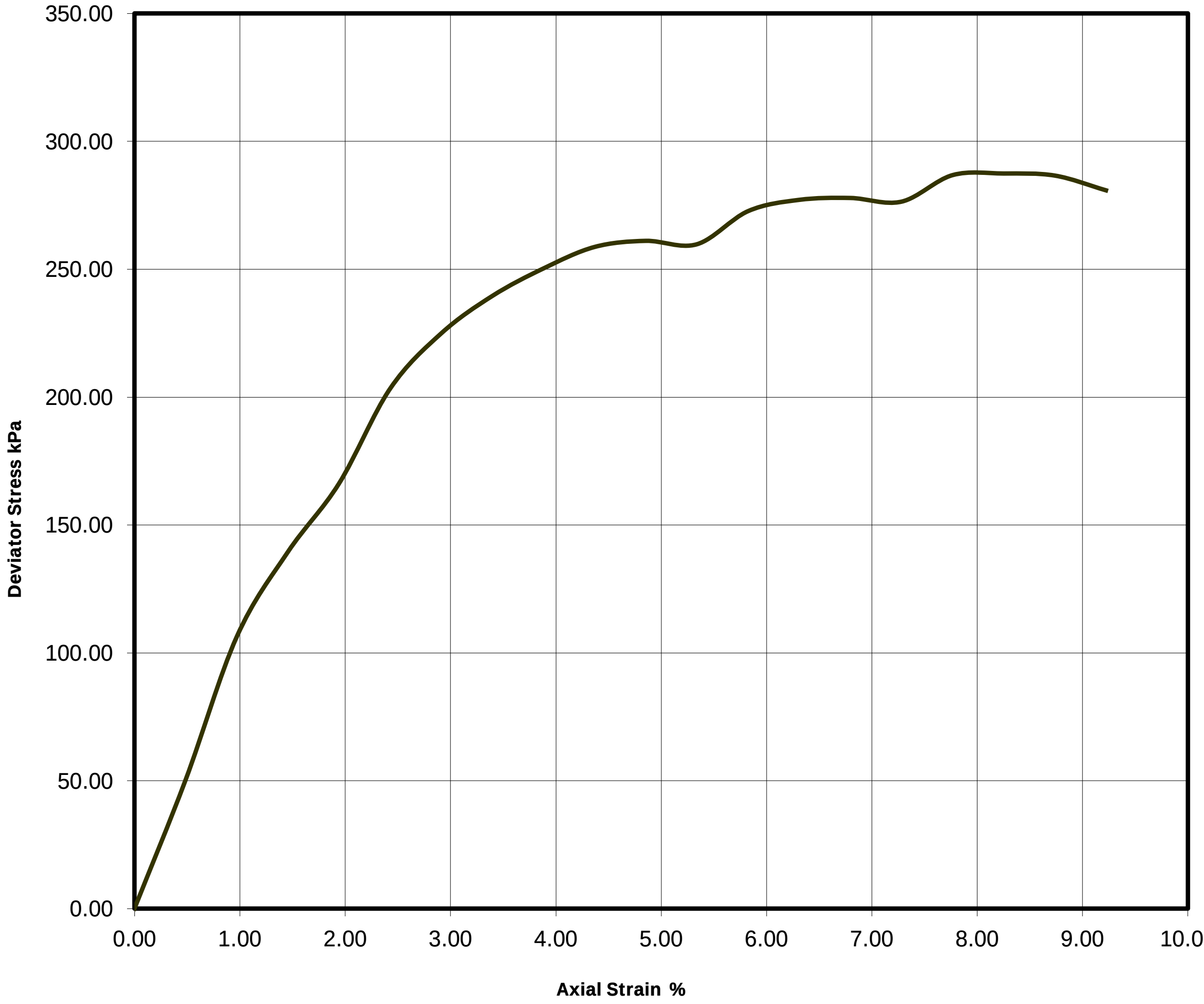
Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH301**
Sample Number:	**23**
Depth (m) :	**10.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.7	2.04	1.61	100	261	131	4.9	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	278	139	6.8		
				300	287	144	8.3		

GEO Site & Testing Services Limited

Checked By

Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref: 35180
Location: Edmonton Ecopark
Contract Number: 23719-010714
Hole Number BH301
Sample Number: 23
Depth (m) : 10.00

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.7	2.04	1.61	100	261	131	4.9	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	278	139	6.8		
				300	287	144	8.3		

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GEO Site & Testing Services Limited

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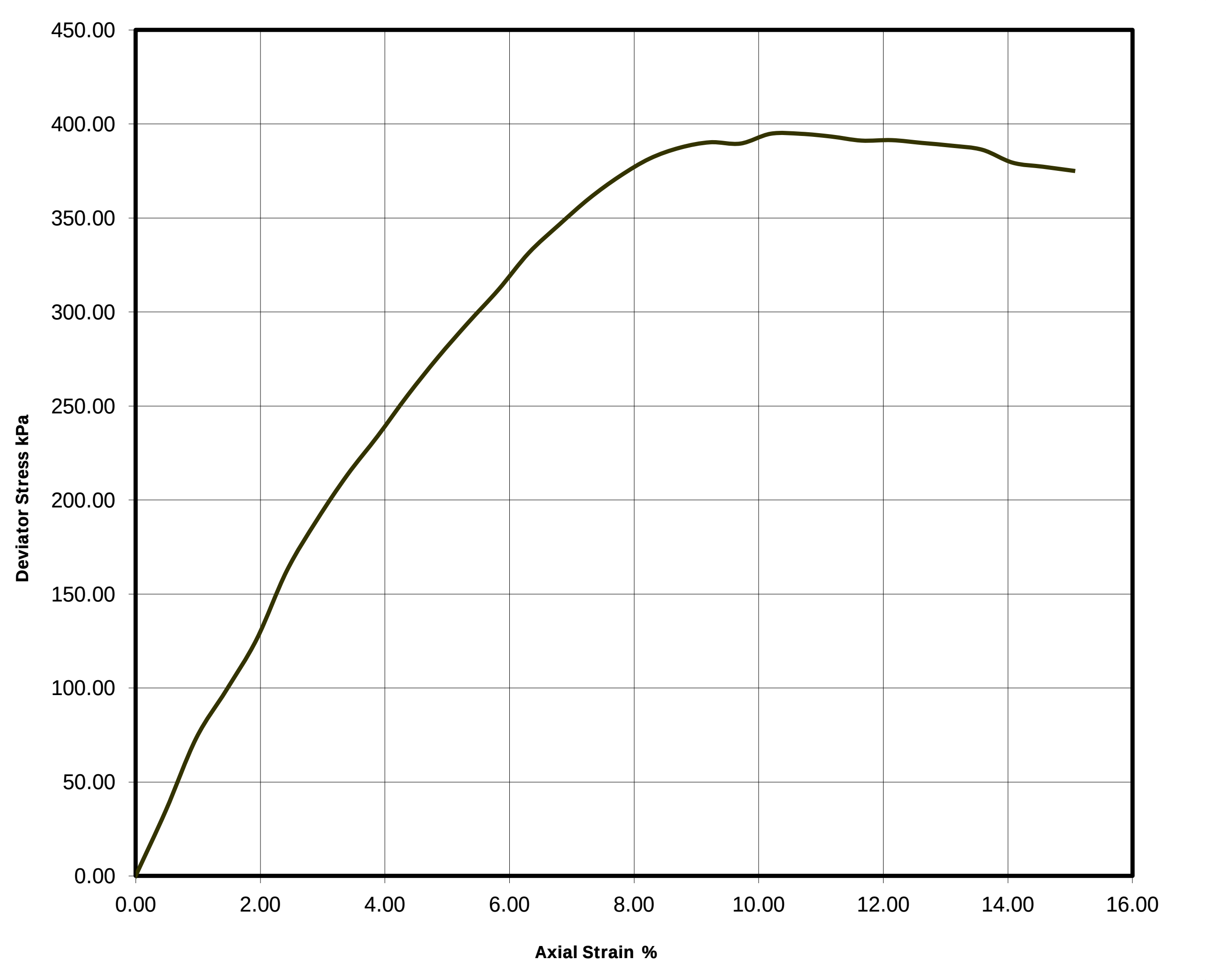
Approved By:

UKAS TESTING
2788

Date Approved: 17.7.14

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH302**
Sample Number:	**22**
Depth (m) :	**10.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



<table>
<tr><td colspan="10">Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage</td></tr>
<tr><td>Specimen</td><td>Moisture Content (%)</td><td>Bulk Density (Mg/m3)</td><td>Dry Density (Mg/m3)</td><td>Cell Pressure (kPa)</td><td>Deviator Stress (kPa)</td><td>Cohesion (kPa)</td><td>Failure Strain (%)</td><td>Mode of Failure</td><td>Remarks
Sample taken from Top of tube</td></tr>
<tr><td>A</td><td>27.3</td><td>2.05</td><td>1.61</td><td>100</td><td>390</td><td>195</td><td>9.2</td><td>Compound</td><td>Rate of strain = 2 %/min
Latex Membrane used mm thickness</td></tr>
<tr><td></td><td></td><td></td><td></td><td>200</td><td>395</td><td>197</td><td>10.2</td><td></td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td>300</td><td>391</td><td>196</td><td>12.1</td><td></td><td></td></tr>
</table>

GEO Site & Testing Services Limited

BSharp
Checked By

DP Evans
Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH302**
Sample Number:	**22**
Depth (m) :	**10.00**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	27.3	2.05	1.61	100	390	195	9.2	Compounc	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	395	197	10.2		
				300	391	196	12.1		

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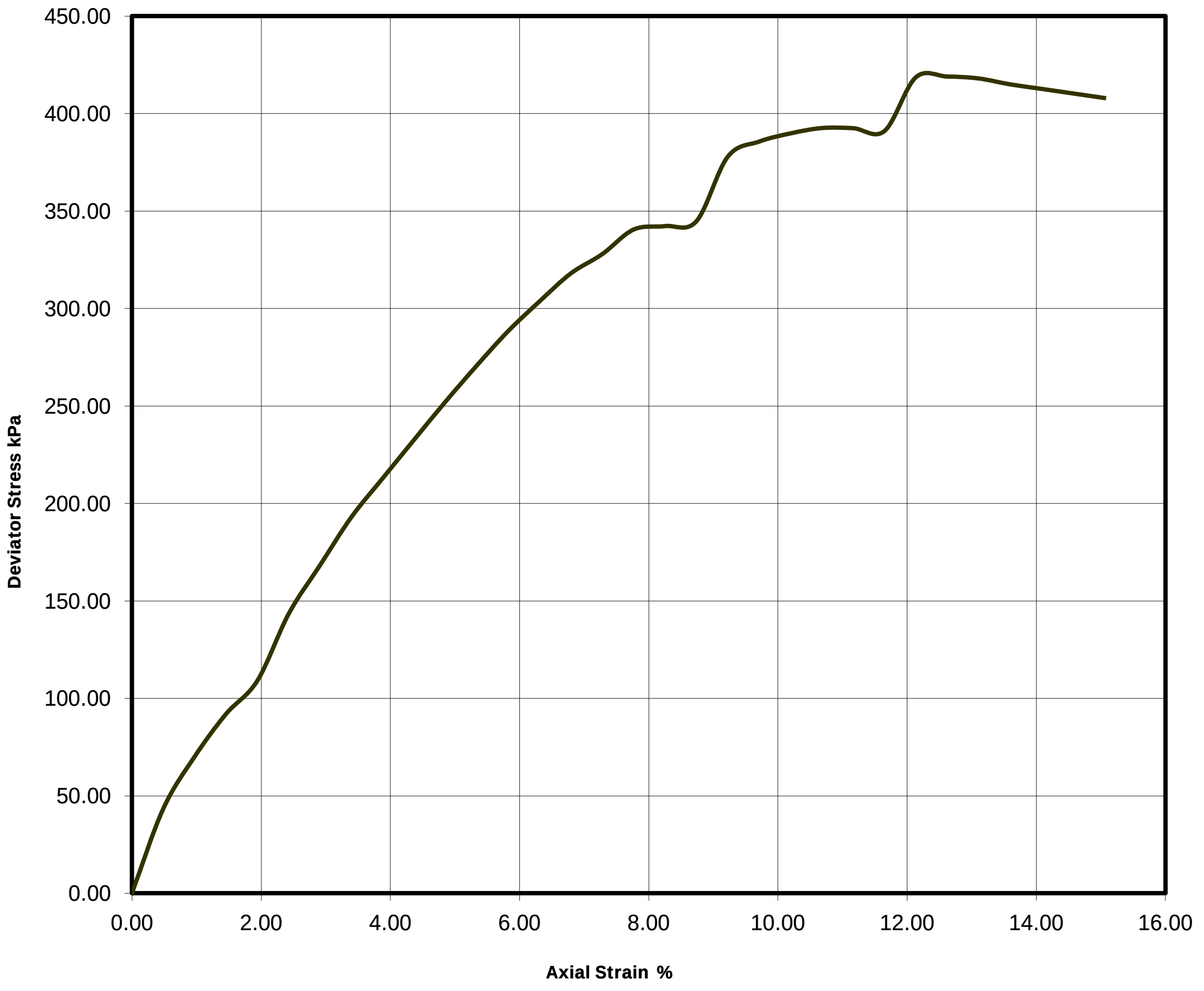
Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH303**
Sample Number:	**17**
Depth (m) :	**10.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103	Height (mm): 200	Test: 100mm Multistage							
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	23.7	2.10	1.70	100	345	172	8.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	393	196	10.7		
				300	419	210	12.6		

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BSharp

DP Evans

Checked By Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH303**
Sample Number:	**17**
Depth (m) :	**10.00**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	23.7	2.10	1.70	100	345	172	8.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	393	196	10.7		
				300	419	210	12.6		

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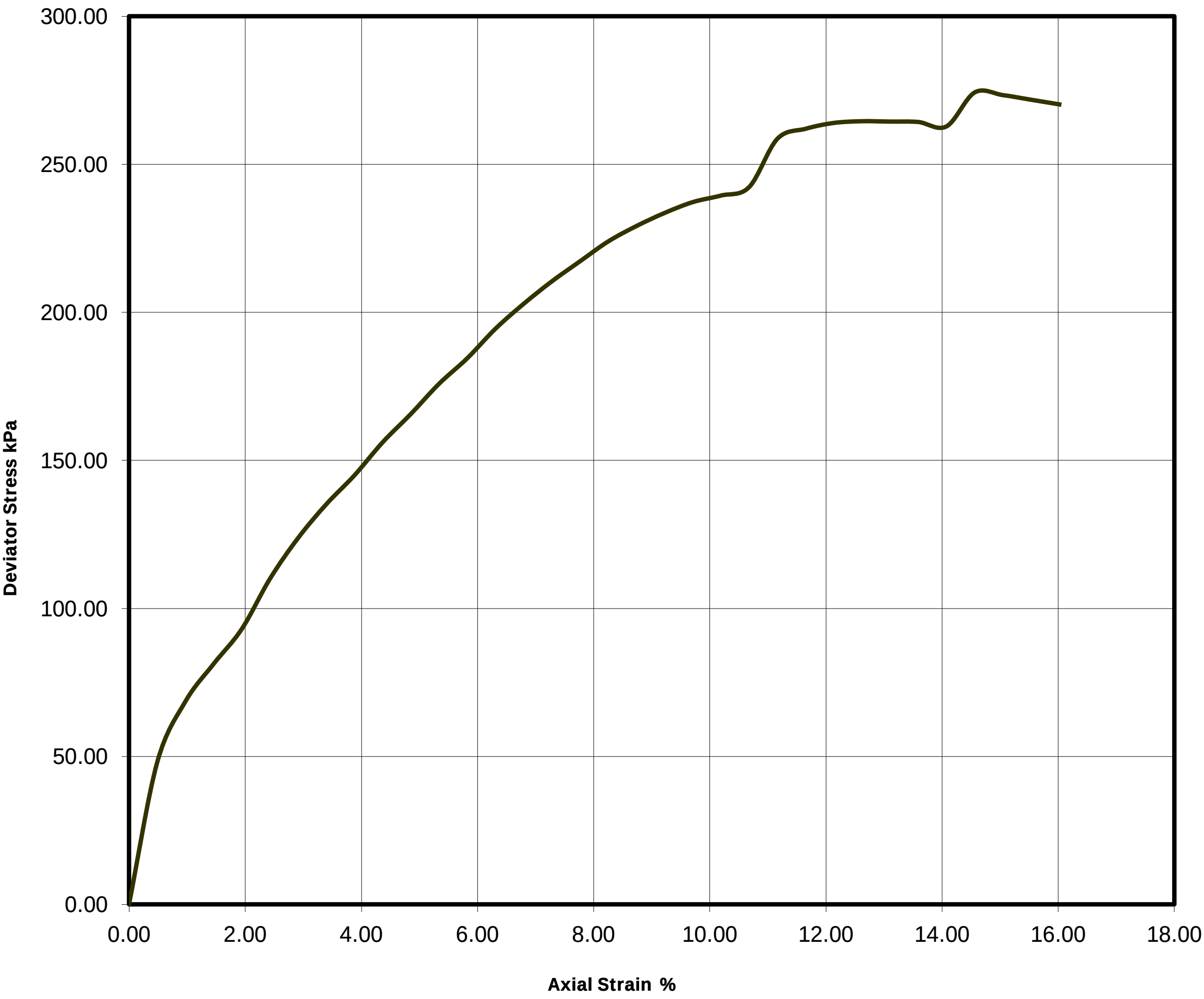
Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report: **Undrained Shear Strength in Triaxial Compression**
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH304**
Sample Number:	**16**
Depth (m) :	**10.50 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.2	2.06	1.63	100	242	121	10.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	265	132	12.6		
				300	274	137	14.6		

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DP Gang

Checked By Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH304**
Sample Number:	**16**
Depth (m) :	**10.50**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.2	2.06	1.63	100	242	121	10.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	265	132	12.6		
				300	274	137	14.6		

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TESTING
2788

Date Approved: 17.7.14

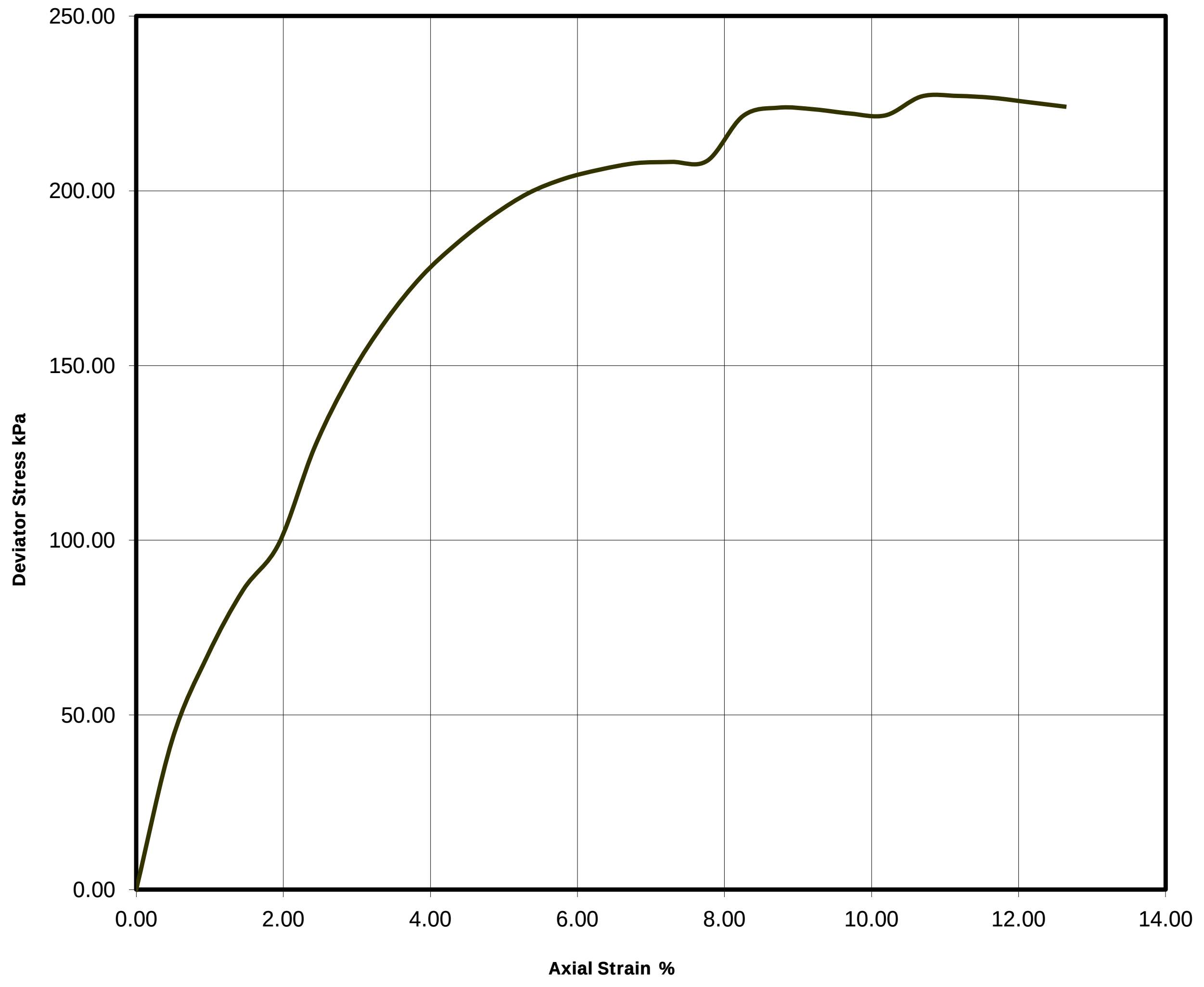
Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref: 35180
Location: Edmonton Ecopark
Contract Number: 23719-010714
Hole Number BH305
Sample Number: 16
Depth (m) : 10.20 to N/A
Sample Description : Very Firm silty CLAY.



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	27.7	1.99	1.56	100	209	104	7.8	Compound	Rate of strain = 2 %/min
				200	224	112	8.7		Latex Membrane used mm thickness
				300	227	114	11.2		

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GEO Site & Testing Services Limited

Checked By

Approved By:

Date Approved: 17.7.14

UKAS TESTING 2788

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH305**
Sample Number:	**16**
Depth (m) :	**10.20**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	27.7	1.99	1.56	100	209	104	7.8	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	224	112	8.7		
				300	227	114	11.2		

GSTL
GEO Site & Testing Services Limited

Checked By

Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

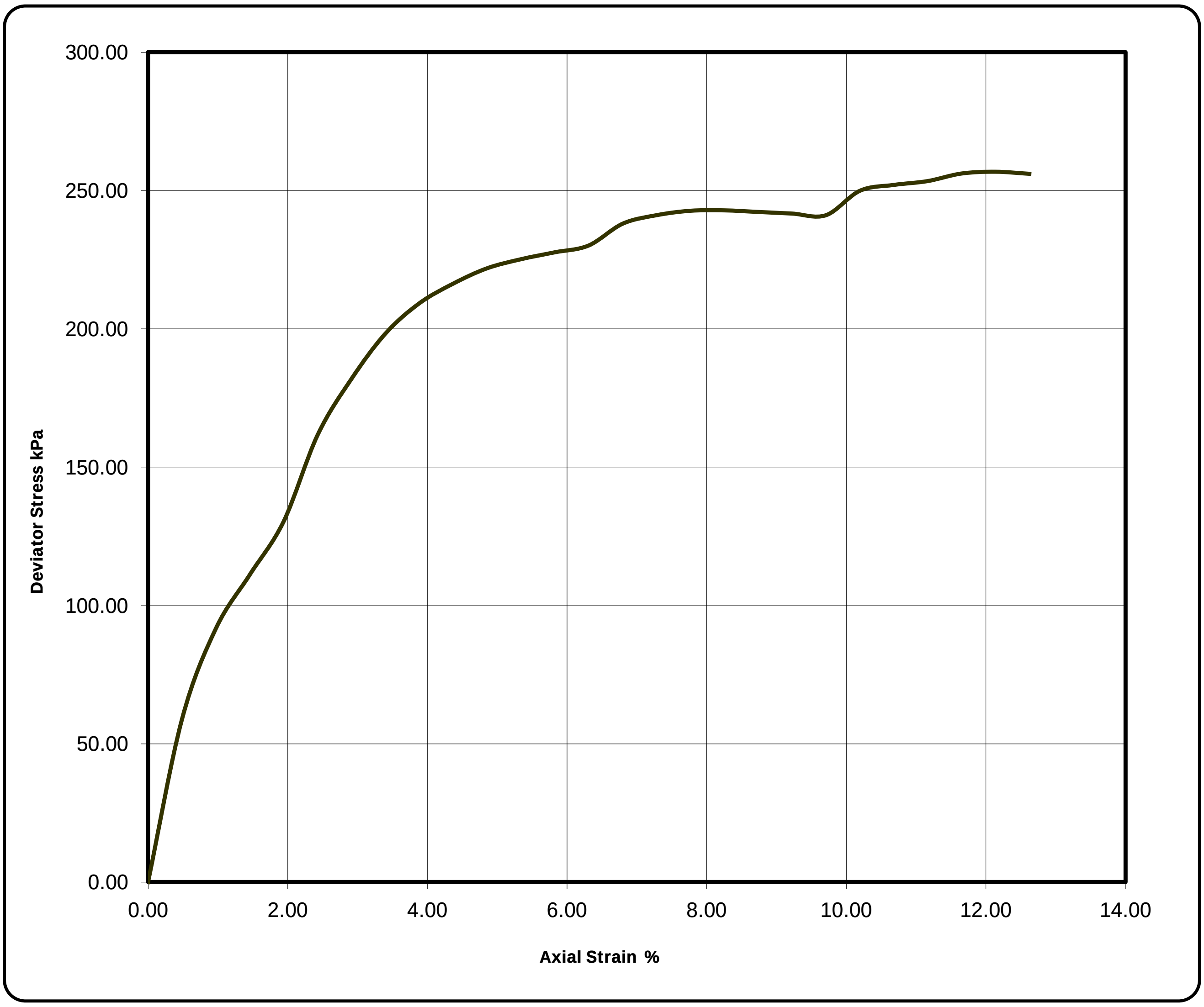
Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH306**
Sample Number:	**15**
Depth (m) :	**10.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	25.2	2.10	1.68	100	230	115	6.3	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	243	121	8.3		
				300	257	128	12.1		

GSTL
GEO Site & Testing Services Limited

B Sharp

Checked By

DP Evans

Approved By:

UKAS TESTING 2788

Date Approved: 17.7.14

Test Report: **Undrained Shear Strength in Triaxial Compression**

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH306**
Sample Number:	**15**
Depth (m) :	**10.00**

Post Test Specimen

Specimen Split

Diameter (mm): 103	Height (mm): 200	Test: 100mm Multistage							
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	25.2	2.10	1.68	100	230	115	6.3	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	243	121	8.3		
				300	257	128	12.1		

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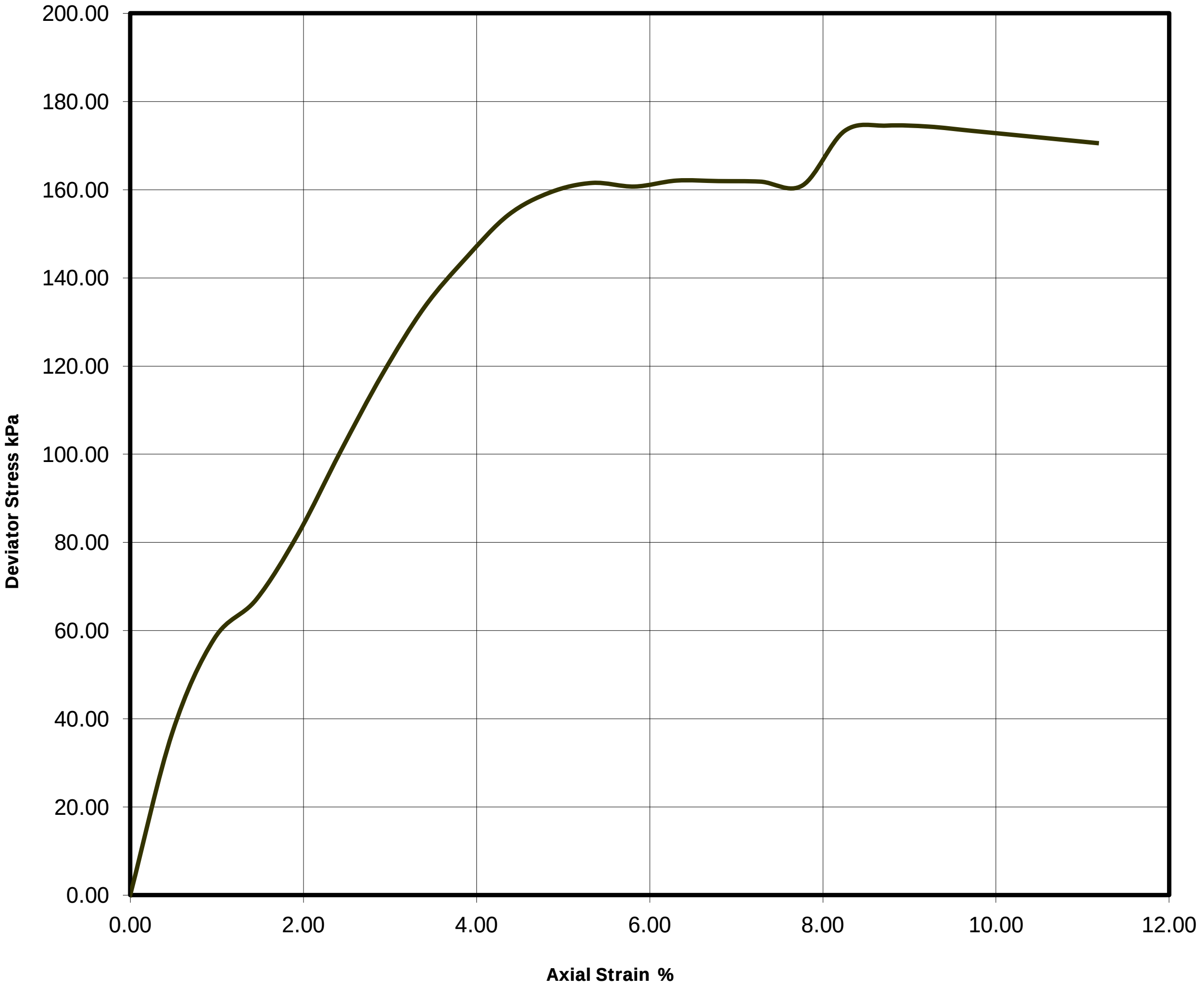
Approved By:

Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH307**
Sample Number:	**13**
Depth (m) :	**7.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	30.4	1.95	1.50	75	162	81	5.3	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				150	162	81	6.3		
				300	175	87	8.7		

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Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref: **35180**
Location: **Edmonton Ecopark**
Contract Number: **23719-010714**
Hole Number **BH307**
Sample Number: **13**
Depth (m) : **7.00**

Post Test Specimen

Specimen Split

Diameter (mm):	103	Height (mm):		200	Test:	100mm Multistage			
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	30.4	1.95	1.50	75	162	81	5.3	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				150	162	81	6.3		
				300	175	87	8.7		

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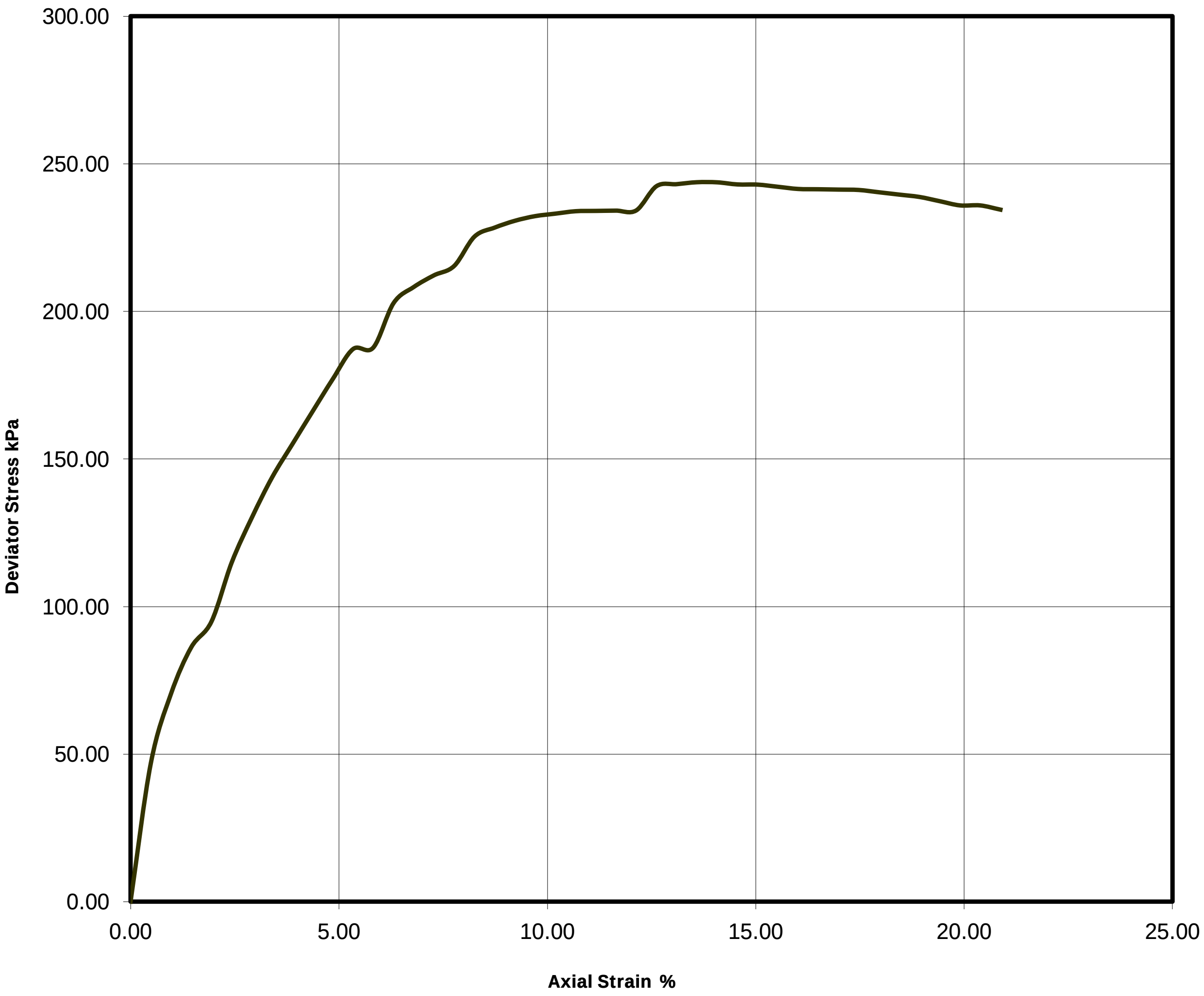
Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH308**
Sample Number:	**16**
Depth (m) :	**8.00 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	27.3	2.06	1.62	75	215	108	7.8	Compound	Rate of strain = 2 %/min
				150	234	117	12.1		Latex Membrane used mm thickness
				300	244	122	13.6		

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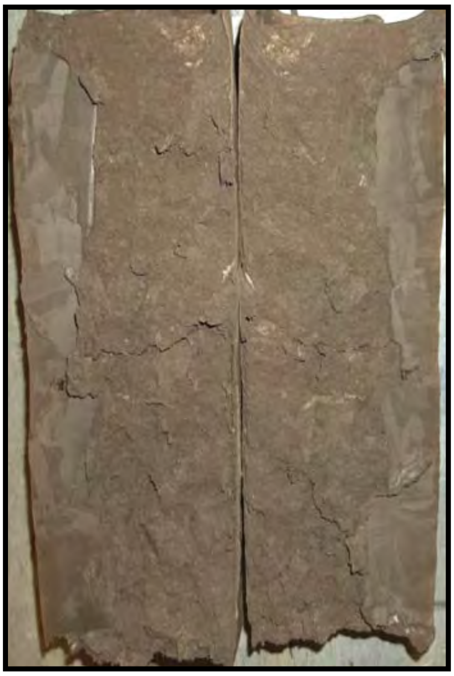
Test Report:	**Undrained Shear Strength in Triaxial Compression** **BS 1377 : Part7 : Clause 8 : 1990 Multistage Test** **without measurement of Pore Pressure**
Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH308**
Sample Number:	**16**
Depth (m) :	**8.00**

Post Test Specimen



Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	27.3	2.06	1.62	75	215	108	7.8	Compoun	Rate of strain = 2 %/min Latex Membrane used mm thickness
				150	234	117	12.1		
				300	244	122	13.6		

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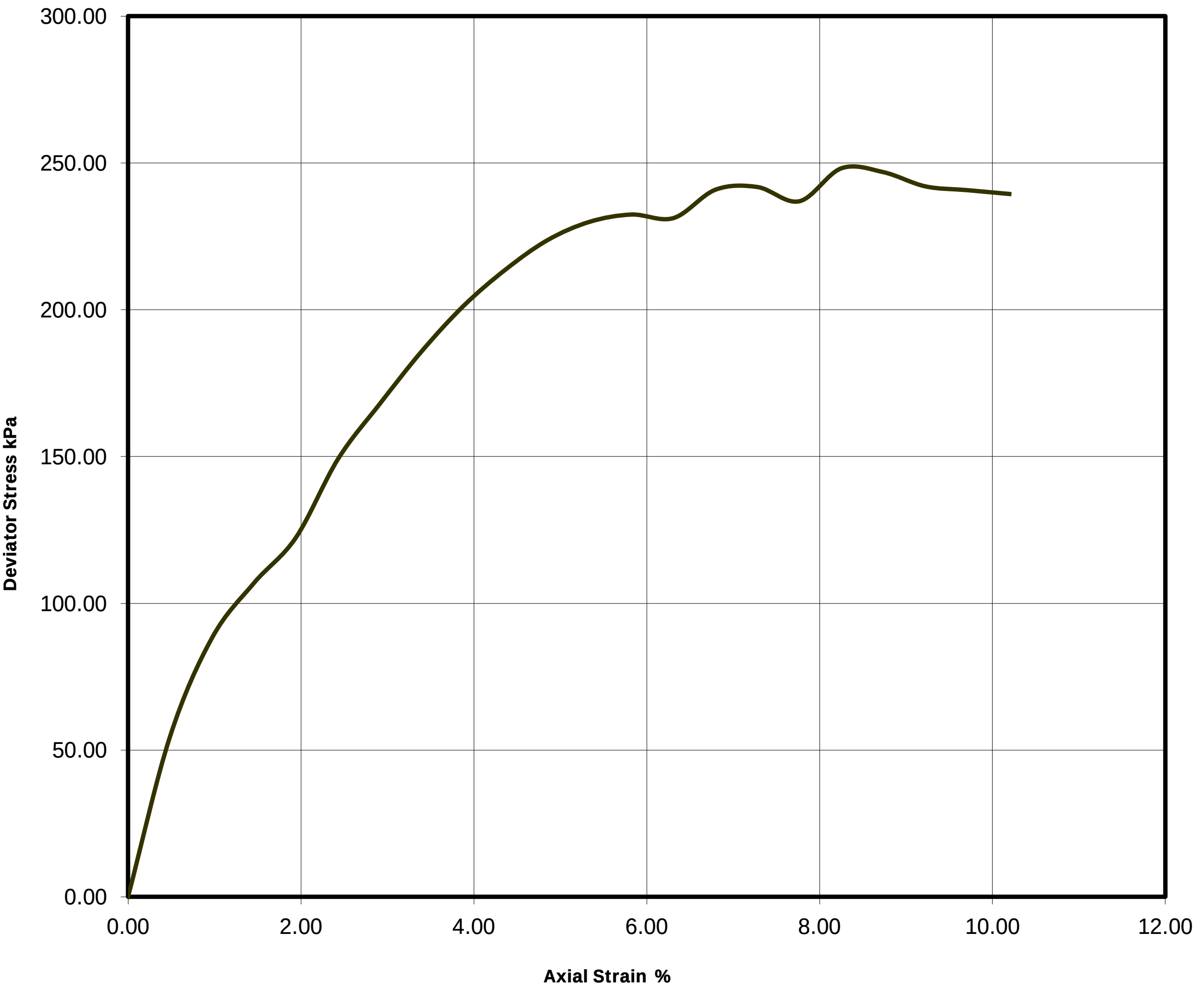
Date Approved: 17.7.14

Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH309**
Sample Number:	**12**
Depth (m) :	**7.50 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.8	2.13	1.68	75	232	116	5.8	Compound	Rate of strain = 2 %/min
				150	242	121	7.3		Latex Membrane used mm thickness
				300	248	124	8.3		

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Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref: 35180
Location: Edmonton Ecopark
Contract Number: 23719-010714
Hole Number BH309
Sample Number: 12
Depth (m) : 7.50

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	26.8	2.13	1.68	75	232	116	5.8	Compoun	Rate of strain = 2 %/min Latex Membrane used mm thickness
				150	242	121	7.3		
				300	248	124	8.3		

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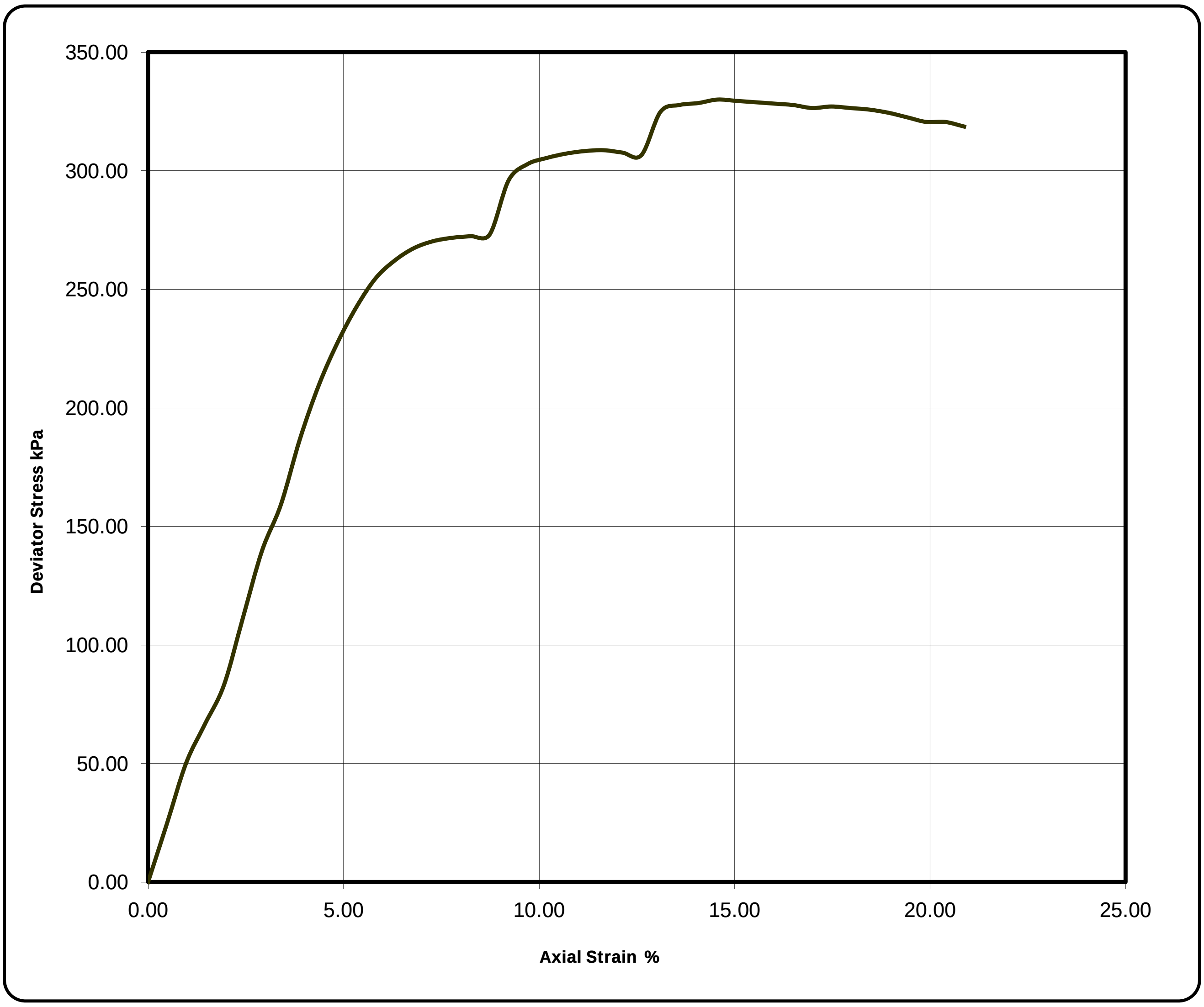
Test Report:

Undrained Shear Strength in Triaxial Compression

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH310**
Sample Number:	**10**
Depth (m) :	**8.50 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103	Height (mm): 200	Test: 100mm Multistage							
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	24.9	2.06	1.65	100	273	137	8.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	309	154	11.7		
				300	330	165	14.6		

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Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH310**
Sample Number:	**10**
Depth (m) :	**8.50**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	24.9	2.06	1.65	100	273	137	8.7	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	309	154	11.7		
				300	330	165	14.6		

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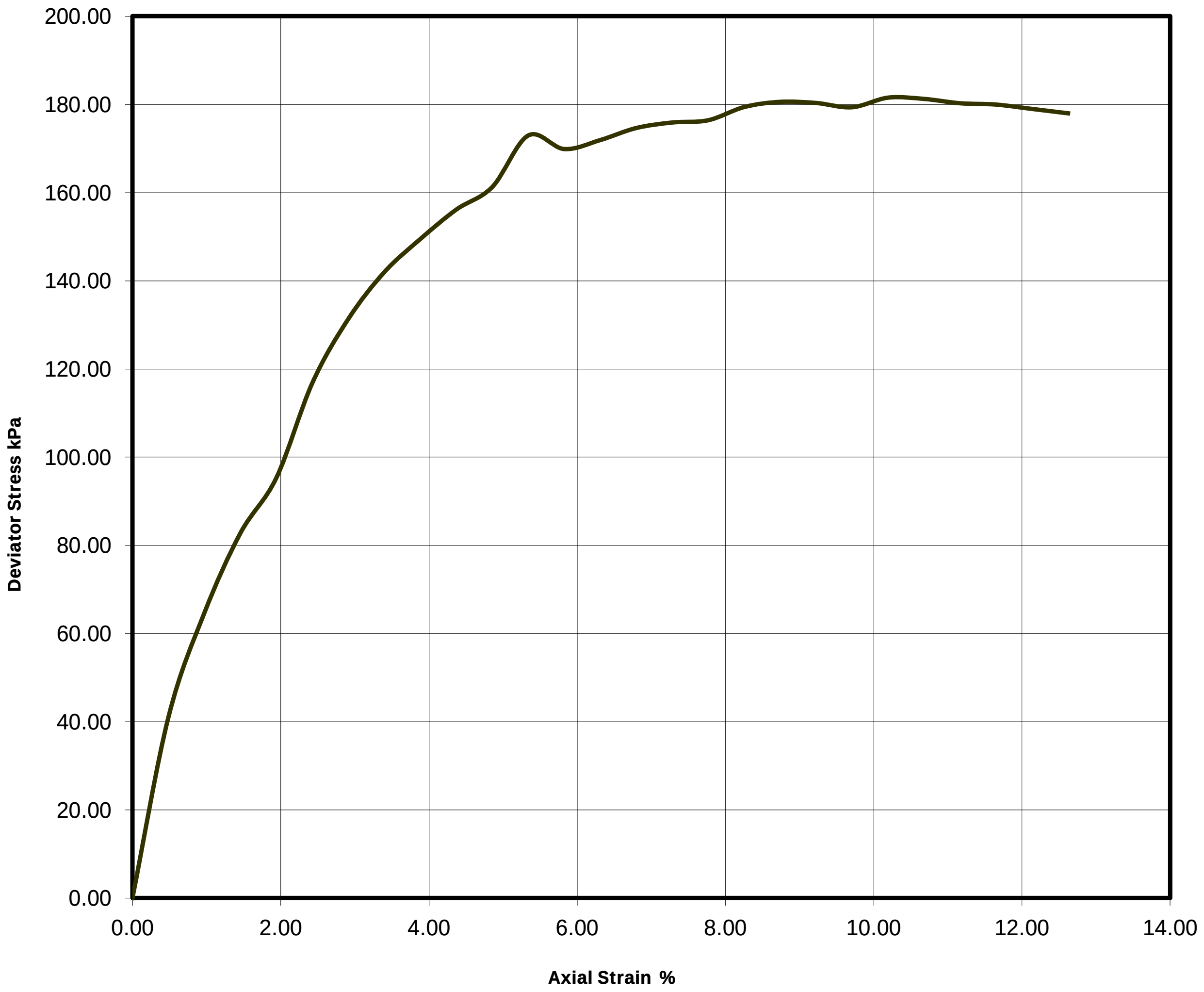
Test Report:

Undrained Shear Strength in Triaxial Compression
BS 1377 : Part7 : Clause 8 : 1990 Multistage Test
without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH311**
Sample Number:	**18**
Depth (m) :	**8.50 to N/A**
Sample Description :	**Very Firm silty CLAY.**



Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	24.9	1.96	1.57	100	176	88	7.8	Compound	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	181	90	8.7		
				300	182	91	10.2		

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Test Report: **Undrained Shear Strength in Triaxial Compression**

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH311**
Sample Number:	**18**
Depth (m) :	**8.50**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	24.9	1.96	1.57	100	176	88	7.8	Compounc	Rate of strain = 2 %/min
				200	181	90	8.7		Latex Membrane used mm thickness
				300	182	91	10.2		

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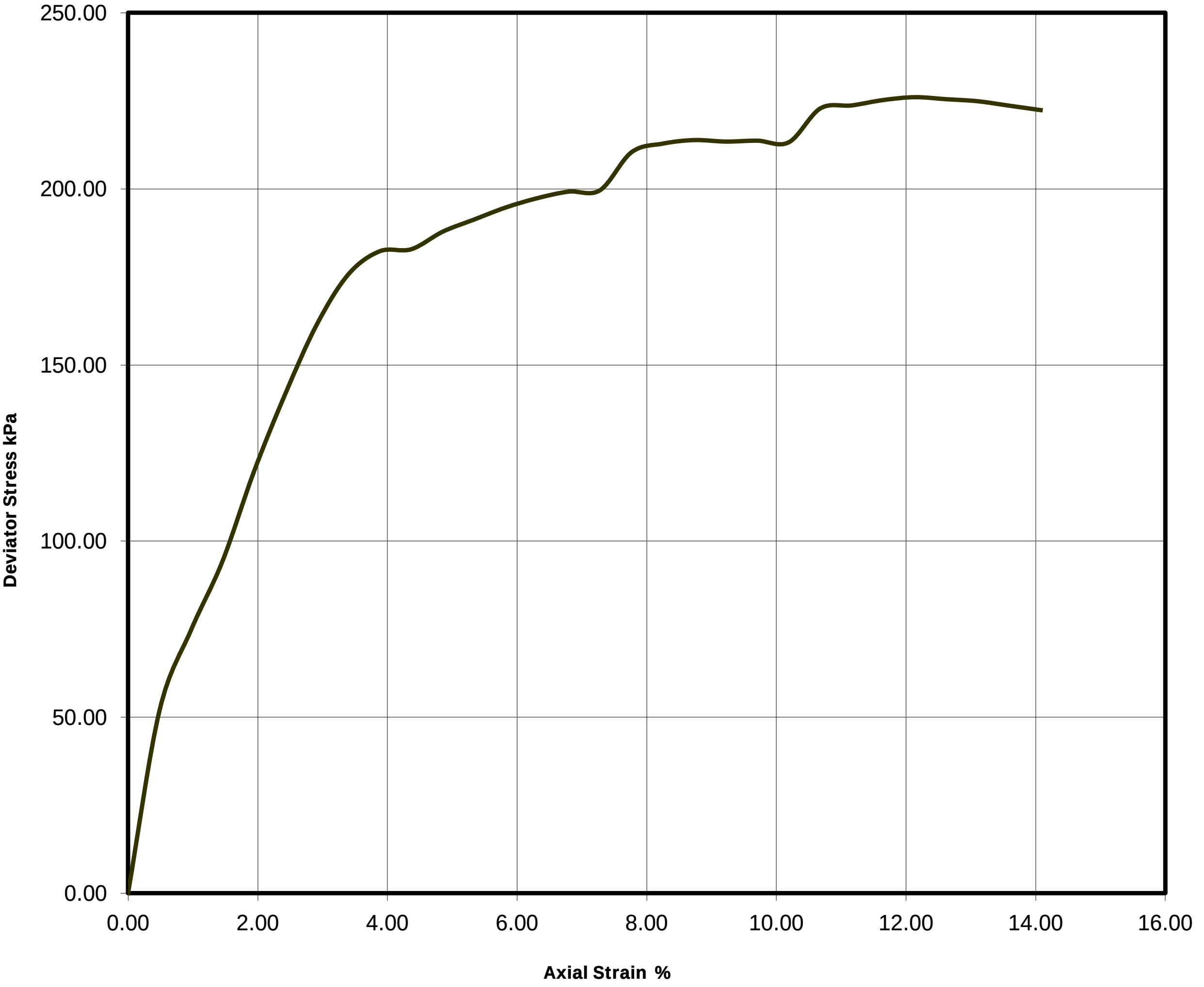
Test Report: **Undrained Shear Strength in Triaxial Compression**

BS 1377 : Part7 : Clause 8 : 1990 Multistage Test

without measurement of Pore Pressure

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH312**
Sample Number:	**3**
Depth (m) :	**13.50 to N/A**
Sample Description :	**Very Firm silty CLAY.**



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<tr><td colspan="10">Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage</td></tr>
<tr><td>Specimen</td><td>Moisture
Content
(%)</td><td>Bulk
Density
(Mg/m3)</td><td>Dry
Density
(Mg/m3)</td><td>Cell
Pressure
(kPa)</td><td>Deviator
Stress
(kPa)</td><td>Cohesion

(kPa)</td><td>Failure
Strain
(%)</td><td>Mode
of
Failure</td><td>Remarks
Sample taken from Top of tube</td></tr>
<tr><td>A</td><td>32.5</td><td>1.97</td><td>1.48</td><td>100</td><td>200</td><td>100</td><td>7.3</td><td>Compound</td><td rowspan="3">Rate of strain = 2 %/min
Latex Membrane used mm thickness</td></tr>
<tr><td colspan="4"></td><td>200</td><td>214</td><td>107</td><td>8.7</td><td></td></tr>
<tr><td colspan="4"></td><td>300</td><td>226</td><td>113</td><td>12.1</td><td></td></tr>
</table>

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Date Approved: 17.7.14

Test Report:	**Undrained Shear Strength in Triaxial Compression** **BS 1377 : Part7 : Clause 8 : 1990 Multistage Test** **without measurement of Pore Pressure**
Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole Number	**BH312**
Sample Number:	**3**
Depth (m) :	**13.50**

Post Test Specimen

Specimen Split

Diameter (mm): 103 Height (mm): 200 Test: 100mm Multistage

Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa)	Deviator Stress (kPa)	Cohesion (kPa)	Failure Strain (%)	Mode of Failure	Remarks Sample taken from Top of tube
A	32.5	1.97	1.48	100	200	100	7.3	Compoun	Rate of strain = 2 %/min Latex Membrane used mm thickness
				200	214	107	8.7		
				300	226	113	12.1		

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Date Approved: 17.7.14

ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

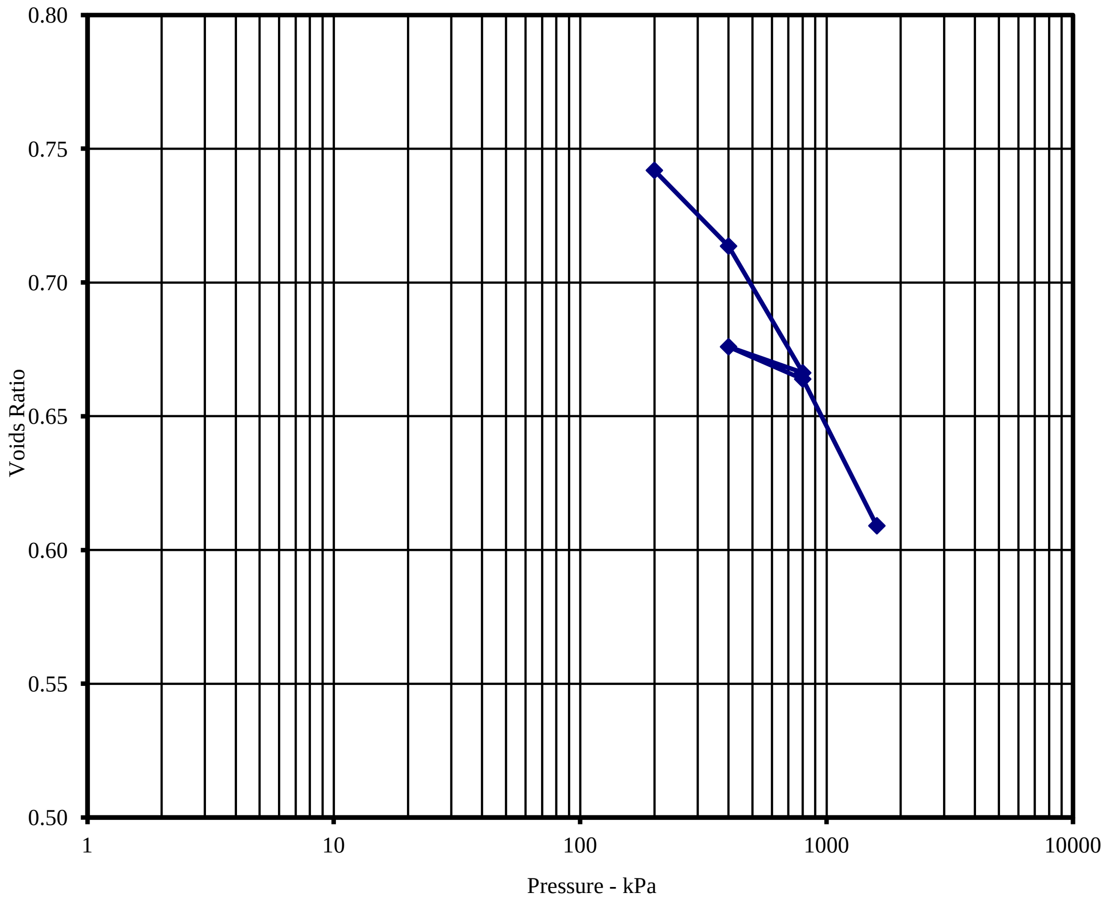
Hole/Sample Number: **BH301**

Depth (m) : **2.00 - N/A**

Sample Type: **U**

Hole Number: **BH301** Depth (m): **2.00** **to** **N/A**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	27						
Bulk Density (Mg/m3):	1.92	0	-	100	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.51	100	-	200	0.08	10.27	
Voids Ratio:	0.7493	200	-	400	0.08	6.71	Location of specimen with sample top
Degree of saturation:	95.1	400	-	800	0.07	4.51	
Height (mm):	20.13	800	-	400	0.01	3.38	Remarks:
Diameter (mm)	50.01	400	-	800	0.02	9.36	
Particle Density (Mg/m3): Assumed	2.65	800	-	1600	0.04	2.38	



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Checked By **Date**

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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

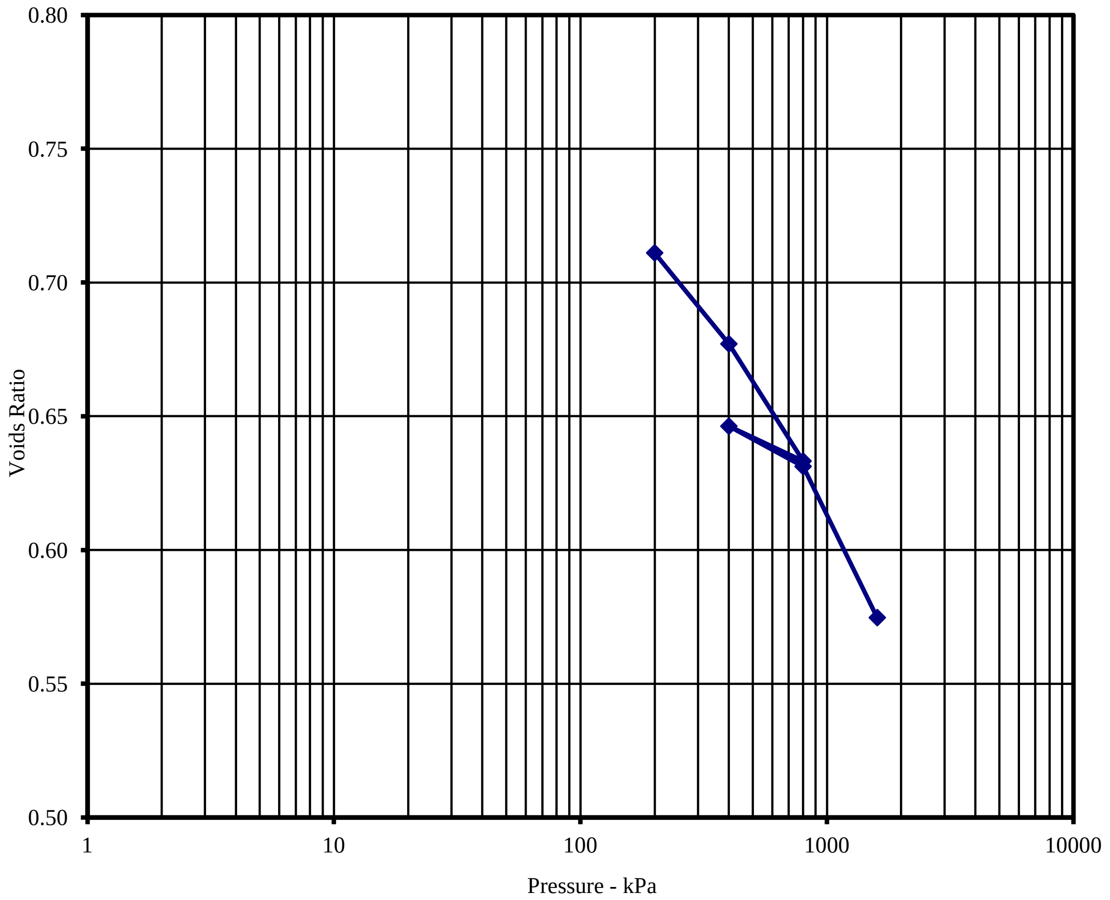
Hole/Sample Number: **BH302**

Depth (m) : **10.00 - N/A**

Sample Type: **U**

Hole Number: **BH302** Depth (m): **10.00 to N/A**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	28						
Bulk Density (Mg/m3):	1.95	0	-	100	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.53	100	-	200	0.10	9.91	
Voids Ratio:	0.7305	200	-	400	0.10	6.44	Location of specimen with sample top
Degree of saturation:	100.2	400	-	800	0.07	3.36	
Height (mm):	19.9	800	-	400	0.02	9.01	Remarks:
Diameter (mm)	75.13	400	-	800	0.02	6.03	
Particle Density (Mg/m3):	2.65	800	-	1600	0.04	2.28	
Assumed							



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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

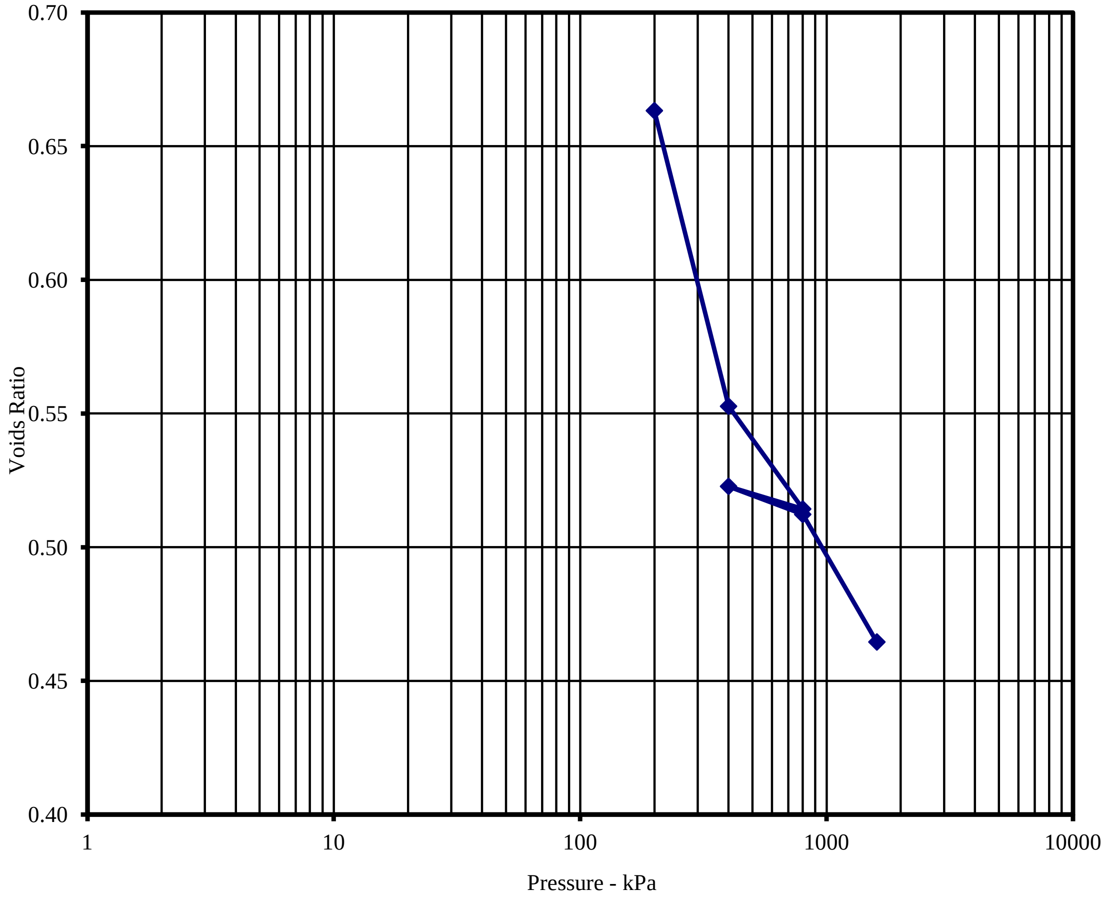
Hole/Sample Number: **BH303**

Depth (m) : **10.00 - N/A**

Sample Type: **U**

Hole Number: **BH303** Depth (m): **10.00 to N/A**

Initial Conditions		Pressure Range kPa	Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	24				
Bulk Density (Mg/m3):	1.96	0 - 100	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.58	100 - 200	0.07	22.27	
Voids Ratio:	0.6769	200 - 400	0.33	10.28	Location of specimen with sample top
Degree of saturation:	92.8	400 - 800	0.06	8.81	
Height (mm):	19.82	800 - 400	0.01	13.49	Remarks:
Diameter (mm)	74.98	400 - 800	0.02	15.66	
Particle Density (Mg/m3): Assumed	2.65	800 - 1600	0.04	5.76	



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21/07/14

Checked By **Date**

21/07/14

Approved By **Date**

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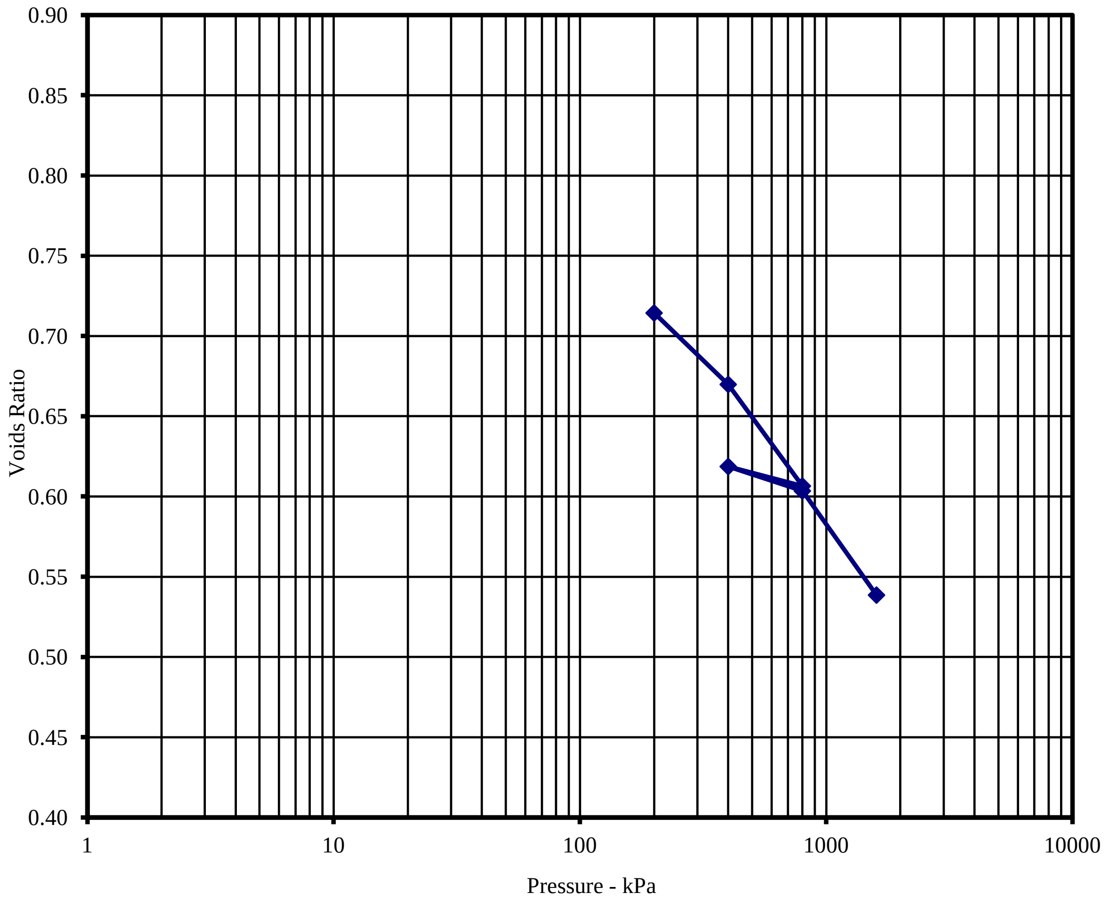
ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole/Sample Number:	**BH304**
Depth (m) :	**10.50 - N/A**
Sample Type:	**U**

Hole Number: **BH304** Depth (m): **10.50 to N/A**

Initial Conditions		Pressure Range kPa	Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	26				
Bulk Density (Mg/m3):	1.92	0 - 100	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.52	100 - 200	0.13	9.87	
Voids Ratio:	0.7411	200 - 400	0.13	3.42	Location of specimen with sample top
Degree of saturation:	94.3	400 - 800	0.09	9.41	
Height (mm):	19.91	800 - 400	0.02	4.13	Remarks:
Diameter (mm)	75.09	400 - 800	0.02	3.31	
Particle Density (Mg/m3):	2.65	800 - 1600	0.05	2.40	
Assumed					



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Approved By **Date** 21/07/14

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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

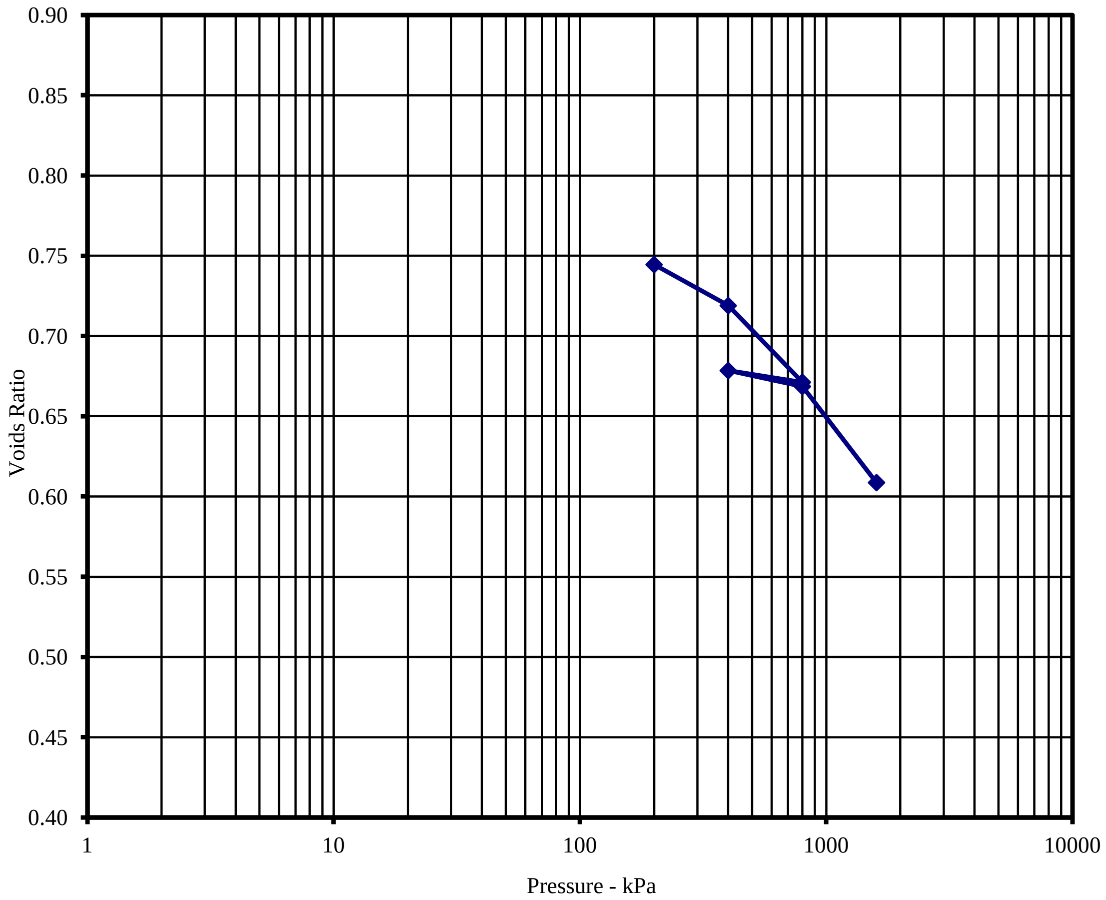
Hole/Sample Number: **BH305**

Depth (m) : **10.20 - N/A**

Sample Type: **U**

Hole Number: **BH305** Depth (m): **10.20 to N/A**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	28	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.93	0	-	100	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.51	100	-	200	0.06	22.91	20'C
Voids Ratio:	0.7516	200	-	400	0.07	11.16	Location of specimen with sample
Degree of saturation:	98.4	400	-	800	0.07	10.07	top
Height (mm):	20.03	800	-	400	0.01	9.30	Remarks:
Diameter (mm)	50	400	-	800	0.01	10.42	
Particle Density (Mg/m3):	2.65	800	-	1600	0.04	2.35	
Assumed							



Checked By 21/07/14 **Date**

Approved By 21/07/14 **Date**

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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

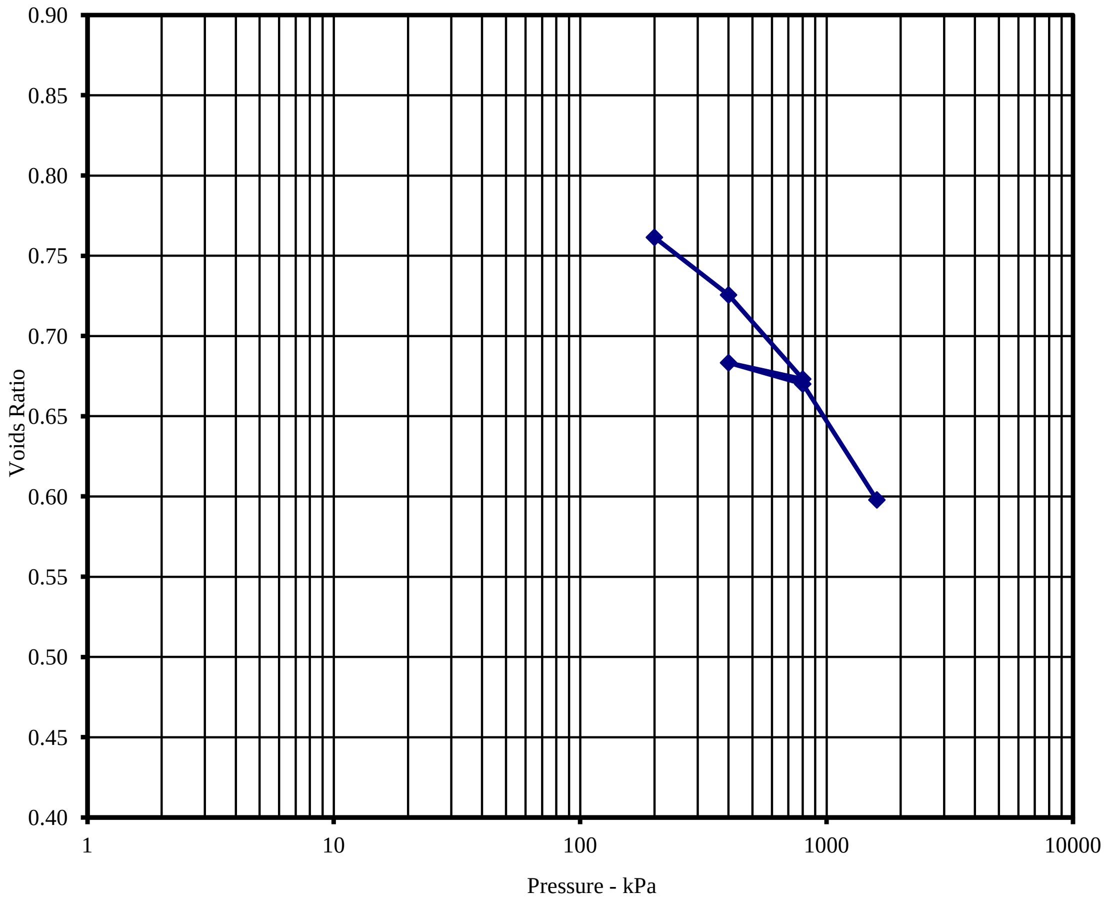
Hole/Sample Number: **BH306**

Depth (m) : **10.00 - N/A**

Sample Type: **U**

Hole Number: **BH306** Depth (m): **10.00 to N/A**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	26	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.85	0	-	100	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.47	100	-	200	0.12	9.02	20'C
Voids Ratio:	0.8049	200	-	400	0.10	9.81	Location of specimen with sample
Degree of saturation:	84.9	400	-	800	0.08	6.10	top
Height (mm):	19.22	800	-	400	0.02	3.88	Remarks:
Diameter (mm)	75.07	400	-	800	0.02	15.52	
Particle Density (Mg/m3):	2.65	800	-	1600	0.05	2.81	
Assumed							



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ONE DIMENSIONAL CONSOLIDATION

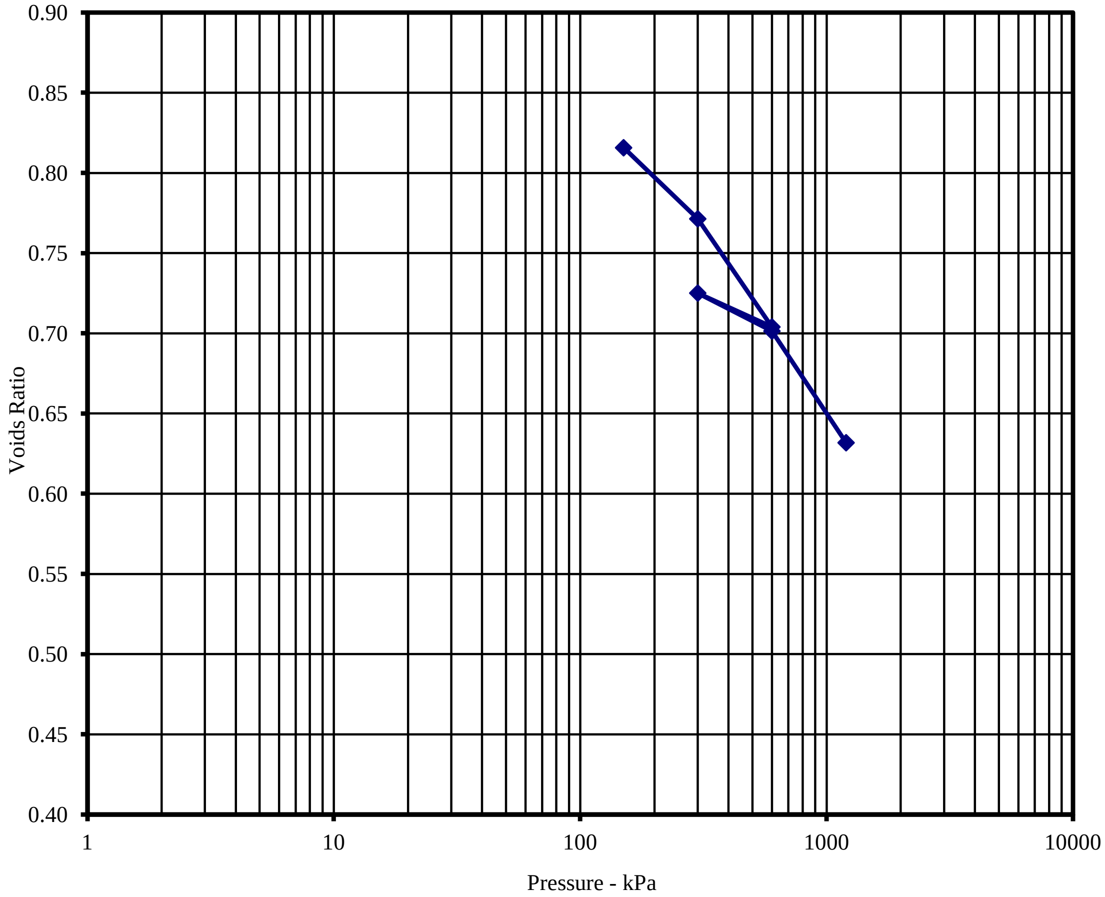
BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**
Contract Number: **23719-010714**
Hole/Sample Number: **BH307**
Depth (m) : **7.00 - N/A**
Sample Type: **U**

Hole Number: **BH307** Depth (m): **7.00 to N/A**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	30	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.90	0	-	75	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.45	75	-	150	0.18	9.97	20'C
Voids Ratio:	0.8215	150	-	300	0.16	2.69	Location of specimen with sample
Degree of saturation:	98.3	300	-	600	0.13	0.82	top
Height (mm):	19.76	600	-	300	0.04	0.61	Remarks:
Diameter (mm)	74.91	300	-	600	0.05	1.53	
Particle Density (Mg/m3): Assumed	2.65	600	-	1200	0.07	0.58	



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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: 35180

Location: Edmonton Ecopark

Contract Number: 23719-010714

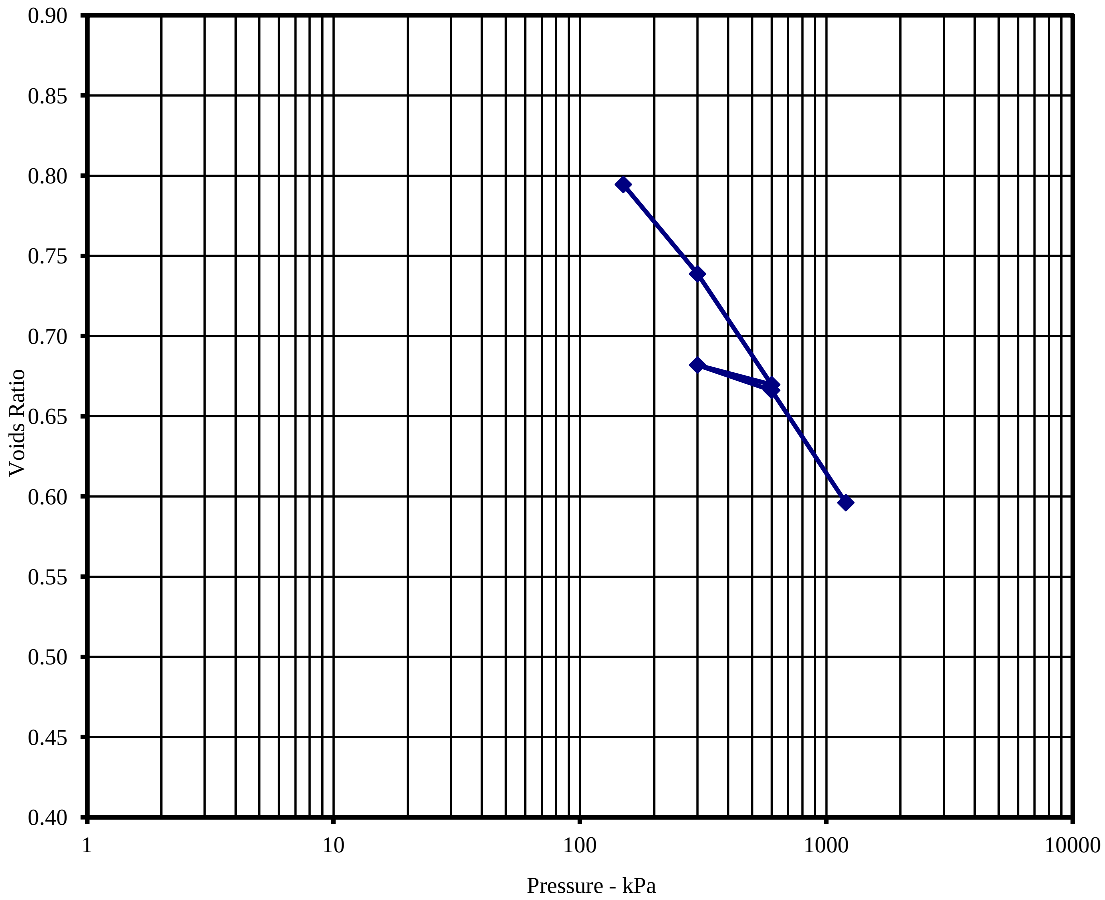
Hole/Sample Number: BH308

Depth (m) : 8.00 - N/A

Sample Type: U

Hole Number: **BH308** Depth (m): **8.00** **to** **N/A**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	28						
Bulk Density (Mg/m3):	1.85	0	-	75	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.45	75	-	150	0.19	22.33	
Voids Ratio:	0.8264	150	-	300	0.21	6.94	Location of specimen with sample top
Degree of saturation:	88.9	300	-	600	0.13	6.46	
Height (mm):	19.96	600	-	300	0.02	2.38	Remarks:
Diameter (mm)	50.06	300	-	600	0.03	9.53	
Particle Density (Mg/m3): Assumed	2.65	600	-	1200	0.07	1.01	



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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

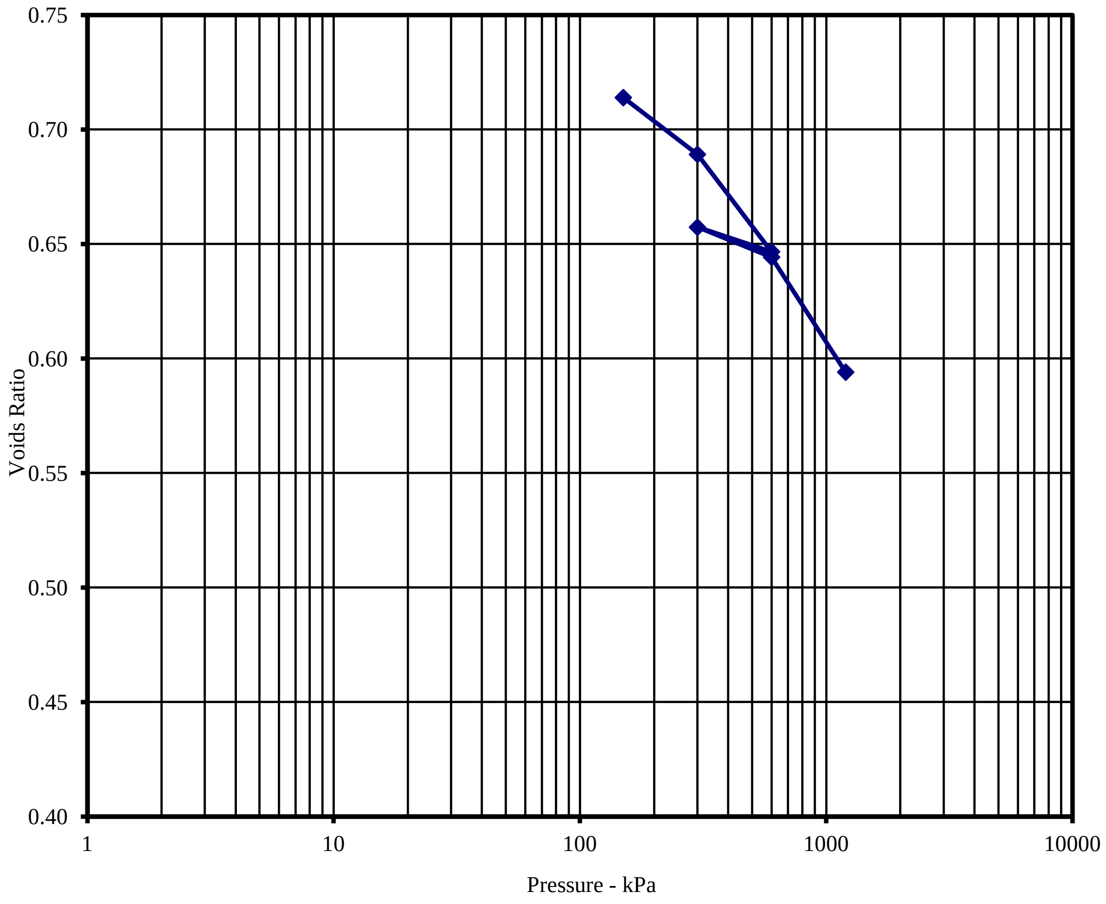
Hole/Sample Number: **BH309**

Depth (m) : **7.50 - N/A**

Sample Type: **U**

Hole Number: **BH309** Depth (m): **7.50 to N/A**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	27	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.96	0	-	75	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.55	75	-	150	0.07	7.52	20'C
Voids Ratio:	0.7136	150	-	300	0.10	2.65	Location of specimen with sample
Degree of saturation:	99.4	300	-	600	0.08	1.13	top
Height (mm):	20.04	600	-	300	0.02	1.58	Remarks:
Diameter (mm)	50.02	300	-	600	0.03	2.65	
Particle Density (Mg/m3):	2.65	600	-	1200	0.05	0.60	
Assumed							



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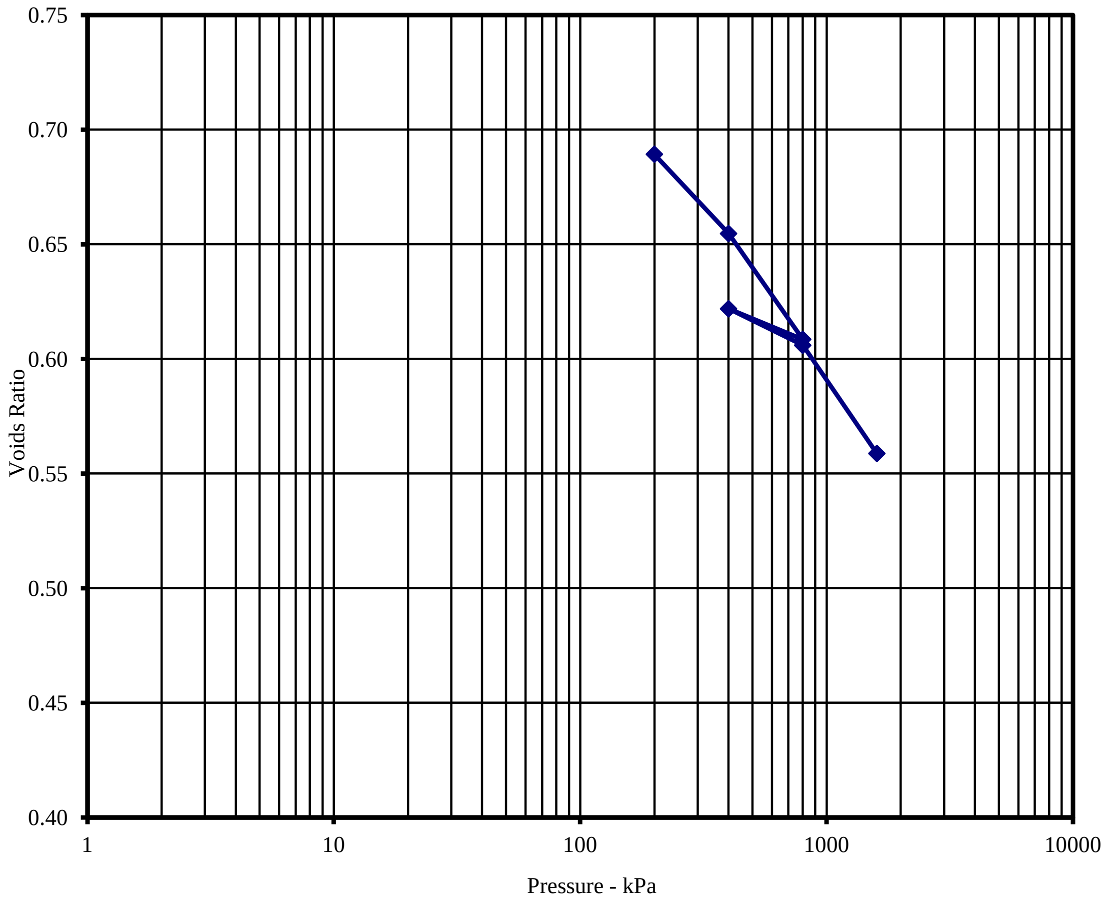
ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref:	**35180**
Location:	**Edmonton Ecopark**
Contract Number:	**23719-010714**
Hole/Sample Number:	**BH310**
Depth (m) :	**8.50 - N/A**
Sample Type:	**U**

Hole Number: **BH310** Depth (m): **8.50 to N/A**

Initial Conditions		Pressure Range			Mv	Cv	Method of time fitting used
Moisture Content (%):	26	kPa			m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.95	0	-	100	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.55	100	-	200	0.11	6.65	20'C
Voids Ratio:	0.7133	200	-	400	0.10	1.09	Location of specimen with sample
Degree of saturation:	96.6	400	-	800	0.07	1.05	top
Height (mm):	19.06	800	-	400	0.02	1.50	Remarks:
Diameter (mm)	74.93	400	-	800	0.02	2.94	
Particle Density (Mg/m3):	2.65	800	-	1600	0.04	0.99	
Assumed							



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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

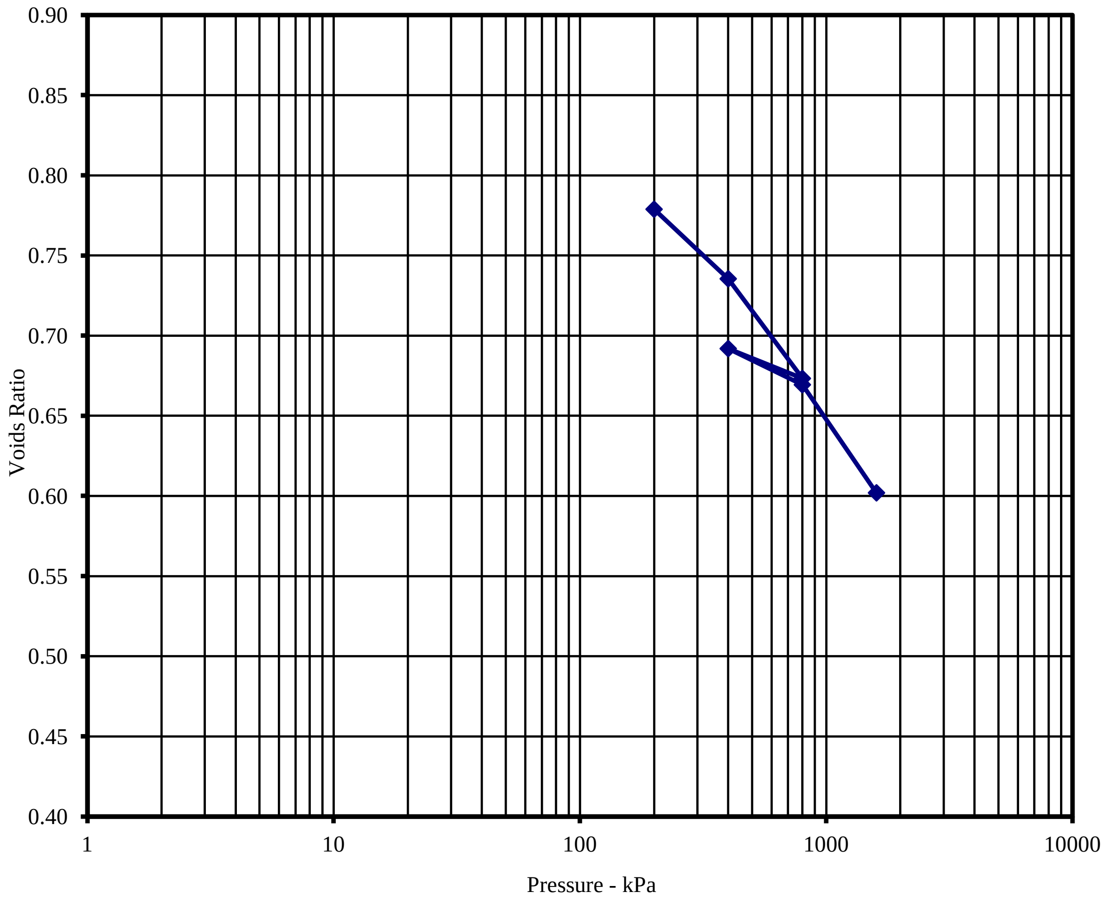
Hole/Sample Number: **BH311**

Depth (m) : **8.50 - N/A**

Sample Type: **U**

Hole Number: **BH311** Depth (m): **8.50 to N/A**

Initial Conditions		Pressure Range kPa			Mv m2/MN	Cv m2/yr	Method of time fitting used Cv Calculated using t90
Moisture Content (%):	31						
Bulk Density (Mg/m3):	1.94	0	-	100	Swelling	Stage	Nominal Laboratory Temperature 20'C
Dry Density (Mg/m3):	1.48	100	-	200	0.12	7.46	
Voids Ratio:	0.7904	200	-	400	0.12	0.91	Location of specimen with sample top
Degree of saturation:	105.2	400	-	800	0.09	0.53	
Height (mm):	20.02	800	-	400	0.03	1.65	Remarks:
Diameter (mm)	50.05	400	-	800	0.03	0.83	
Particle Density (Mg/m3): Assumed	2.65	800	-	1600	0.05	0.78	



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ONE DIMENSIONAL CONSOLIDATION

BS1377: Part 5: 1990

Client ref: **35180**

Location: **Edmonton Ecopark**

Contract Number: **23719-010714**

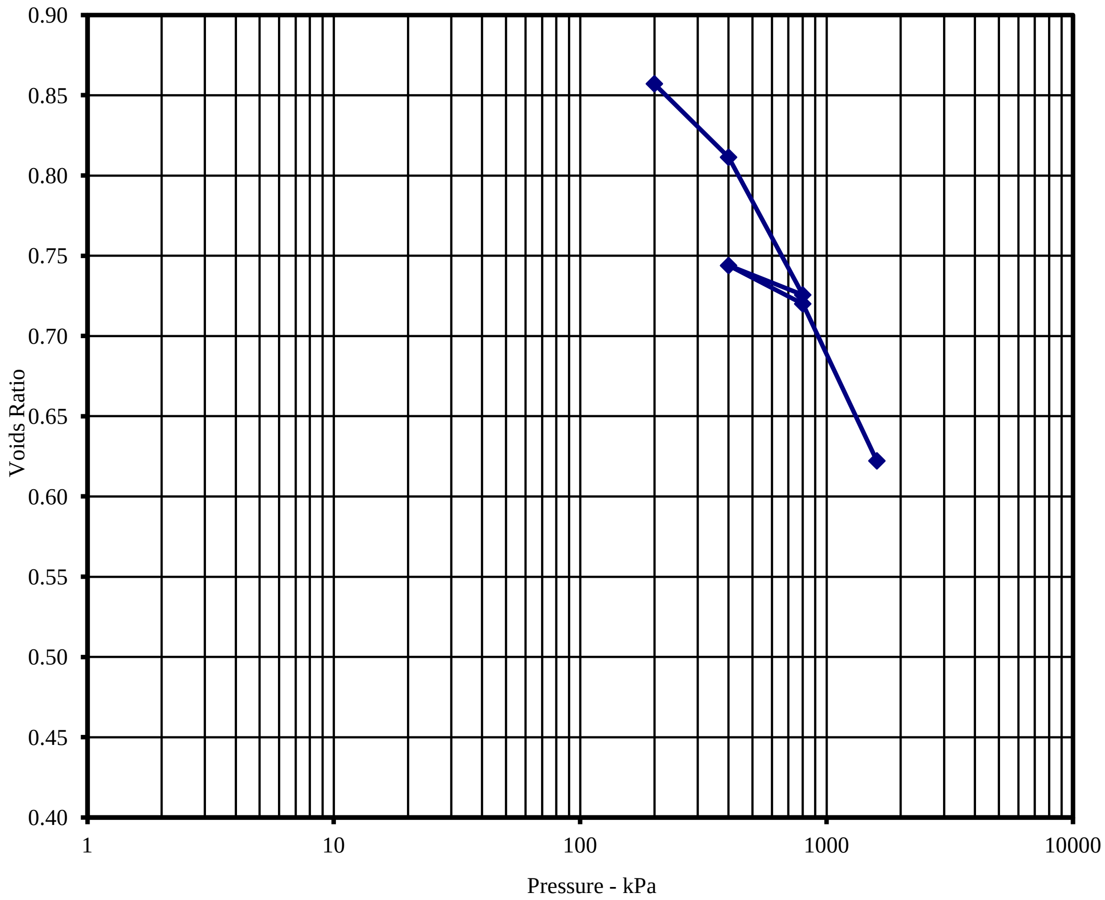
Hole/Sample Number: **BH312**

Depth (m) : **13.50 - N/A**

Sample Type: **U**

Hole Number: **BH312** Depth (m): **13.50 to N/A**

Initial Conditions		Pressure Range	Mv	Cv	Method of time fitting used
Moisture Content (%):	33	kPa	m2/MN	m2/yr	Cv Calculated using t90
Bulk Density (Mg/m3):	1.90	0 - 100	Swelling	Stage	Nominal Laboratory Temperature
Dry Density (Mg/m3):	1.43	100 - 200	0.11	5.77	20'C
Voids Ratio:	0.8491	200 - 400	0.12	2.77	Location of specimen with sample
Degree of saturation:	101.8	400 - 800	0.12	1.56	top
Height (mm):	19.92	800 - 400	0.03	1.36	Remarks:
Diameter (mm)	50.02	400 - 800	0.03	1.55	
Particle Density (Mg/m3):	2.65	800 - 1600	0.07	0.57	
Assumed					



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Appendix B: Soil Generic Quantitative Risk Assessment

Data Summary Statistics

Site:	Edmonton Ecopark EfW Additional SI	**Project No:**	29541
Data Description:	All Soils	**SOM (%):**	1.0%
Land Use:	Commercial	**Completed By:**	JG
Receptor:	Human Health	**Checked By:**	

Assessment Criteria Key

a) 2009 SGV (Res with Plant)
b) 2009 SGV (Allotment)
c) 2009 SGV (Commercial/Industrial)
d) EIC GAC (Res with Plant)
e) EIC GAC (Res without Plant)
f) EIC GAC (Allotment)
g) EIC GAC (Commercial/Ind)
h) AMEC GAC (Res with Plant)
i) AMEC GAC (Res without Plant)
j) AMEC GAC (Allotment)
k) AMEC GAC (Commercial/Ind)
l) LQM CIEH GAC (Res with Plant)
m) LQM CIEH GAC (Res without Plant)
n) LQM CIEH GAC (Commercial/Ind)
o) C4SL (Res with Plant)
p) C4SL (Res without Plant)
q) C4SL (Allotment)
r) (C4SL (Commercial)
s) Dutch Intervention values
t) Soil Code
u) BRE Special Digest
v) Other Generic Criteria
w) Site Specific Assessment Criteria
x) Laboratory limit of detection

Summary Statistics

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC
General Inorganics					0	0	0	0	-	-	0
pH	pH Units	N/A	-		99	102	6.4	10.8	8.05858586	0.86920209	-
Total Cyanide	mg/kg	1	-		22	3	1	5	1.31818182	1.04135277	-
Free Cyanide	mg/kg	1	168	(k)	22	0	1	1	-	-	0
Total Sulphate as SO4	mg/kg	50	-								
Water Soluble Sulphate (Soil Equivalent)	g/l	0.0025	-		83	80	0.0025	6.4	0.98824096	1.16467204	-
Water Soluble Sulphate as SO4 (2:1)	mg/kg	2.5	-		76	73	2.5	6400	1048.17105	1230.50503	-
Water Soluble Sulphate (2:1 Leachate Equivale	g/l	0.00125	-		28	31	0.072	3	0.65746429	0.67494672	-
Sulphide	mg/kg	1	-		91	84	1	220	34.2934066	51.3738624	-
Ammonium as NH4	mg/kg	5	-		20	14	5	240	24.085	51.752928	-
Ammonium as NH4 (leachate equivalent)	mg/l	5	-		20	12	5	120	13.22	25.4400348	-
Organic Matter	%	0.1	-		13	13	0.2	13	2.05384615	4.21932368	-
Asbestos in Soil Screen	-										
Asbestos Type	-										
Asbestos quantification	%		-								
Total Phenols					0	0	0	0	-	-	0
Total Phenols (monohydric)	mg/kg	mg/kg	1		40	1	1	37	2.4	-	0
Speciated PAHs					0	0	0	0	-	-	0
Naphthalene	mg/kg	0.05	200	(n)	98	25	0.05	14	0.26540816	1.42148475	0
Acenaphthylene	mg/kg	0.1	84000	(n)	98	4	0.1	5.7	0.23173469	0.56033316	0
Acenaphthene	mg/kg	0.1	85000	(n)	98	16	0.1	6.6	0.24163265	0.75088771	0
Fluorene	mg/kg	0.1	64000	(n)	98	14	0.1	7.5	0.31602041	0.85895734	0
Phenanthrene	mg/kg	0.1	22000	(n)	98	47	0.1	58	1.39061224	5.96088761	0
Anthracene	mg/kg	0.1	530000	(n)	98	37	0.1	14	0.44132653	1.60509154	0
Fluoranthene	mg/kg	0.1	23000	(n)	98	59	0.1	59	2.49857143	7.85033613	0
Pyrene	mg/kg	0.1	54000	(n)	98	59	0.1	47	2.12591837	6.25708206	0
Benzo(a)anthracene	mg/kg	0.1	90	(n)	98	51	0.1	22	1.01010204	2.84944903	0
Chrysene	mg/kg	0.05	140	(n)	98	56	0.05	21	0.95214286	2.67988008	0
Benzo(b)fluoranthene	mg/kg	0.1	100	(n)	98	50	0.1	30	1.17785714	3.45388807	0
Benzo(k)fluoranthene	mg/kg	0.1	140	(n)	98	43	0.1	11	0.6405102	1.4910775	0
Benzo(a)pyrene	mg/kg	0.1	14	(n)	98	48	0.1	20	0.92877551	2.65286356	0
Indeno(1,2,3-cd)pyrene	mg/kg	0.1	60	(n)	98	29	0.1	13	0.56693878	1.54326298	0
Dibenz(a,h)anthracene	mg/kg	0.1	13	(n)	98	4	0.1	1.9	0.20142857	0.20687663	0
Benzo(ghi)perylene	mg/kg	0.05	650	(n)	98	30	0.05	13	0.52540816	1.66039814	0
Total PAH					0	0	0	0	-	-	0
Speciated Total EPA-16 PAHs	mg/kg	1.6	-		98	53	1.6	340	12.9497959	41.169774	-
Heavy Metals / Metalloids					0	0	0	0	-	-	0
Aluminium (aqua regia extractable)	mg/kg	30	-		83	86	740	66000	18840.241	13698.7845	-
Arsenic (aqua regia extractable)	mg/kg	1	640	(c)	99	101	1	42	12.1929293	6.95205523	0
Barium (aqua regia extractable)	mg/kg	1	22000	(g)	83	86	14	880	173.325301	161.221716	0
Boron (water soluble)	mg/kg	0.2	19000	(n)	91	82	0.2	65	4.49120879	8.78666475	0
Cadmium (aqua regia extractable)	mg/kg	0.2	230	(c)	99	64	0.2	64	3.25454545	9.33630474	0
Chromium (aqua regia extractable)	mg/kg	1	35	(n)	99	102	7.1	220	42.8060606	36.9523792	0
Copper (aqua regia extractable)	mg/kg	1	72000	(n)	99	102	3.4	2800	206.617172	445.058354	0
Iron (aqua regia extractable)	mg/kg	40	-		83	86	8100	220000	40562.6506	31774.6053	-
Lead (aqua regia extractable)	mg/kg	1	2330	(r)	99	102	3.6	2700	202.00202	348.75289	0
Mercury (aqua regia extractable)	mg/kg	0.3	3600	(c)	99	23	0.3	4.1	0.55757576	0.76024847	0
Nickel (aqua regia extractable)	mg/kg	1	1800	(c)	99	102	6.6	280	39.969697	38.4762674	0
Selenium (aqua regia extractable)	mg/kg	1	13000	(c)	99	17	1	12	1.42828283	1.51792288	0
Zinc (aqua regia extractable)	mg/kg	1	670000	(n)	99	102	15	10000	512.515152	1209.69472	0
Magnesium (aqua regia extractable)	mg/kg	20	-		6	6	1600	12000	6833.33333	4120.51777	-
Monoaromatics					0	0	0	0	-	-	0
Benzene	mg/kg	0.001	28	(k)	82	0	0.001	1	-	-	0
Toluene	mg/kg	0.001	870	(k)	82	1	0.001	1	0.86605	-	0
Ethylbenzene	mg/kg	0.001	520	(k)	82	0	0.001	1	-	-	0
p & m-xylene	mg/kg	0.001	480	(k)	82	1	0.001	1	0.86599756	-	0
o-xylene	mg/kg	0.001	480	(k)	82	0	0.001	1	-	-	0
Total xylene	mg/kg	0.002	480	(k)	74	0	0.002	2	-	-	0
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	0.001	7900	(g)	82	0	0.001	1	-	-	0
Petroleum Hydrocarbons					0	0	0	0	-	-	0
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	0.1	3400	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	0.1	8300	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	0.1	2100	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	1	10000	(n)	78	13	1	21	1.88717949	2.76402487	0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	2	61000	(n)	78	21	2	290	12.7192308	40.1320452	0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	8	1600000	(n)	78	24	8	3500	87.4705128	415.254432	0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	8	1600000	(n)	78	30	8	9200	267.294872	1225.41309	0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	10	-		78	30	10	13000	363.410256	1666.2728	-
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	0.1	7200	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	0.1	59000	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	0.1	3700	(n)	78	0	0.1	0.1	-	-	0
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	17000	(n)	78	15	1	17	2.11025641	3.0004584	0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	36000	(n)	78	18	2	49	3.65641026	5.9543412	0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	10	28000	(n)	78	23	10	440	30.6923077	62.7661725	0
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	10	28000	(n)	78	29	10	1200	80.7307692	198.774993	0
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	10	-	(n)	78	32	10	1400	106.846154	255.900959	-
SVOCs					0	0	0	0	-	-	0
Aniline	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-
Phenol	mg/kg	0.2	3200	(c)	5	0	0.2	0.2	-	-	0
2-Chlorophenol	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	35000	(g)	5	0	0.2	0.2	-	-	0
1,3-Dichlorobenzene	mg/kg	0.2	32	(n)	5	0	0.2	0.2	-	-	0

Sample Identifiers and Analytical Data

Contaminant	BH401	BH401	BH401	BH402	BH402	BH402	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH404	BH404	BH404	BH404	BH404	BH404	BH404
	0.10-0.20	0.40-0.50	0.70-0.90	0.10-0.20	0.30-0.50	0.60-0.80	0.10-0.20	0.50-0.60	1.50-1.80	2.10-2.30	3.50-3.80	4.80-5.00	6.50-7.00	7.50-8.00	10.00-10.40	0.40-0.60	0.80-1.00	1.80-2.00	3.50-3.70	6.00-6.10	6.70-6.80	9.00-9.40
	09/12/2014	09/12/2014	09/12/2014	08/12/2014	08/12/2014	08/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	18/12/2014
	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	LG	LG	LG	MG	MG	MG	MG	MG	LG	LG
General Inorganics																						
pH	9.9	8.8	7.7	10	9.7	7.6	7.4	10.8	10.3	8.9	8.9	9.7	10.6	9.2	9.2	8.7	8.1	8.2	8.3	8.2	8.4	8.4
Total Cyanide	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	4	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Free Cyanide	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Total Sulphate as SO4	-	-	-	-	-	-	500	4800	2900	770	690	1000	2700	2100	960	2400	16000	1300	1900	1800	770	-
Water Soluble Sulphate (Soil Equivalent)	0.79	0.73	0.19	0.86	0.16	0.55	0.14	1.8	1.3	0.78	0.68	0.62	1.4	1.9	0.78	0.94	3.9	0.95	1.4	1.5	0.71	1.3
Water Soluble Sulphate as SO4 (2:1)	790	730	190	860	160	550	140	1800	1300	780	680	620	1400	1900	780	940	3900	950	1400	1500	710	1300
Water Soluble Sulphate (2:1 Leachate Equivale	0.4	0.37	0.097	0.43	0.08	0.27	0.072	0.91	0.65	0.39	0.34	0.31	0.72	0.94	0.39	0.47	1.9	0.48	0.72	0.73	0.36	0.65
Sulphide	32	5.6	1.1	24	2.2	20	1.4	1.3	11	18	33	29	22	45	87	6.4	2.6	19	23	21	79	140
Ammonium as NH4	< 5.0	17	< 5.0	< 5.0	< 5.0	25	< 5.0	< 5.0	< 5.0	11	29	240	96	42	12	< 5.0	< 5.0	28	31	28	8.7	11
Ammonium as NH4 (leachate equivalent)	< 5.0	8.4	< 5.0	< 5.0	< 5.0	12	< 5.0	< 5.0	< 5.0	5.6	15	120	48	21	5.9	< 5.0	< 5.0	14	15	14	< 5.0	5.4
Organic Matter	-	-	-	-	-	-	-	-	-	1.8	-	-	-	-	-	-	1.5	-	1.2	-	-	-
Asbestos in Soil Screen	-	Not-detected	-	Not-detected	-	-	-	-	Not-detected	-	-	-	-	Not-detected	-	Detected	-	Detected	-	-	-	-
Asbestos Type																Chrysotile-Loose fibres		Amosite-Loose fibres				
Asbestos quantification																< 0.001		0.005				
Total Phenols																						
Total Phenols (monohydric)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs																						
Naphthalene	0.21	0.2	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	0.39	< 0.05	< 0.05	-	0.13	0.19	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	-	0.14	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.43	< 0.10	0.2	-	0.52	0.25	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.31	< 0.10	0.23	-	0.57	0.31	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	2	1.3	< 0.10	0.19	< 0.10	0.66	< 0.10	< 0.10	4.3	1.3	2.2	-	2.8	2.3	< 0.10	0.59	0.5	< 0.10	< 0.10	< 0.10	0.63	< 0.10
Anthracene	0.39	0.22	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	0.68	0.27	0.44	-	0.68	0.59	< 0.10	0.11	0.1	< 0.10	< 0.10	< 0.10	0.19	< 0.10
Fluoranthene	3.4	2	< 0.10	0.58	0.4	1.5	< 0.10	< 0.10	4.9	2.2	2.7	-	3.9	2.8	< 0.10	0.5	1.1	< 0.10	< 0.10	< 0.10	0.55	< 0.10
Pyrene	2.9	1.8	< 0.10	0.7	0.43	1.2	< 0.10	< 0.10	3.9	1.9	2.1	-	3.3	2.4	< 0.10	0.41	0.94	< 0.10	< 0.10	< 0.10	0.46	< 0.10
Benzo(a)anthracene	1.7	1.2	< 0.10	0.33	0.32	0.77	< 0.10	< 0.10	1.8	0.74	0.8	-	1.6	1.1	< 0.10	0.18	0.5	< 0.10	< 0.10	< 0.10	0.15	< 0.10
Chrysene	1.9	1.1	< 0.05	0.5	0.33	0.85	< 0.05	< 0.05	2.5	1.5	1.3	-	1.4	0.94	< 0.05	0.2	0.77	< 0.05	< 0.05	< 0.05	0.35	< 0.05
Benzo(b)fluoranthene	2.5	1.4	< 0.10	0.61	0.36	1.1	< 0.10	< 0.10	2.2	1.3	0.88	-	1.4	0.89	< 0.10	< 0.10	0.71	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	0.89	0.86	< 0.10	0.31	0.18	0.49	< 0.10	< 0.10	1.1	0.8	0.57	-	0.75	0.49	< 0.10	< 0.10	0.45	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	1.6	1.1	< 0.10	0.36	0.27	0.75	< 0.10	< 0.10	1.5	0.93	0.87	-	1.1	0.76	< 0.10	< 0.10	0.64	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	1.1	0.64	< 0.10	0.24	< 0.10	0.42	< 0.10	< 0.10	0.76	0.57	0.27	-	0.74	0.44	< 0.10	< 0.10	0.28	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)anthracene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	-	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(ghi)perylene	1.3	0.83	< 0.05	0.37	< 0.05	0.52	< 0.05	< 0.05	1.2	0.81	0.41	-	0.76	0.45	< 0.05	< 0.05	0.36	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH																						
Speciated Total EPA-16 PAHs	20	12.6	< 1.60	4.19	2.29	8.42	< 1.60	< 1.60	26	12.4	13.1	-	19.9	13.9	< 1.60	1.99	6.36	< 1.60	< 1.60	< 1.60	2.33	< 1.60
Heavy Metals / Metalloids																						
Aluminium (aqua regia extractable)	11000	21000	25000	8000	9100	27000	2100	6800	12000	12000	15000	11000	21000	23000	18000	7000	14000	19000	18000	15000	20000	18000
Arsenic (aqua regia extractable)	12	15	9.2	9.6	9.6	15	8.5	8.4	12	11	9.8	14	15	11	5.8	21	19	9.1	8.9	8.8	4.8	4.2
Barium (aqua regia extractable)	120	150	120	82	73	150	24	38	170	120	110	120	180	160	32	64	310	46	66	72	60	36
Boron (water soluble)	3.3	3	1.8	1.6	1.7	3.6	< 0.2	1	1	2	1.7	3.7	2.2	9.2	1.7	< 0.2	1.3	2.8	1.9	1.3	1	2
Cadmium (aqua regia extractable)	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.3	0.2	< 0.2	0.5	0.8	1.3	2.9	1.1	0.7	< 0.2	< 0.2	0.4	0.5	0.4	0.3	0.4	0.2
Chromium (aqua regia extractable)	20	31	40	16	17	37	14	15	31	26	33	31	24	34	33	22	20	34	35	31	38	36
Copper (aqua regia extractable)	33	47	24	27	16	66	13	54	57	65	79	130	100	51	29	19	69	45	44	41	43	31
Iron (aqua regia extractable)	22000	32000	35000	17000	17000	37000	18000	19000	22000	28000	26000	23000	28000	34000	28000	49000	35000	32000	30000	26000	29000	25000
Lead (aqua regia extractable)	130	180	28	68	26	76	11	32	290	110	100	92	110	65	9.9	45	710	44	72	31	20	11
Mercury (aqua regia extractable)	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	0.3	< 0.3	< 0.3	0.6	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	13	26	29	12	16	40	15	14	24	26	28	30	33	33	30	25	22	32	32	29	31	27
Selenium (aqua regia extractable)	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	98	130	78	67	48	140	49	87	210	200	230	280	180	130	66	91	290	110	130	82	100	73
Magnesium (aqua regia extractable)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1600	2300	9500	8600	7000	12000	-
Monoaromatics																						
Benzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
Toluene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
Ethylbenzene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
p & m-xylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
o-xylene	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
Total xylene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	-	< 0.002	-	< 0.002	-	< 0.002	-	-	< 0.002	-	< 0.002	-	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	-	< 0.001	-	< 0.001	-	< 0.001	-	-	< 0.001	-	< 0.001	-	-	-	-	-
Petroleum Hydrocarbons																						
TPH-CWG - Aliphatic >EC5 - EC6	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aliphatic >EC6 - EC8	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aliphatic >EC8 - EC10	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aliphatic >EC10 - EC12	-	< 1.0	-	-	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	-	< 1.0	-	< 1.0	-	-	-	-	-
TPH-CWG - Aliphatic >EC12 - EC16	-	< 2.0	-	-	-	< 2.0	-	4.4	-	4.5	-	4.4	-	-	< 2.0	-	< 2.0	-	-	-	-	-
TPH-CWG - Aliphatic >EC16 - EC21	-	< 8.0	-	-	-	< 8.0	-	28	-	18	-	37	-	-	< 8.0	-	9.1	-	-	-	-	-
TPH-CWG - Aliphatic >EC21 - EC35	-	32	-	-	-	< 8.0	-	120	-	61	-	170	-	-	< 8.0	-	21	-	-	-	-	-
TPH-CWG - Aliphatic (EC5 - EC35)	-	32	-	-	-	< 10	-	150	-	84	-	210	-	-	< 10	-	30	-	-	-	-	-
TPH-CWG - Aromatic >EC5 - EC7	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aromatic >EC7 - EC8	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aromatic >EC8 - EC10	-	< 0.1	-	-	-	< 0.1	-	< 0.1	-	< 0.1	-	< 0.1	-	-	< 0.1	-	< 0.1	-	-	-	-	-
TPH-CWG - Aromatic >EC10 - EC12	-	< 1.0	-	-	-	< 1.0	-	< 1.0	-	< 1.0	-	< 1.0	-	-	< 1.0	-	< 1.0	-	-	-	-	-
TPH-CWG - Aromatic >EC12 - EC16	-	3.7	-	-	-	< 2.0	-	< 2.0	-	2.4	-	< 2.0	-	-	< 2.0	-	< 2.0	-	-	-	-	-
TPH-CWG - Aromatic >EC16 - EC21	-	17	-	-	-	< 10	-	< 10	-	17	-	25	-	-	< 10	-	< 10	-	-	-	-	-
TPH-CWG - Aromatic >EC21 - EC35	-	57	-	-	-	21	-	13	-	53	-	79	-	-	< 10	-	16	-	-	-	-	-
TPH-CWG - Aromatic (EC5 - EC35)	-	78	-	-	-	21	-	13	-	72	-	100	-	-	< 10	-	16	-	-	-	-	-
SVOCs																						
Aniline	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
Phenol	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
2-Chlorophenol	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
Bis(2-chloroethyl)ether	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
1,3-Dichlorobenzene	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-

Data Summary Statistics

Site:	Edmonton Ecopark EfW Additional SI	**Project No:**	29541
Data Description:	All Soils	**SOM (%):**	1.0%
Land Use:	Commercial	**Completed By:**	JG
Receptor:	Human Health	**Checked By:**	

Assessment Criteria Key

a) 2009 SGV (Res with Plant)
b) 2009 SGV (Allotment)
c) 2009 SGV (Commercial/Industrial)
d) EIC GAC (Res with Plant)
e) EIC GAC (Res without Plant)
f) EIC GAC (Allotment)
g) EIC GAC (Commercial/Ind)
h) AMEC GAC (Res with Plant)
i) AMEC GAC (Res without Plant)
j) AMEC GAC (Allotment)
k) AMEC GAC (Commercial/Ind)
l) LQM CIEH GAC (Res with Plant)
m) LQM CIEH GAC (Res without Plant)
n) LQM CIEH GAC (Commercial/Ind)
o) C4SL (Res with Plant)
p) C4SL (Res without Plant)
q) C4SL (Allotment)
r) (C4SL (Commercial)
s) Dutch Intervention values
t) Soil Code
u) BRE Special Digest
v) Other Generic Criteria
w) Site Specific Assessment Criteria
x) Laboratory limit of detection

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Summary Statistics							Sample Identifiers and Analytical Data																					
					Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC	BH401	BH401	BH401	BH402	BH402	BH402	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH403	BH404	BH404	BH404	BH404	BH404	BH404	BH404
												0.10-0.20	0.40-0.50	0.70-0.90	0.10-0.20	0.30-0.50	0.60-0.80	0.10-0.20	0.50-0.60	1.50-1.80	2.10-2.30	3.50-3.80	4.80-5.00	6.50-7.00	7.50-8.00	10.00-10.40	0.40-0.60	0.80-1.00	1.80-2.00	3.50-3.70	6.00-6.10	6.70-6.80	9.00-9.40
												09/12/2014	09/12/2014	09/12/2014	08/12/2014	08/12/2014	08/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	15/12/2014	18/12/2014
												MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	LG	LG	LG	MG	MG	MG	MG	MG	LG	LG
1,2-Dichlorobenzene	mg/kg	0.1	2100	(n)	5	0	0.1	0.1	-	-	0	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	4500	(n)	5	0	0.2	0.2	-	-	0	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
2-Methylphenol	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Hexachloroethane	mg/kg	0.05	22	(g)	5	0	0.05	0.3	-	-	0	-	-	-	-	-	-	-	-	-	< 0.05	-	-	-	-	-	-	< 0.05	-	< 0.05	-	-	-
Nitrobenzene	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
4-Methylphenol	mg/kg	0.2	-		5	0	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Isophorone	mg/kg	0.2	-		5	0	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
2-Nitrophenol	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	16000	(g)	5	0	0.3	0.3	-	-	0	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	230	(n)	5	0	0.3	0.3	-	-	0	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Naphthalene	mg/kg	0.1	200	(n)	5	2	0.05	0.5	0.19	0.20432817	0	-	-	-	-	-	-	-	-	-	< 0.05	-	-	-	-	-	-	< 0.05	-	< 0.05	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
4-Chloroaniline	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	-		5	0	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	0.1	390	(g)	5	0	0.1	0.1	-	-	0	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
Dimethylphthalate	mg/kg	0.1	-		5	0	0.1	0.1	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	1900	(g)	5	0	0.1	0.1	-	-	0	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	-	-	< 0.1	-	< 0.1	-	-	-
Acenaphthylene	mg/kg	0.1	84000	(n)	5	0	0.1	0.2	-	-	0	-	-	-	-	-	-	-	-	-	< 0.10	-	-	-	-	-	-	< 0.10	-	< 0.10	-	-	-
Acenaphthene	mg/kg	0.1	85000	(n)	5	1	0.1	0.5	0.18	-	0	-	-	-	-	-	-	-	-	-	< 0.10	-	-	-	-	-	-	< 0.10	-	< 0.10	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	3700	(g)	5	0	0.2	0.2	-	-	0	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Dibenzofuran	mg/kg	0.2	-		5	1	0.2	0.3	0.22	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Diethyl phthalate	mg/kg	0.2	150000	(g)	5	0	0.2	0.2	-	-	0	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
4-Nitroaniline	mg/kg	0.2	-		5	0	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Fluorene	mg/kg	0.1	64000	(n)	5	1	0.1	0.5	0.2	-	0	-	-	-	-	-	-	-	-	-	< 0.10	-	-	-	-	-	-	< 0.10	-	< 0.10	-	-	-
Azobenzene	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	-		5	0	0.2	0.2	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	0.3	48	(n)	5	0	0.3	0.3	-	-	0	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Phenanthrene	mg/kg	0.1	22000	(n)	5	4	0.1	2.7	1	1.04880885	0	-	-	-	-	-	-	-	-	-	1.3	-	-	-	-	-	-	0.5	-	< 0.10	-	-	-
Anthracene	mg/kg	0.1	530000	(n)	5	3	0.1	0.7	0.254	0.25996154	0	-	-	-	-	-	-	-	-	-	0.27	-	-	-	-	-	-	0.1	-	< 0.10	-	-	-
Carbazole	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	0.2	15000	(g)	5	0	0.2	0.2	-	-	0	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	-	-	< 0.2	-	< 0.2	-	-	-
Anthraquinone	mg/kg	0.3	-		5	0	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	-	-	< 0.3	-	< 0.3	-	-	-

Data Summary Statistics

Contaminant	Units	BH404	BH313	BH302-01	BH302-02	BH308	BH301	BH310	BH307-01	BH303-02	BH201	BH201	BH202	BH202	BH203	BH203	BH204	BH204	BH101	BH102	BH103	BH103	BH103	BH104	BH105	BH105	BH106	BH106	BH106	BH107	BH107
		17-17.20	0.25-0.40	0.40-0.50	0.80-1.00	1.40-1.60	0.90-1.00	0.5	one Supplie	one Supplie	0.50-0.60	3.70-3.80	0.50-0.60	3.80-4.00	1.70-1.80	10.80-11.00	0.60-0.70	11.50-12.00	2.20-2.40	1.70-1.90	0.40-0.60	2.30-2.50	18.00-18.20	0.20-0.40	1.80-2.00	4.60-4.80	0.70-0.90	4.70-4.90	0.70-0.90	1.80-2.00	1.80-2.00
		18/12/2014	21/05/2014	29/05/2014	29/05/2014	29/05/2014	30/05/2014	04/06/2014	03/06/2014	02/06/2014	06/12/2011	07/12/2011	06/12/2011	07/12/2011	06/12/2011	07/12/2011	06/12/2011	07/12/2011	15/03/2011	07/03/2011	07/03/2011	07/03/2011	09/03/2011	10/03/2011	09/03/2011	10/03/2011	22/03/2011	22/03/2011	22/03/2011	18/03/2011	18/03/2011
		LG	MG	MG	MG	MG	MG	MG	MG	MG	MG	AL	MG	KPG	MG	LC	MG	LG	MG	MG	MG	MG	LG	MG	MG	KPG	MG	AL	MG	MG	MG
General Inorganics																															
pH	pH Units	8.2	8.5	10.2	9	8.5	8.2	8.6	8.2	7.8	7.6	7.5	7.9	7.6	8.8	9	7.5	8.5	7.6	7.6	8.2	7.3	8.5	10	7.3	8	6.9	8.1	6.9	7.3	7.5
Total Cyanide	mg/kg	< 1											< 1		5																
Free Cyanide	mg/kg	< 1											< 1		< 1																
Total Sulphate as SO4	mg/kg	-									3000	750	390	270	1100	540	2500	550	1200	7800	480	1100	860	3500	3000	270	210	1400	340	2700	550
Water Soluble Sulphate (Soil Equivalent)	g/l	1.1																	0.8	6.4	0.017	0.71	0.93	1.6	3.1	0.2	0.095	1.1	0.22	1.7	0.43
Water Soluble Sulphate as SO4 (2:1)	mg/kg	1100									3000	480	370	130	1100	410	2300	440	800	6400	17	-	-	1600	3100	-	95	-	220	1700	430
Water Soluble Sulphate (2:1 Leachate Equivale	g/l	0.55									3	0.48	0.37	0.13	1.1	0.41	2.3	0.44													
Sulphide	mg/kg	140									35	110	13	51	88	210	13	170	20	7.7	3.1	3.2	51	8.8	14	7.9	1.3	1.7	1.4	43	44
Ammonium as NH4	mg/kg	8																													
Ammonium as NH4 (leachate equivalent)	mg/l	< 5.0																													
Organic Matter	%	-																	-	-	-	-	-	-	-	-	0.3	0.9	0.2	-	-
Asbestos in Soil Screen	-	-	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected	Detected	Absent		Absent		Absent		Absent		Absent	Absent	Absent	-	-	Absent	Absent	-	Absent	-	Absent	Absent	Absent
Asbestos Type	-									Chrysotile - Loose fibres									-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos quantification	%																														
Total Phenols																															
Total Phenols (monohydric)	mg/kg	< 1.0											< 2.0		< 2.0				-	-	-	-	-	-	-	-	-	-	-	-	-
Speciated PAHs																															
Naphthalene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.41	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Acenaphthene	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.74	6.6	< 0.10	< 0.10	0.56	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	0.68	4.5	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.25	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	mg/kg	< 0.10	< 0.10	< 0.10	0.96	3.1	12	< 0.10	0.47	4	< 0.20	< 0.20	< 0.20	< 0.20	2.8	< 0.20	3.1	< 0.20	0.86	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.26	< 0.20	< 0.20	< 0.20
Anthracene	mg/kg	< 0.10	< 0.10	< 0.10	0.23	1.9	14	< 0.10	< 0.10	1	< 0.10	< 0.10	< 0.10	< 0.10	0.47	< 0.10	0.98	< 0.10	0.4	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	< 0.10	< 0.10	0.62	2.1	7.9	51	< 0.10	0.5	5.3	< 0.20	< 0.20	< 0.20	< 0.20	2.8	< 0.20	6.7	< 0.20	2.7	0.91	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.59	< 0.20	< 0.20	< 0.20
Pyrene	mg/kg	< 0.10	< 0.10	0.62	1.8	6.2	40	< 0.10	0.37	6.1	< 0.20	< 0.20	< 0.20	< 0.20	2.3	< 0.20	5.7	< 0.20	2.3	0.8	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.45	< 0.20	< 0.20	< 0.20
Benzo(a)anthracene	mg/kg	< 0.10	< 0.10	0.3	0.95	2.4	18	< 0.10	< 0.10	2	< 0.20	< 0.20	< 0.20	< 0.20	0.75	< 0.20	2.7	< 0.20	1.5	0.64	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Chrysene	mg/kg	< 0.05	< 0.05	0.38	0.86	2.7	16	< 0.05	< 0.05	2.4	< 0.05	< 0.05	< 0.05	< 0.05	0.9	< 0.05	2.8	< 0.05	1.1	0.4	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.17	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	< 0.10	< 0.10	0.43	0.89	2.1	16	< 0.10	< 0.10	2.6	< 0.10	< 0.10	< 0.10	< 0.10	0.95	< 0.10	3.5	< 0.10	2.1	0.63	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.19	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	< 0.10	< 0.10	0.3	0.77	1.5	11	< 0.10	< 0.10	1.3	< 0.20	< 0.20	< 0.20	< 0.20	0.46	< 0.20	1.6	< 0.20	1.2	0.32	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(a)pyrene	mg/kg	< 0.10	< 0.10	0.24	0.97	2.1	17	< 0.10	< 0.10	2.6	< 0.10	< 0.10	< 0.10	< 0.10	0.6	< 0.10	2.4	< 0.10	1.9	0.56	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.10	< 0.10	< 0.10	0.37	0.8	8.2	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.7	< 0.20	1.3	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibenz(a,h)anthracene	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.9	< 0.10	< 0.10	< 0.10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.24	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(ghi)perylene	mg/kg	< 0.05	< 0.05	< 0.05	0.59	1.1	9.8	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	1.8	< 0.05	1.4	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH																															
Speciated Total EPA-16 PAHs	mg/kg	< 1.60	< 1.6	3	11	33	230	< 1.6	< 1.6	29	< 1.6	< 1.6	< 1.6	< 1.6	12	< 1.6	34	< 1.6	17	4.4	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	2	< 1.6	< 1.6	< 1.6
Heavy Metals / Metalloids																															
Aluminium (aqua regia extractable)	mg/kg	12000																	14000	37000	6000	66000	31000	38000	45000	740	2000	37000	2900	20000	15000
Arsenic (aqua regia extractable)	mg/kg	7.6	2	4.4	7	8.5	11	10	18	18	9.7	11	9.2	6.4	14	7.9	18	5.6	17	9.4	7	13	5.7	1	9.8	3	12	6.5	7.9	20	11
Barium (aqua regia extractable)	mg/kg	28																	320	96	77	290	45	400	46	15	17	260	15	37	220
Boron (water soluble)	mg/kg	1.7									1.7	8	< 0.2	< 0.2	5.9	2.5	4.1	0.3	13	4.8	< 0.2	11	1.6	3.1	3.6	< 0.2	< 0.2	6.5	< 0.2	3.2	2.6
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	6	1.7	< 0.2	0.3	0.4	0.3	45	< 0.2	0.4	< 0.2	< 0.2	11	0.4	4.9	< 0.2	5.8	0.8	1.1	< 0.2	< 0.2	1.7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	1.3
Chromium (aqua regia extractable)	mg/kg	27	7.1	84	44	33	34	22	33	200	31	59	16	15	95	48	49	31	64	37	15	67	45	120	45	16	9.2	66	8.2	36	30
Copper (aqua regia extractable)	mg/kg	22	11	2800	540	36	51	30	26	1000	24	47	24	6	320	35	310	23	250	65	46	70	85	1400	37	20	6.7	58	5.5	23	82
Iron (aqua regia extractable)	mg/kg	37000																	40000	60000	34000	87000	71000	220000	74000	8100	35000	43000	21000	67000	31000
Lead (aqua regia extractable)	mg/kg	8.1	5.1	1100	220	130	110	10	21	270	28	43	26	6.3	170	13	450	7.9	230	78	76	41	11	1400	16	3.6	5.9	12	4.9	15	220
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	3.9	< 0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3	1.1	< 0.3	3.4	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	23	6.6	120	37	28	27	22	27	200	25	40	15	12	56	31	50	19	51	32	15	45	22	48	37	12	16	39	15	46	25
Selenium (aqua regia extractable)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.3	< 1.0	< 1.0	< 1.0	2.2
Zinc (aqua regia extractable)	mg/kg	49	28	5300	780	95	170	56	60	1700	82	110	50	19	480	77	780	47	530	160	160	57	89	960	86	30	23	63	22	63	320
Magnesium (aqua regia extractable)	mg/kg	-																													
Monoaromatics																															
Benzene	mg/kg	< 0.001									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	mg/kg	0.0061									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	mg/kg	< 0.001									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	mg/kg	0.0018									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	mg/kg	< 0.001									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total xylene	mg/kg	< 0.002																	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	< 0.001									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons																															
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	< 1.0									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.4	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	< 2.0									< 2.0	< 2.0	< 2.0	< 2.0	69	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	9.1	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	< 8.0									< 8.0	< 8.0	< 8.0	< 8.0	240	< 8.0	< 8.0	< 8.0	34	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	8.6	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	< 8.0									< 8.0	< 8.0	< 8.0	< 8.0	980	< 8.0	120	< 8.0	210	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	46	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	< 10									< 10	< 10	< 10	< 10	1300	< 10	120	< 10	240	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	69	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	< 0.1									< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	< 1.0									< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	< 2.0									< 2.0	< 2.0	< 2.0	< 2.0	4.7	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	< 10									< 10	< 10	< 10	< 10	110	< 10	18	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	< 10									< 10	< 10	< 10	< 10	210	< 10	33	< 10	75	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	< 10									< 10	< 10	< 10	< 10	320	< 10	51	< 10	75	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SVOCs																															
Aniline	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Summary Statistics

Contaminant	Units	BH404	BH313	BH302-01	BH302-02	BH308	BH301	BH310	BH307-01	BH303-02	BH201	BH201	BH202	BH202	BH203	BH203	BH204	BH204	BH101	BH102	BH103	BH103	BH103	BH104	BH105	BH105	BH106	BH106	BH106	BH107	BH107
		17-17.20	0.25-0.40	0.40-0.50	0.80-1.00	1.40-1.60	0.90-1.00	0.5	one Supplie	one Supplie	0.50-0.60	3.70-3.80	0.50-0.60	3.80-4.00	1.70-1.80	10.80-11.00	0.60-0.70	11.50-12.00	2.20-2.40	1.70-1.90	0.40-0.60	2.30-2.50	18.00-18.20	0.20-0.40	1.80-2.00	4.60-4.80	0.70-0.90	4.70-4.90	0.70-0.90	1.80-2.00	1.80-2.00
		18/12/2014	21/05/2014	29/05/2014	29/05/2014	29/05/2014	30/05/2014	04/06/2014	03/06/2014	02/06/2014	06/12/2011	07/12/2011	06/12/2011	07/12/2011	06/12/2011	07/12/2011	06/12/2011	07/12/2011	15/03/2011	07/03/2011	07/03/2011	07/03/2011	09/03/2011	10/03/2011	09/03/2011	10/03/2011	22/03/2011	22/03/2011	22/03/2011	18/03/2011	18/03/2011
		LG	MG	MG	MG	MG	MG	MG	MG	MG	MG	AL	MG	KPG	MG	LC	MG	LG	MG	MG	MG	MG	LG	MG	MG	KPG	MG	AL	MG	MG	MG
1,2-Dichlorobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethylphthalate	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Azobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibutyl phthalate	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthraquinone	mg/kg	-																	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Summary Statistics

Contaminant	Units	BH108	BH109	BH109	BH110	BH110	BH113	BH113	BH114	BH115	BH116	BH116	BH116	BH117	BH117	BH119	BH120	BH120	BH121	BH121	BH122	BH123	BH123	BH124	BH124	BH125	WS101	WS105
		0.70-0.90	0.10-0.30	5.80-6.00	0.50-0.70	3.00-3.20	0.20-0.40	5.00-5.20	0.60-0.80	0.70-0.90	0.60-0.80	0.7	2.50-2.70	1.00-1.20	2.20-2.40	0.50-0.70	0.40-0.60	4.30-4.50	0.10-0.30	3.60-3.80	0.10-0.30	0.00-0.30	11.50-12.00	0.40-0.60	10.00-10.20	10.40-10.60	1.80-1.90	0.30-0.50
		14/03/2011	15/03/2011	16/03/2011	22/03/2011	22/03/2011	08/03/2011	09/03/2011	10/03/2011	08/03/2011	07/03/2011	07/03/2011	07/03/2011	10/03/2011	10/03/2011	22/03/2011	22/03/2011	23/03/2011	15/03/2011	15/03/2011	23/03/2011	16/03/2011	21/03/2011	14/03/2011	16/03/2011	16/03/2011	15/03/2011	18/03/2011
		MG	MG	LC	MG	KPG	MG	KPG	MG	MG	MG	MG	AL	MG	AL	MG	MG	KPG	MG	AL	MG	MG	LG	MG	LC	LC	MG	MG
General Inorganics																												
pH	pH Units	6.4	7.6	7.5	8	8.6	8.3	8	7.8	7.6	7.6	-	7.4	8	8.1	9.9	8	7.8	8.2	7.8	8.3	8	7	7.4	7.8	7.4	7.8	10.4
Total Cyanide	mg/kg																											
Free Cyanide	mg/kg																											
Total Sulphate as SO4	mg/kg	2800	3000	670	1600	550	820	< 100	2100	2900	4400	-	820	910	2900	7400	890	340	4900	1700	920	3100	800	530	1700	1100	1300	820
Water Soluble Sulphate (Soil Equivalent)	g/l	2.8	0.067	0.48	0.77	0.46	0.22	0.023	0.87	1.5	0.31	-	0.8	0.59	1.8	3.8	0.25	0.2	3	0.76	0.049	1.7	0.5	0.041	1.7	0.88	1.3	0.15
Water Soluble Sulphate as SO4 (2:1)	mg/kg	2800	67	-	770	-	220	-	870	1500	310	-	-	590	-	3800	250	-	3000	-	-	1700	-	41	-	-	1300	150
Water Soluble Sulphate (2:1 Leachate Equivale	g/l																											
Sulphide	mg/kg	< 1.0	< 1.0	100	39	3.4	7.1	29	11	5.7	18	-	4.6	23	28	140	2.4	11	1.6	8.5	< 1.0	18	180	< 1.0	160	220	68	< 1.0
Ammonium as NH4	mg/kg																											
Ammonium as NH4 (leachate equivalent)	mg/l																											
Organic Matter	%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.4	-	0.3	16	-	-	0.6	-	-	-	-	-
Asbestos in Soil Screen	-	Absent	Absent	-	Absent	-	Absent	-	Absent	Absent	Present	-	-	Absent	-	Absent	Absent	-	Absent	-	-	Absent	-	Absent	-	-	Absent	Absent
Asbestos Type	-	-	-	-	-	-	-	-	-	-	Chrysotile and Amosite	Chrysotile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos quantification	%																											
Total Phenols																												
Total Phenols (monohydric)	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	< 2.0	-	< 2.0	< 2.0	-	< 2.0	-	-	< 2.0	-	< 2.0	-	-	-	-
Speciated PAHs																												
Naphthalene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	14	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	0.15	0.54	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.23	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	5.7	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Acenaphthene	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.6	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10	0.52	1.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.22	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	7.5	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	0.31	0.88	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	0.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	mg/kg	< 0.20	< 0.20	< 0.20	0.64	< 0.20	58	< 0.20	0.52	< 0.20	1.5	-	< 0.20	1.4	2.7	1.1	0.65	< 0.20	0.34	< 0.20	2.5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Anthracene	mg/kg	< 0.10	< 0.10	< 0.10	0.3	< 0.10	7.8	< 0.10	0.11	< 0.10	0.62	-	< 0.10	0.69	0.69	0.29	0.18	< 0.10	< 0.10	< 0.10	0.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	mg/kg	0.32	0.36	< 0.20	4	< 0.20	59	< 0.20	0.74	3.8	4.8	-	1.3	3.7	2.9	1.8	1.5	< 0.20	0.62	< 0.20	4.2	< 0.20	< 0.20	0.66	< 0.20	< 0.20	< 0.20	< 0.20
Pyrene	mg/kg	0.29	0.33	< 0.20	3.4	< 0.20	47	< 0.20	0.62	3.3	4	-	1	3	3	1.6	1.3	< 0.20	0.48	< 0.20	3.3	< 0.20	< 0.20	0.59	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(a)anthracene	mg/kg	0.2	< 0.20	< 0.20	1.9	< 0.20	22	< 0.20	0.36	1.4	1.9	-	0.41	1.6	1.3	0.81	0.78	< 0.20	0.26	< 0.20	2	< 0.20	< 0.20	0.38	< 0.20	< 0.20	< 0.20	< 0.20
Chrysene	mg/kg	0.17	0.18	< 0.05	1.9	< 0.05	21	< 0.05	0.35	1.3	2.1	-	0.38	1.5	1.8	0.76	0.73	< 0.05	0.27	< 0.05	1.8	< 0.05	< 0.05	0.33	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.24	0.18	< 0.10	2.3	< 0.10	30	< 0.10	0.33	1.9	2.6	-	0.61	1.5	< 0.10	1	0.92	< 0.10	0.33	< 0.10	2.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	mg/kg	< 0.20	< 0.20	< 0.20	1.1	< 0.20	10	< 0.20	0.23	0.87	1.4	-	0.26	0.96	< 0.20	0.5	0.43	< 0.20	< 0.20	< 0.20	1.1	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(a)pyrene	mg/kg	< 0.10	0.21	< 0.10	1.5	< 0.10	20	< 0.10	0.32	1.4	2.4	-	0.48	1.4	< 0.10	0.67	0.79	< 0.10	0.24	< 0.10	1.7	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.20	< 0.20	< 0.20	0.92	< 0.20	13	< 0.20	< 0.20	0.8	1.3	-	< 0.20	0.85	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Dibenz(a,h)anthracene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	1.2	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(ghi)perylene	mg/kg	< 0.05	< 0.05	< 0.05	1.1	< 0.05	13	< 0.05	< 0.05	0.94	1.8	-	< 0.05	0.84	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.62	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total PAH																												
Speciated Total EPA-16 PAHs	mg/kg	< 1.6	< 1.6	< 1.6	19	< 1.6	340	< 1.6	3.6	16	24	-	4.6	18	15	8.6	7.4	< 1.6	2.6	< 1.6	21	< 1.6	< 1.6	2	< 1.6	< 1.6	< 1.6	< 1.6
Heavy Metals / Metalloids																												
Aluminium (aqua regia extractable)	mg/kg	24000	16000	33000	19000	6500	23000	1600	27000	20000	28000	-	47000	37000	26000	17000	6500	1700	10000	8600	15000	39000	11000	13000	14000	28000	43000	4200
Arsenic (aqua regia extractable)	mg/kg	15	6.6	15	20	9.3	12	5.1	6.9	14	42	-	16	14	36	12	12	7.3	16	4.9	14	< 1.0	11	8.8	4.4	8	8.4	9.1
Barium (aqua regia extractable)	mg/kg	130	120	56	280	50	330	14	54	340	330	-	210	150	590	880	110	79	310	70	260	520	41	360	31	47	66	39
Boron (water soluble)	mg/kg	3.4	0.8	1.8	8.7	1.6	1.1	< 0.2	8.2	2.9	6	-	15	3.7	46	2.7	0.7	0.2	0.6	13	2.1	6.6	1.3	0.9	0.6	1.3	3.1	0.4
Cadmium (aqua regia extractable)	mg/kg	2.1	0.3	< 0.2	6.5	< 0.2	3.3	< 0.2	0.4	2.8	6.8	-	0.5	0.8	64	0.8	0.8	< 0.2	4.5	< 0.2	1.9	2.8	< 0.2	4.9	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	40	25	49	50	18	35	9.9	31	32	92	-	60	42	220	23	20	9.3	48	14	40	110	20	48	25	30	63	14
Copper (aqua regia extractable)	mg/kg	85	31	35	450	30	280	3.4	54	110	510	-	36	95	2300	130	69	11	300	15	150	1200	19	230	19	47	38	22
Iron (aqua regia extractable)	mg/kg	63000	23000	56000	36000	14000	59000	8600	47000	43000	170000	-	22000	69000	40000	24000	18000	11000	31000	15000	29000	84000	85000	35000	46000	65000	56000	25000
Lead (aqua regia extractable)	mg/kg	110	73	13	380	25	520	4.9	33	330	690	-	40	190	390	490	130	13	290	3.7	230	660	13	160	7.6	8.9	13	21
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	< 0.3	1	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	-	< 0.3	< 0.3	4.1	< 0.3	0.6	< 0.3	1.3	< 0.3	0.9	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	67	21	49	71	17	44	7.8	33	28	81	-	40	43	280	20	18	12	52	19	38	100	21	52	19	25	45	20
Selenium (aqua regia extractable)	mg/kg	< 1.0	2.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	8.4	< 1.0	< 1.0	< 1.0	2	5.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	560	85	73	1100	63	1100	15	150	510	1400	-	180	250	3500	1900	260	31	700	45	450	1600	48	560	41	50	80	65
Magnesium (aqua regia extractable)	mg/kg																											
Monoaromatics																												
Benzene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total xylene	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons																												
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	< 1.0	< 1.0	< 1.0	1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	< 2.0	< 2.0	< 2.0	17	< 2.0	2	< 2.0	< 2.0	< 2.0	< 2.0	-	< 2.0	10	90	170	< 2.0	< 2.0	< 2.0	4.6	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	12	< 8.0	< 8.0	95	< 8.0	10	< 8.0	< 8.0	9	< 8.0	-	< 8.0	20	1100	300	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	57	< 8.0	< 8.0	400	< 8.0	15	< 8.0	< 8.0	40	20	-	66	62	5800	87	< 8.0	< 8.0	< 8.0	19	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	69	< 10	< 10	520	< 10	27	< 10	< 10	49	20	-	66	92	7000	560	< 10	< 10	< 10	28	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	1	< 1.0	< 1.0	< 1.0	< 1.0	10	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	2	< 2.0	< 2.0	< 2.0	< 2.0	49	< 2.0	< 2.0	< 2.0	< 2.0	-	< 2.0	< 2.0	5	19	< 2.0	< 2.0	< 2.0	< 2.0	4.5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	< 10	< 10	< 10	17	< 10	260	< 10	< 10	14	< 10	-	< 10	< 10	220	94	< 10	< 10	< 10	< 10	11	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	140	< 10	< 10	87	< 10	240	< 10	< 10	57	20	-	< 10	16	1200	39	< 10	< 10	< 10	< 10	35	< 10	< 10	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	140	< 10	< 10	100	< 10	560	< 10	< 10	71	20	-	< 10	16	1400	150	< 10	< 10	< 10	< 10	56	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SVOCs																												
Aniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Summary Statistics

Contaminant	Units	BH108	BH109	BH109	BH110	BH110	BH113	BH113	BH114	BH115	BH116	BH116	BH116	BH117	BH117	BH119	BH120	BH120	BH121	BH121	BH122	BH123	BH123	BH124	BH124	BH125	WS101	WS105
		0.70-0.90	0.10-0.30	5.80-6.00	0.50-0.70	3.00-3.20	0.20-0.40	5.00-5.20	0.60-0.80	0.70-0.90	0.60-0.80	0.7	2.50-2.70	1.00-1.20	2.20-2.40	0.50-0.70	0.40-0.60	4.30-4.50	0.10-0.30	3.60-3.80	0.10-0.30	0.00-0.30	11.50-12.00	0.40-0.60	10.00-10.20	10.40-10.60	1.80-1.90	0.30-0.50
		14/03/2011	15/03/2011	16/03/2011	22/03/2011	22/03/2011	08/03/2011	09/03/2011	10/03/2011	08/03/2011	07/03/2011	07/03/2011	07/03/2011	10/03/2011	10/03/2011	22/03/2011	22/03/2011	23/03/2011	15/03/2011	15/03/2011	23/03/2011	16/03/2011	21/03/2011	14/03/2011	16/03/2011	16/03/2011	15/03/2011	18/03/2011
		MG	MG	LC	MG	KPG	MG	KPG	MG	MG	MG	MG	AL	MG	AL	MG	MG	KPG	MG	AL	MG	MG	LG	MG	LC	LC	MG	MG
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Isophorone	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloroaniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobutadiene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dimethylphthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibenzofuran	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4-Nitroaniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bromophenyl phenyl ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hexachlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbazole	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibutyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anthraquinone	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Data Summary Statistics

Contaminant	Units	WS107	WS109	WS109	WS110	WS111	WS112	WS113	WS115	WS116	WS117	WS119	WS121	WS123	WS124	WS125	WS127	WS127	WS128	WS128	WS130	WS131	WS131	WS133	WS134	WS135
		0.80-1.00	0.20-0.40	0.80-1.00	0.30-0.50	0.20-0.40	1.00-1.10	0.20-0.40	1.40-1.50	0.40-0.60	0.30-0.50	1.40-1.50	1.50-1.60	1.30-1.40	1.35	0.30-0.50	0.10-0.30	2.00-2.10	0.00-0.20	1.40-1.50	0.20-0.40	0.20-0.40	1.60-1.70	0.30-0.40	0.50-0.60	0.10-0.30
		14/03/2011	18/03/2011	18/03/2011	17/03/2011	17/03/2011	16/03/2011	17/03/2011	14/03/2011	21/03/2011	21/03/2011	15/03/2011	17/03/2011	16/03/2011	16/03/2011	17/03/2011	18/03/2011	21/03/2011	16/03/2011	16/03/2011	18/03/2011	18/03/2011	21/03/2011	22/03/2011	15/03/2011	21/03/2011
		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
General Inorganics																										
pH	pH Units	7.3	7	7.7	7.5	7	7.4	8	7	7.7	7.9	7.4	8.2	7.7	-	8.2	8	7.8	7.3	7.2	6.8	7.6	7.7	6.5	7.8	7.6
Total Cyanide	mg/kg																									
Free Cyanide	mg/kg																									
Total Sulphate as SO4	mg/kg	< 100	2300	4300	1400	2000	350	2200	2300	7400	11000	510	1400	1000	-	520	620	1400	880	11000	1300	2400	650	1000	< 100	780
Water Soluble Sulphate (Soil Equivalent)	g/l	0.089	0.49	0.45	1.4	0.38	0.15	0.43	0.42	3.2	3.4	0.29	1.3	0.34	-	0.43	< 0.0025	0.22	< 0.0025	4.6	< 0.0025	1.6	< 0.0025	< 0.0025	0.098	< 0.0025
Water Soluble Sulphate as SO4 (2:1)	mg/kg	89	490	450	1400	380	150	430	420	3200	3400	290	1300	340	-	430	< 2.5	220	< 2.5	4600	< 2.5	1600	< 2.5	< 2.5	97	< 2.5
Water Soluble Sulphate (2:1 Leachate Equivale	g/l																									
Sulphide	mg/kg	< 1.0	170	37	2	3.2	7.9	2.4	64	18	45	9.9	39	31	-	2.4	< 1.0	62	1.5	< 1.0	< 1.0	< 1.0	21	5.4	1.3	2.7
Ammonium as NH4	mg/kg																									
Ammonium as NH4 (leachate equivalent)	mg/l																									
Organic Matter	%	-	-	-	-	-	-	-	-	0.7	1.1	-	-	-	-	-	0.7	-	-	-	-	-	-	-	-	-
Asbestos in Soil Screen	-	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Present	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent	Absent
Asbestos Type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Chrysotile	-	-	-	-	-	-	-	-	-	-	-
Asbestos quantification	%																									
Total Phenols																										
Total Phenols (monohydric)	mg/kg	-	< 2.0	37	-	-	< 2.0	-	-	-	-	< 2.0	< 2.0	< 2.0	-	< 2.0	-	< 2.0	-	< 2.0	-	-	< 2.0	< 2.0	< 2.0	< 2.0
Speciated PAHs																										
Naphthalene	mg/kg	< 0.05	< 0.05	2	0.34	0.42	< 0.05	0.17	0.06	< 0.05	0.25	< 0.05	< 0.05	< 0.05	-	< 0.05	0.13	0.5	< 0.05	< 0.05	0.41	0.26	0.27	0.27	< 0.05	0.22
Acenaphthylene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Acenaphthene	mg/kg	< 0.10	0.31	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.14	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	0.49	< 0.10	< 0.10	0.27	0.1	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	mg/kg	< 0.20	0.38	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	0.54	< 0.20	< 0.20	0.29	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Phenanthrene	mg/kg	0.22	2.7	< 0.20	0.72	0.74	< 0.20	0.27	0.79	0.21	0.35	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	2.7	1.1	1.6	2.7	0.86	0.39	0.62	< 0.20	0.34
Anthracene	mg/kg	< 0.10	0.72	< 0.10	0.23	0.19	< 0.10	< 0.10	0.3	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	-	< 0.10	< 0.10	0.73	0.15	0.58	0.92	0.16	< 0.10	0.1	< 0.10	< 0.10
Fluoranthene	mg/kg	0.25	7.2	4.9	1.6	2.1	0.52	0.61	1.7	0.65	0.46	< 0.20	< 0.20	1.1	-	< 0.20	0.42	4.6	3.5	5.5	5	3	1.1	1.7	< 0.20	1.1
Pyrene	mg/kg	0.2	6.3	8.6	1.3	1.7	0.52	0.54	1.7	0.61	0.38	< 0.20	< 0.20	0.98	-	< 0.20	0.35	3.8	3	4.5	4.2	2.5	0.95	1.5	< 0.20	0.92
Benzo(a)anthracene	mg/kg	< 0.20	2.3	< 0.20	0.89	1.1	< 0.20	0.4	0.61	0.36	< 0.20	< 0.20	< 0.20	0.42	-	< 0.20	< 0.20	1.8	1.8	1.5	2.7	1.4	0.48	0.97	< 0.20	0.53
Chrysene	mg/kg	0.1	2.3	< 0.05	0.59	0.91	< 0.05	0.35	0.74	0.32	0.17	< 0.05	< 0.05	0.46	-	< 0.05	0.19	2.4	1.3	1.9	2.3	1.5	0.62	0.77	< 0.05	0.61
Benzo(b)fluoranthene	mg/kg	0.1	2.9	< 0.10	1.2	1.9	< 0.10	< 0.10	< 0.10	0.49	0.38	< 0.10	< 0.10	0.62	-	< 0.10	0.28	3.5	2.1	1.7	4.2	2.4	0.9	1.8	< 0.10	1.3
Benzo(k)fluoranthene	mg/kg	< 0.20	1.6	< 0.20	0.53	0.83	< 0.20	< 0.20	< 0.20	0.27	< 0.20	< 0.20	< 0.20	0.38	-	< 0.20	< 0.20	1.2	1.3	1.2	1.5	1.3	0.54	0.65	< 0.20	0.42
Benzo(a)pyrene	mg/kg	< 0.10	1.9	< 0.10	0.81	1.2	< 0.10	< 0.10	< 0.10	0.42	0.24	< 0.10	< 0.10	0.52	-	< 0.10	0.2	2.2	1.9	1.6	2.7	1.8	0.69	1.2	< 0.10	0.76
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	1.2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	1.2	1.3	0.77	2	1.2	0.47	0.86	< 0.20	0.44
Dibenz(a,h)anthracene	mg/kg	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo(ghi)perylene	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	1.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	-	< 0.05	< 0.05	1.2	1.3	0.99	1.8	1.2	0.41	0.67	< 0.05	0.53
Total PAH																										
Speciated Total EPA-16 PAHs	mg/kg	< 1.6	29	16	8.2	13	< 1.6	2.4	6	3.4	2.4	< 1.6	< 1.6	4.6	-	< 1.6	< 1.6	27	19	22	31	18	6.8	11	< 1.6	7.2
Heavy Metals / Metalloids																										
Aluminium (aqua regia extractable)	mg/kg	4000	7600	6300	20000	11000	39000	6600	52000	11000	18000	61000	27000	28000	-	12000	6900	25000	26000	18000	13000	17000	7700	14000	3900	12000
Arsenic (aqua regia extractable)	mg/kg	23	5.4	5.3	12	26	10	13	16	15	17	15	7.5	20	-	31	11	21	15	13	25	30	12	13	6.6	14
Barium (aqua regia extractable)	mg/kg	29	85	490	84	360	110	200	340	280	120	190	40	210	-	46	110	340	320	190	560	480	160	170	28	180
Boron (water soluble)	mg/kg	< 0.2	1.7	65	3	2.3	3.5	1.6	21	2.6	4	8.2	2.7	5.8	-	0.2	< 0.2	21	2	3.5	2.1	6.4	6.2	0.7	< 0.2	1.8
Cadmium (aqua regia extractable)	mg/kg	< 0.2	< 0.2	50	5.9	7.1	< 0.2	1.4	12	0.3	1.2	0.5	0.2	9	-	< 0.2	0.7	12	3.7	1	6.1	6.7	1.4	1.7	< 0.2	1.4
Chromium (aqua regia extractable)	mg/kg	18	24	190	42	55	64	15	110	19	23	77	37	67	-	34	18	85	45	30	50	70	21	28	8.1	26
Copper (aqua regia extractable)	mg/kg	3.9	14	1800	240	430	38	88	370	30	50	29	27	440	-	15	64	490	260	110	500	500	94	140	8.6	88
Iron (aqua regia extractable)	mg/kg	53000	13000	10000	18000	18000	57000	11000	71000	22000	32000	69000	46000	55000	-	80000	17000	20000	32000	31000	18000	55000	25000	36000	18000	35000
Lead (aqua regia extractable)	mg/kg	10	49	280	330	280	82	370	160	720	340	22	28	2700	-	23	180	240	240	300	610	590	230	280	7.3	280
Mercury (aqua regia extractable)	mg/kg	< 0.3	< 0.3	3.9	< 0.3	0.4	< 0.3	0.3	0.9	< 0.3	< 0.3	< 0.3	< 0.3	0.9	-	< 0.3	< 0.3	1.1	0.9	0.4	2.5	2.2	0.9	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	23	17	160	43	79	52	22	85	15	21	48	27	92	-	35	19	84	44	26	57	77	25	32	9.6	29
Selenium (aqua regia extractable)	mg/kg	< 1.0	1.8	12	< 1.0	1.3	< 1.0	2.1	1.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	2.7	< 1.0	< 1.0	2.5	< 1.0	< 1.0	1.3	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	29	45	2000	10000	1300	120	320	910	260	150	230	67	500	-	87	180	790	650	330	940	1000	290	440	26	320
Magnesium (aqua regia extractable)	mg/kg																									
Monoaromatics																										
Benzene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total xylene	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
MTBE (Methyl Tertiary Butyl Ether)	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons																										
TPH-CWG - Aliphatic >EC5 - EC6	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC6 - EC8	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC8 - EC10	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aliphatic >EC10 - EC12	mg/kg	< 1.0	< 1.0	21	< 1.0	4.9	< 1.0	< 1.0	4	< 1.0	< 1.0	< 1.0	< 1.0	7.2	-	< 1.0	< 1.0	9	< 1.0	< 1.0	6.2	2.9	4.5	6.9	< 1.0	4.5
TPH-CWG - Aliphatic >EC12 - EC16	mg/kg	< 2.0	< 2.0	290	< 2.0	8.6	< 2.0	< 2.0	53	< 2.0	< 2.0	< 2.0	< 2.0	33	-	< 2.0	< 2.0	76	< 2.0	< 2.0	5.3	3.8	5.9	11	< 2.0	6.5
TPH-CWG - Aliphatic >EC16 - EC21	mg/kg	< 8.0	12	3500	< 8.0	41	< 8.0	< 8.0	230	< 8.0	< 8.0	< 8.0	< 8.0	110	-	< 8.0	< 8.0	420	< 8.0	< 8.0	35	25	< 8.0	48	< 8.0	49
TPH-CWG - Aliphatic >EC21 - EC35	mg/kg	< 8.0	140	9200	< 8.0	160	< 8.0	< 8.0	770	< 8.0	< 8.0	< 8.0	< 8.0	320	-	< 8.0	< 8.0	910	< 8.0	< 8.0	160	110	39	200	< 8.0	130
TPH-CWG - Aliphatic (EC5 - EC35)	mg/kg	< 10	160	13000	< 10	220	< 10	< 10	1100	< 10	< 10	< 10	< 10	470	-	< 10	< 10	1400	< 10	< 10	200	140	50	270	< 10	190
TPH-CWG - Aromatic >EC5 - EC7	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC7 - EC8	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC8 - EC10	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	-	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
TPH-CWG - Aromatic >EC10 - EC12	mg/kg	< 1.0	5.6	2.5	1.5	17	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1.0	< 1.0	13	10	8.6	3.7	9.4	2.4	6.4	< 1.0	5.9
TPH-CWG - Aromatic >EC12 - EC16	mg/kg	< 2.0	12	< 2.0	< 2.0	13	< 2.0	< 2.0	6	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	-	< 2.0	< 2.0	5.8	11	7.7	6.1	8.1	< 2.0	2	< 2.0	3.2
TPH-CWG - Aromatic >EC16 - EC21	mg/kg	< 10	45	14	< 10	110	< 10	< 10	71	< 10	< 10	< 10	< 10	60	-	< 10	< 10	440	64	61	47	52	< 10	38	< 10	39
TPH-CWG - Aromatic >EC21 - EC35	mg/kg	< 10	< 10	< 10	18	310	< 10	< 10	210	< 10	< 10	< 10	< 10	420	-	< 10	< 10	950	480	670	30	190	18	120	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35)	mg/kg	< 10	63	17	20	450	< 10	< 10	290	< 10	< 10	< 10	< 10	480	-	< 10	< 10	1400	570	740	87	260	20	170	< 10	48
SVOCs																										
Aniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
Phenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
2-Chlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
Bis(2-chloroethyl)ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
1,3-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-

Data Summary Statistics

Contaminant	Units	WS107	WS109	WS109	WS110	WS111	WS112	WS113	WS115	WS116	WS117	WS119	WS121	WS123	WS124	WS125	WS127	WS127	WS128	WS128	WS130	WS131	WS131	WS133	WS134	WS135
		0.80-1.00	0.20-0.40	0.80-1.00	0.30-0.50	0.20-0.40	1.00-1.10	0.20-0.40	1.40-1.50	0.40-0.60	0.30-0.50	1.40-1.50	1.50-1.60	1.30-1.40	1.35	0.30-0.50	0.10-0.30	2.00-2.10	0.00-0.20	1.40-1.50	0.20-0.40	0.20-0.40	1.60-1.70	0.30-0.40	0.50-0.60	0.10-0.30
		14/03/2011	18/03/2011	18/03/2011	17/03/2011	17/03/2011	16/03/2011	17/03/2011	14/03/2011	21/03/2011	21/03/2011	15/03/2011	17/03/2011	16/03/2011	16/03/2011	17/03/2011	18/03/2011	21/03/2011	16/03/2011	16/03/2011	18/03/2011	18/03/2011	21/03/2011	22/03/2011	15/03/2011	21/03/2011
		MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG	MG
1,2-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
1,4-Dichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
2-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Hexachloroethane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Nitrobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
4-Methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Isophorone	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
2-Nitrophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
2,4-Dimethylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Naphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	0.3	-	-	-
2,4-Dichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
4-Chloroaniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
Hexachlorobutadiene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
4-Chloro-3-methylphenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
2,4,6-Trichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
2,4,5-Trichlorophenol	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
2-Methylnaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
2-Chloronaphthalene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
Dimethylphthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
2,6-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	< 0.1	-	-	-
Acenaphthylene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Acenaphthene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	< 0.1	-	-	-
2,4-Dinitrotoluene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Dibenzofuran	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	< 0.2	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Diethyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
4-Nitroaniline	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Fluorene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	-	-	-	< 0.2	-	-	-
Azobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Bromophenyl phenyl ether	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Hexachlorobenzene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Phenanthrene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.7	-	-	-	-	0.4	-	-	-
Anthracene	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.7	-	-	-	-	< 0.1	-	-	-
Carbazole	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-
Dibutyl phthalate	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.2	-	-	-	-	< 0.2	-	-	-
Anthraquinone	mg/kg	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.3	-	-	-	-	< 0.3	-	-	-

Appendix C: Groundwater and surface water analytical results

Appendix C1

Data Summary Statistics

Site:	NLWA Edmonton	**Project No:**	29541
Data Description:	Borehole Samples	**SOM (%):**	
Land Use:	Commerical	**Completed By:**	JG
Receptor:	Groundwater	**Checked By:**	BF

Assessment Criteria Key

a) UK DWS	e)	i)	m)	q)	u)
b)	f)	j)	n)	r)	v)
c)	g)	k)	o)	s)	w) Site Specific Assessment Criteria
d)	h)	l)	p)	t)	x) Laboratory limit of detection

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Summary Statistics							Sample Identifiers and Analytical Data																					
					Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC	BH101	BH 101	BH106	BH 106	BH107	BH 107	BH109	BH109	BH110	BH 110	BH113	BH 113	BH114	BH 114	BH115	BH115	BH116	BH116	BH117	BH117	BH118	BH118
												29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14
												KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG
General Inorganics					0	0	0	0	-	-	0																						
pH	pH Units	N/A	-		170	170	6.4	8.5	7.20058824	0.2457923	-	7.3	6.9	7.1	6.9	7.3	7	7.3	7	7.2	6.9	7.2	7	7.1	7	7.1	7.1	7	6.9	7	7.1	7.1	7.2
Electrical Conductivity	µS/cm	10	-		19	19	990	2200	1667.89474	410.590076	-																						
Sulphate as SO4	ug/l	45	250000	DWS	171	171	51200	650000	189388.304	93111.0689	34	129000	116000	177000	186000	114000	99200	276000	317000	151000	153000	138000	150000	217000	137000	219000	165000	147000	331000	178000	198000	105000	82900
Sulphide	µg/l	5	-		170	0	5	5	-	-	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	4	250	DWS	171	171	16	660	218.923977	100.712462	54	120	110	180	170	73	70	260	330	320	170	220	110	270	110	120	80	130	120	170	220	280	170
Ammonium as NH4	µg/l	15	500	DWS	171	170	15	40000	5869.81287	4631.40034	164	2500	2400	5300	5500	410	2400	1000	2300	8400	6200	9300	5500	8800	2100	6700	4100	5000	9800	6300	7200	8600	5100
Nitrate as N	mg/l	1	-		170	13	0.3	17	0.94235294	1.29828074	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3
Nitrate as NO3	mg/l	5	50	DWS	41	4	5	14	5.41463415	1.75692359	0																						
Chemical Oxygen Demand (Total)	mg/l	3	-		170	154	2	830	42.1617647	102.921046	-	9.4	17	15	23	2.1	44	28	24	18	19	13	13	33	5.4	20	17	25	31	28	29	20	23
Hardness - Total	mgCaCO3/l	1	-		171	171	25.8	1130	522.42807	176.550311	-	423	296	676	518	363	313	602	761	392	339	323	302	565	327	519	453	505	805	618	730	428	394
Heavy Metals / Metalloids					0	0	0	0	-	-	0																						
Aluminium (dissolved)	mg/l	0.012	0.2	DWS	142	110	0.001	1.6	0.17026761	0.27011594	31		< 0.0010		< 0.0010		< 0.0010		0.0081		< 0.0010		< 0.0010		< 0.0010		0.0115		0.0188		0.0016		< 0.0010
Arsenic (dissolved)	µg/l	1	10	DWS	171	158	0.19	27	7.46725146	5.50972072	46	10	8.3	3.5	1.22	< 1.0	0.72	2.5	3.22	3.3	4.77	3.8	4.67	1.4	1.16	< 1.0	1.7	1.4	6.11	< 1.0	0.26	1.3	0.31
Barium (dissolved)	µg/l	0.05	-		171	171	8.6	140	51.9099415	25.5934474	-	16	14	62	48	28	30	67	71	28	17	29	20	27	21	69	43	24	61	93	96	27	27
Boron (dissolved)	µg/l	10	1000	DWS	171	171	91	1400	339.362573	180.172001	3	210	120	340	370	140	190	390	310	270	250	250	210	470	120	380	220	450	410	460	440	290	260
Cadmium (dissolved)	µg/l	0.1	5	DWS	171	0	0.02	0.1	-	-	0	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02
Chromium (dissolved)	µg/l	0.4	50	DWS	171	84	0.2	5.8	0.72807018	0.68016115	0	< 0.4	0.2	< 0.4	0.5	< 0.4	0.3	< 0.4	< 0.2	< 0.4	0.4	< 0.4	0.4	< 0.4	< 0.2	< 0.4	0.3	< 0.4	0.3	< 0.4	0.5	< 0.4	1
Copper (dissolved)	µg/l	0.7	2000	DWS	171	135	0.5	44	3.54327485	4.40958833	0	3.6	< 0.5	2.4	0.7	2.1	4.6	3.9	0.9	1.3	4.8	2.5	5.3	1.9	5.2	2.5	0.6	3.1	3.2	2.8	< 0.5	4.3	6.5
Iron (dissolved)	mg/l	0.004	0.2	DWS	142	140	0.005	7.4	0.69902817	1.23539747	85		0.013		< 0.005		0.011		0.05		0.021		0.013		< 0.005		0.13		0.033		0.098		0.11
Lead (dissolved)	µg/l	1	10	DWS	171	54	0.2	5.3	1.34561404	0.92305188	0	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2
Mercury (dissolved)	µg/l	0.5	1	DWS	171	4	0.05	0.51	0.46245614	0.12251215	0	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	0.19
Nickel (dissolved)	µg/l	0.3	20	DWS	171	167	0.3	23	5.72573099	4.42941158	3	11	4.3	23	15	6.5	11	5.2	8.5	6.8	3.8	8.8	5.6	9.1	4.9	9.3	4.1	8.4	8.5	9.8	6.3	8.2	4.5
Selenium (dissolved)	µg/l	4	10	DWS	171	15	0.6	20	3.90175439	1.75644942	2	< 4.0	< 0.6	< 4.0	0.8	< 4.0	< 0.6	< 4.0	1.2	20	0.8	< 4.0	< 0.6	< 4.0	0.8	< 4.0	< 0.6	< 4.0	1.5	< 4.0	1.4	< 4.0	1
Zinc (dissolved)	µg/l	0.4	-		171	111	0.4	27	4.10467836	4.62255103	-	6.4	< 0.5	5.8	2.5	4.7	13	3.8	< 0.5	1.3	< 0.5	4.2	0.6	3.5	1	2	< 0.5	2.1	< 0.5	2	< 0.5	4.6	< 0.5
Calcium (dissolved)	mg/l	0.012	-		171	171	5.5	410	184.663743	63.7501979	-	150	105	230	175	130	111	220	276	140	121	110	106	200	117	190	163	180	285	220	259	150	143
Magnesium (dissolved)	mg/l	0.005	-		171	171	2.9	68	14.774269	7.94152407	-	12	8.2	26	20	8.7	8.9	13	17	10	8.8	11	9.2	19	8.3	13	11	13	22	17	20	10	9
Total Phenols					0	0	0	0	-	-	0																						
Total Phenols (monohydric)	µg/l	10	0.5	DWS	170	8	10	42	10.5235294	3.18502959	170	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
VOCs					0	0	0	0	-	-	0																						
Chloromethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	0.5	DWS	171	1	1	10.4	5.10760234	-	171	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0
Trichlorofluoromethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-dichloroethene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-dichloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichloroethane	µg/l	1	3	DWS	171	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	3	DWS	171	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichloropropane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	10	DWS	171	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Propylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-dichlorobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
P-Isopropyltoluene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichlorobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-dichlorobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	-		171	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Data Summary Statistics

Site:	NLWA Edmonton	**Project No:**	35180
Data Description:	Borehole Samples	**SOM (%):**	
Land Use:	Industrial	**Completed By:**	JG
Receptor:	Groundwater	**Checked By:**	BF

Assessment Criteria Key

a)	EQS FW	e)		i)		m)		q)		u)							
b)	WFD	f)		j)		n)		r)		v)							
c)		g)		k)		o)		s)		w) Site Specific Assessment Criteria							
d)		h)		l)		p)		t)		x) Laboratory limit of detection							

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Summary Statistics							Sample Identifiers and Analytical Data																					
					Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC	BH101	BH 101	BH106	BH 106	BH107	BH 107	BH109	BH109	BH110	BH 110	BH113	BH 113	BH114	BH 114	BH115	BH115	BH116	BH116	BH117	BH117	BH118	BH118
												29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14	29/05/2014	05/11/14
												KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG	KPG
General Inorganics					0	0	0	0	-	-	0																						
pH	pH Units	N/A	-		178	178	6.4	8.5	7.2	0.24540984	-	7.3	6.9	7.1	6.9	7.3	7	7.3	7	7.2	6.9	7.2	7	7.1	7	7.1	7.1	7	6.9	7	7.1	7.1	7.2
Electrical Conductivity	µS/cm	10			19	19	990	2200	1667.89474	410.590076	0																						
Sulphate as SO4	ug/l	45	400000	EQS FW	175	175	51200	650000	187178.286	93245.1046	5	129000	116000	177000	186000	114000	99200	276000	317000	151000	153000	138000	150000	217000	137000	219000	165000	147000	331000	178000	198000	105000	82900
Sulphide	µg/l	5	250	EQS FW	174	0	5	5	-	-	0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	4	250	EQS FW	175	175	16	660	215.685714	101.812079	54	120	110	180	170	73	70	260	330	320	170	220	110	270	110	120	80	130	120	170	220	280	170
Ammonium as NH4	µg/l	15	-		175	174	15	40000	5778.67429	4622.49378	-	2500	2400	5300	5500	410	2400	1000	2300	8400	6200	9300	5500	8800	2100	6700	4100	5000	9800	6300	7200	8600	5100
Nitrate as N	mg/l	1	-		174	17	0.3	20	1.17528736	2.33015385	-	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	0.3	< 0.3	< 0.3	< 0.3	0.4	< 0.3
Nitrate as NO3	mg/l	5			41	4	5	14	5.41463415	1.75692359	0																						
Chemical Oxygen Demand (Total)	mg/l	3	-		178	162	2	830	41.7050562	100.624163	-	9.4	17	15	23	2.1	44	28	24	18	19	13	13	33	5.4	20	17	25	31	28	29	20	23
Hardness - Total	mgCaCO3/l	1	-		179	179	25.8	1130	513.07933	178.041387	-	423	296	676	518	363	313	602	761	392	339	323	302	565	327	519	453	505	805	618	730	428	394
Heavy Metals / Metalloids					0	0	0	0	-	-	0																						
Aluminium (dissolved)	mg/l	0.012	-		150	110	0.001	1.6	0.16257267	0.26482869	-		< 0.0010		< 0.0010		< 0.0010		0.0081		< 0.0010		< 0.0010		< 0.0010		0.0115		0.0188		0.0016		< 0.0010
Arsenic (dissolved)	µg/l	1	50	WFD	179	158	0.19	27	7.37703911	5.48651776	0	10	8.3	3.5	1.22	< 1.0	0.72	2.5	3.22	3.3	4.77	3.8	4.67	1.4	1.16	< 1.0	1.7	1.4	6.11	< 1.0	0.26	1.3	0.31
Barium (dissolved)	µg/l	0.05	-		179	175	5.9	140	50.903352	25.7138683	-	16	14	62	48	28	30	67	71	28	17	29	20	27	21	69	43	24	61	93	96	27	27
Boron (dissolved)	µg/l	10	2000		179	175	91	1400	331.011173	180.394978	0	210	120	340	370	140	190	390	310	270	250	250	210	470	120	380	220	450	410	460	440	290	260
Cadmium (dissolved)	µg/l	0.1	0.25	WFD	179	0	0.02	0.5	-	-	4	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02	< 0.08	< 0.02
Chromium (dissolved)	µg/l	0.4	3.4	EQS FW (Cr V	179	84	0.2	5.8	0.72290503	0.67021751	2	< 0.4	0.2	< 0.4	0.5	< 0.4	0.3	< 0.4	< 0.2	< 0.4	0.4	< 0.4	0.4	< 0.4	< 0.2	< 0.4	0.3	< 0.4	0.3	< 0.4	0.5	< 0.4	1
Copper (dissolved)	µg/l	0.7	28	EQS FW	179	139	0.5	44	3.97094972	5.1500676	2	3.6	< 0.5	2.4	0.7	2.1	4.6	3.9	0.9	1.3	4.8	2.5	5.3	1.9	5.2	2.5	0.6	3.1	3.2	2.8	< 0.5	4.3	6.5
Iron (dissolved)	mg/l	0.004	1	EQS FW	150	140	0.005	7.4	0.66744	1.2093642	21		0.013		< 0.005		0.011		0.05		0.021		0.013		< 0.005		0.13		0.033		0.098		0.11
Lead (dissolved)	µg/l	1	7.2	WFD	179	54	0.2	5.3	1.40167598	1.06778543	0	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2	< 1.0	< 0.2
Mercury (dissolved)	µg/l	0.5	0.05	EQS FW	179	4	0.05	1.5	0.47642458	0.20531028	163	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	< 0.05	< 0.5	0.19
Nickel (dissolved)	µg/l	0.3	20	WFD	179	171	0.3	23	5.64189944	4.36048121	3	11	4.3	23	15	6.5	11	5.2	8.5	6.8	3.8	8.8	5.6	9.1	4.9	9.3	4.1	8.4	8.5	9.8	6.3	8.2	4.5
Selenium (dissolved)	µg/l	4	-		179	15	0.6	20	3.96703911	2.00117315	-	< 4.0	< 0.6	< 4.0	0.8	< 4.0	< 0.6	< 4.0	1.2	20	0.8	< 4.0	< 0.6	< 4.0	0.8	< 4.0	< 0.6	< 4.0	1.5	< 4.0	1.4	< 4.0	1
Zinc (dissolved)	µg/l	0.4	125	EQS FW	179	115	0.4	40	4.89888268	6.23455385	0	6.4	< 0.5	5.8	2.5	4.7	13	3.8	< 0.5	1.3	< 0.5	4.2	0.6	3.5	1	2	< 0.5	2.1	< 0.5	2	< 0.5	4.6	< 0.5
Calcium (dissolved)	mg/l	0.012	-		179	175	5.5	410	181.344134	64.2298148	-	150	105	230	175	130	111	220	276	140	121	110	106	200	117	190	163	180	285	220	259	150	143
Magnesium (dissolved)	mg/l	0.005	-		179	175	2.9	68	14.5273743	7.84575168	-	12	8.2	26	20	8.7	8.9	13	17	10	8.8	11	9.2	19	8.3	13	11	13	22	17	20	10	9
Total Phenols					0	0	0	0	-	-	0																						
Total Phenols (monohydric)	µg/l	10	7.7	EQS FW	174	8	10	42	10.5114943	3.14897636	174	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
VOCs					0	0	0	0	-	-	0																						
Chloromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	-		175	1	1	10.4	5.01371429	-	-	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0	< 10.0	< 1.0
Trichlorofluoromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-dichloroethene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-dichloroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	100	WFD	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichloroethane	µg/l	1	10	WFD	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	10	WFD	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichloropropane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	50	EQS FW	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	30	WFD	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	30	WFD	175	0	1	1	-	-	0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
N-Propylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tert-Butylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sec-Butylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-dichlorobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
P-Isopropyltoluene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-dichlorobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,4-dichlorobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	-		175	0	1	1	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Data Summary Statistics

Site:	NLWA Edmonton	**Project No:**	35180
Data Description:	Borehole Samples	**SOM (%):**	
Land Use:	Industrial	**Completed By:**	JG
Receptor:	Groundwater	**Checked By:**	BF

Assessment Criteria Key

a) EQS FW	e)	i)	m)	q)	u)
b) WFD	f)	j)	n)	r)	v)
c)	g)	k)	o)	s)	w) Site Specific Assessment Criteria
d)	h)	l)	p)	t)	x) Laboratory limit of detection

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Summary Statistics							Sample Identifiers and Analytical Data									
					Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC	BH101	BH104	BH110	BH113	BH117	BH122	WS107	WS115	WS128	WS130
												2.20-2.40	0.20-0.40	0.50-0.70	0.20-0.40	2.20-2.40	0.10-0.30	0.80-1.00	1.40-1.50	GL-0.20	0.20-0.40
												15/3/11	10/3/11	22/3/11	8/3/11	10/3/11	23/3/11	14/3/11	14/3/11	16/3/11	18/3/11
General Inorganics					0	0	0	0	-	-	0										
pH	pH Units	N/A	-		10	10	5.9	7.8	6.8	0.5868939	-	6.4	7.1	6.1	6.7	7	6.8	6.7	7.5	7.8	5.9
Electrical Conductivity	µS/cm	10			0	0	0	0	-	-	0										
Sulphate as SO4	ug/l	45	400000	EQS FW	10	10	8.7	910	325.27	351.913178	0	290	17	530	57	760	8.7	17	630	910	33
Sulphide	µg/l	5	250	EQS FW	10	0	5	5	-	-	0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	4	250	EQS FW	0	0	0	0	-	-	0										
Ammonium as NH4	µg/l	15	-		10	10	91.2857143	92571.4286	10761.6857	28928.6871	-	733	91	347	117	92571	669	553	10800	1543	193
Nitrate as N	mg/l	1	-		0	0	0	0	-	-	-										
Nitrate as NO3	mg/l	5			0	0	0	0	-	-	0										
Chemical Oxygen Demand (Total)	mg/l	3	-		0	0	0	0	-	-	-										
Hardness - Total	mgCaCO3/l	1	-		0	0	0	0	-	-	-										
Heavy Metals / Metalloids					0	0	0	0	-	-	0										
Aluminium (dissolved)	mg/l	0.012	-		10	9	0.1	6.3	1.52	2.22001001	-	0.5	1.6	< 0.1	0.2	0.1	0.8	0.4	0.3	4.9	6.3
Arsenic (dissolved)	µg/l	1	50	WFD	10	2	10	46	14.7	11.5282262	0	46	< 10	< 10	< 10	21	< 10	< 10	< 10	< 10	< 10
Barium (dissolved)	µg/l	0.05	-		10	10	38	200	110.9	54.2103926	-	130	58	170	75	120	48	38	200	140	130
Boron (dissolved)	µg/l	10	2000		10	10	40	4700	921.7	1414.34555	1	1100	160	790	87	4700	110	40	1500	440	290
Cadmium (dissolved)	µg/l	0.1	0.25	WFD	10	4	0.5	3.5	0.91	0.93148627	10	0.8	< 0.5	0.7	< 0.5	3.5	< 0.5	< 0.5	1.1	< 0.5	< 0.5
Chromium (dissolved)	µg/l	0.4	3.4	EQS FW (Cr V	10	6	1	18	4.25	5.28609287	3	2.6	5.3	< 1.0	7.5	2.6	< 1.0	< 1.0	< 1.0	2.5	18
Copper (dissolved)	µg/l	0.7	28	EQS FW	10	10	5.9	210	75.49	66.9464205	7	82	81	20	26	170	48	5.9	30	82	210
Iron (dissolved)	mg/l	0.004	1	EQS FW	10	6	0.2	5.6	0.96	1.67544356	2	0.4	1.4	< 0.2	< 0.2	< 0.2	0.8	0.4	0.2	< 0.2	5.6
Lead (dissolved)	µg/l	1	7.2	WFD	10	5	5	120	20.64	35.5441259	5	11	17	< 5.0	< 5.0	< 5.0	8.4	< 5.0	< 5.0	25	120
Mercury (dissolved)	µg/l	0.5	0.05	EQS FW	10	0	1.5	1.5	-	-	10	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Nickel (dissolved)	µg/l	0.3	20	WFD	10	10	1.1	110	21.63	32.7141848	3	30	7.7	15	1.1	110	5.7	1.5	27	2.3	16
Selenium (dissolved)	µg/l	4	-		10	0	10	10	-	-	-	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Zinc (dissolved)	µg/l	0.4	125	EQS FW	10	10	1.8	210	70.58	60.3009821	1	77	51	77	12	210	25	1.8	120	59	73
Calcium (dissolved)	mg/l	0.012	-		0	0	0	0	-	-	-										
Magnesium (dissolved)	mg/l	0.005	-		0	0	0	0	-	-	-										
Total Phenols					0	0	0	0	-	-	0										
Total Phenols (monohydric)	µg/l	10	7.7	EQS FW	0	0	0	0	-	-	0										
VOCs					0	0	0	0	-	-	0										
Chloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Chloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Bromomethane	µg/l	1	-		0	0	0	0	-	-	-										
Vinyl Chloride	µg/l	1	-		0	0	0	0	-	-	-										
Trichlorofluoromethane	µg/l	1	-		0	0	0	0	-	-	-										
1,1-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1	-		0	0	0	0	-	-	-										
Cis-1,2-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	-		0	0	0	0	-	-	-										
1,1-dichloroethane	µg/l	1	-		0	0	0	0	-	-	-										
2,2-Dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Trichloromethane	µg/l	1	-		0	0	0	0	-	-	-										
1,1,1-Trichloroethane	µg/l	1	100	WFD	0	0	0	0	-	-	0										
1,2-dichloroethane	µg/l	1	10	WFD	0	0	0	0	-	-	0										
1,1-Dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Trans-1,2-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
Benzene	µg/l	1	10	WFD	0	0	0	0	-	-	0										
Tetrachloromethane	µg/l	1	-		0	0	0	0	-	-	-										
1,2-dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Trichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
Dibromomethane	µg/l	1	-		0	0	0	0	-	-	-										
Bromodichloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Cis-1,3-dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Trans-1,3-dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Toluene	µg/l	1	50	EQS FW	0	0	0	0	-	-	0										
1,1,2-Trichloroethane	µg/l	1	-		0	0	0	0	-	-	-										
1,3-Dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Dibromochloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Tetrachloroethene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-Dibromoethane	µg/l	1	-		0	0	0	0	-	-	-										
Chlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,1,2-Tetrachloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Ethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
p & m-xylene	µg/l	1	30	WFD	0	0	0	0	-	-	0										
Styrene	µg/l	1	-		0	0	0	0	-	-	-										
Tribromomethane	µg/l	1	-		0	0	0	0	-	-	-										
o-xylene	µg/l	1	30	WFD	0	0	0	0	-	-	0										
1,1,2,2-Tetrachloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Isopropylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Bromobenzene	µg/l	1	-		0	0	0	0	-	-	-										
N-Propylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
2-Chlorotoluene	µg/l	1	-		0	0	0	0	-	-	-										
4-Chlorotoluene	µg/l	1	-		0	0	0	0	-	-	-										
1,3,5-Trimethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Tert-Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,2,4-Trimethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Sec-Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,3-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
P-Isopropyltoluene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,4-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-Dibromo-3-chloropropane	µg/l	1	-		0	0	0	0	-	-	-										
1,2,4-Trichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										

Data Summary Statistics

Site:	NLWA Edmonton	**Project No:**	35180
Data Description:	Borehole Samples	**SOM (%):**	
Land Use:		**Completed By:**	JG
Receptor:	Groundwater	**Checked By:**	BF

Assessment Criteria Key

a)	DWS	e)	i)	m)	q)	u)
b)		f)	j)	n)	r)	v)
c)		g)	k)	o)	s)	w) Site Specific Assessment Criteria
d)		h)	l)	p)	t)	x) Laboratory limit of detection

Contaminant	Units	Method Detection Limit	Assess-ment Criteria (AC)	Source (see key)	Summary Statistics							Sample Identifiers and Analytical Data									
					Total Number of Samples	Results Above Detection Limit	Minimum	Maximum	Arithmetic Mean	Standard Deviation	Number of results >AC	BH101	BH104	BH110	BH113	BH117	BH122	WS107	WS115	WS128	WS130
												2.20-2.40	0.20-0.40	0.50-0.70	0.20-0.40	2.20-2.40	0.10-0.30	0.80-1.00	1.40-1.50	GL-0.20	0.20-0.40
												15/3/11	10/3/11	22/3/11	8/3/11	10/3/11	23/3/11	14/3/11	14/3/11	16/3/11	18/3/11
General Inorganics					0	0	0	0	-	-	0										
pH	pH Units	N/A	-		10	10	5.9	7.8	6.8	0.5868939	-	6.4	7.1	6.1	6.7	7	6.8	6.7	7.5	7.8	5.9
Electrical Conductivity	µS/cm	10	-		0	0	0	0	-	-	-										
Sulphate as SO4	ug/l	45	250000	DWS	10	10	8.7	910	325.27	351.913178	0	290	17	530	57	760	8.7	17	630	910	33
Sulphide	µg/l	5	-		10	0	5	5	-	-	-	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	4	250	DWS	0	0	0	0	-	-	0										
Ammonium as NH4	µg/l	15	500	DWS	10	10	91.2857143	92571.4286	10761.6857	28928.6871	6	733	91	347	117	92571	669	553	10800	1543	193
Nitrate as N	mg/l	1	-		0	0	0	0	-	-	-										
Nitrate as NO3	mg/l	5	50	DWS	0	0	0	0	-	-	0										
Chemical Oxygen Demand (Total)	mg/l	3	-		0	0	0	0	-	-	-										
Hardness - Total	mgCaCO3/l	1	-		0	0	0	0	-	-	-										
Heavy Metals / Metalloids					0	0	0	0	-	-	0										
Aluminium (dissolved)	mg/l	0.012	0.2	DWS	10	9	0.1	6.3	1.52	2.22001001	7	0.5	1.6	< 0.1	0.2	0.1	0.8	0.4	0.3	4.9	6.3
Arsenic (dissolved)	µg/l	1	10	DWS	10	2	10	46	14.7	11.5282262	2	46	< 10	< 10	< 10	21	< 10	< 10	< 10	< 10	< 10
Barium (dissolved)	µg/l	0.05	-		10	10	38	200	110.9	54.2103926	-	130	58	170	75	120	48	38	200	140	130
Boron (dissolved)	µg/l	10	1000	DWS	10	10	40	4700	921.7	1414.34555	3	1100	160	790	87	4700	110	40	1500	440	290
Cadmium (dissolved)	µg/l	0.1	5	DWS	10	4	0.5	3.5	0.91	0.93148627	0	0.8	< 0.5	0.7	< 0.5	3.5	< 0.5	< 0.5	1.1	< 0.5	< 0.5
Chromium (dissolved)	µg/l	0.4	50	DWS	10	6	1	18	4.25	5.28609287	0	2.6	5.3	< 1.0	7.5	2.6	< 1.0	< 1.0	< 1.0	2.5	18
Copper (dissolved)	µg/l	0.7	2000	DWS	10	10	5.9	210	75.49	66.9464205	0	82	81	20	26	170	48	5.9	30	82	210
Iron (dissolved)	mg/l	0.004	0.2	DWS	10	6	0.2	5.6	0.96	1.67544356	5	0.4	1.4	< 0.2	< 0.2	< 0.2	0.8	0.4	0.2	< 0.2	5.6
Lead (dissolved)	µg/l	1	10	DWS	10	5	5	120	20.64	35.5441259	4	11	17	< 5.0	< 5.0	< 5.0	8.4	< 5.0	< 5.0	25	120
Mercury (dissolved)	µg/l	0.5	1	DWS	10	0	1.5	1.5	-	-	10	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Nickel (dissolved)	µg/l	0.3	20	DWS	10	10	1.1	110	21.63	32.7141848	3	30	7.7	15	1.1	110	5.7	1.5	27	2.3	16
Selenium (dissolved)	µg/l	4	10	DWS	10	0	10	10	-	-	0	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Zinc (dissolved)	µg/l	0.4	-		10	10	1.8	210	70.58	60.3009821	-	77	51	77	12	210	25	1.8	120	59	73
Calcium (dissolved)	mg/l	0.012	-		0	0	0	0	-	-	-										
Magnesium (dissolved)	mg/l	0.005	-		0	0	0	0	-	-	-										
Total Phenols					0	0	0	0	-	-	0										
Total Phenols (monohydric)	µg/l	10	0.5	DWS	0	0	0	0	-	-	0										
VOCs					0	0	0	0	-	-	0										
Chloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Chloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Bromomethane	µg/l	1	-		0	0	0	0	-	-	-										
Vinyl Chloride	µg/l	1	0.5	DWS	0	0	0	0	-	-	0										
Trichlorofluoromethane	µg/l	1	-		0	0	0	0	-	-	-										
1,1-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/l	1	-		0	0	0	0	-	-	-										
Cis-1,2-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	-		0	0	0	0	-	-	-										
1,1-dichloroethane	µg/l	1	-		0	0	0	0	-	-	-										
2,2-Dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Trichloromethane	µg/l	1	-		0	0	0	0	-	-	-										
1,1,1-Trichloroethane	µg/l	1	-		0	0	0	0	-	-	-										
1,2-dichloroethane	µg/l	1	3	DWS	0	0	0	0	-	-	0										
1,1-Dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Trans-1,2-dichloroethene	µg/l	1	-		0	0	0	0	-	-	-										
Benzene	µg/l	1	-		0	0	0	0	-	-	-										
Tetrachloromethane	µg/l	1	3	DWS	0	0	0	0	-	-	0										
1,2-dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Trichloroethene	µg/l	1	10	DWS	0	0	0	0	-	-	0										
Dibromomethane	µg/l	1	-		0	0	0	0	-	-	-										
Bromodichloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Cis-1,3-dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Trans-1,3-dichloropropene	µg/l	1	-		0	0	0	0	-	-	-										
Toluene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,2-Trichloroethane	µg/l	1	-		0	0	0	0	-	-	-										
1,3-Dichloropropane	µg/l	1	-		0	0	0	0	-	-	-										
Dibromochloromethane	µg/l	1	-		0	0	0	0	-	-	-										
Tetrachloroethene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-Dibromoethane	µg/l	1	-		0	0	0	0	-	-	-										
Chlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,1,2-Tetrachloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Ethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
p & m-xylene	µg/l	1	-		0	0	0	0	-	-	-										
Styrene	µg/l	1	-		0	0	0	0	-	-	-										
Tribromomethane	µg/l	1	-		0	0	0	0	-	-	-										
o-xylene	µg/l	1	-		0	0	0	0	-	-	-										
1,1,2,2-Tetrachloroethane	µg/l	1	-		0	0	0	0	-	-	-										
Isopropylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Bromobenzene	µg/l	1	-		0	0	0	0	-	-	-										
N-Propylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
2-Chlorotoluene	µg/l	1	-		0	0	0	0	-	-	-										
4-Chlorotoluene	µg/l	1	-		0	0	0	0	-	-	-										
1,3,5-Trimethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Tert-Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,2,4-Trimethylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
Sec-Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,3-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
P-Isopropyltoluene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,4-dichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										
Butylbenzene	µg/l	1	-		0	0	0	0	-	-	-										
1,2-Dibromo-3-chloropropane	µg/l	1	-		0	0	0	0	-	-	-										
1,2,4-Trichlorobenzene	µg/l	1	-		0	0	0	0	-	-	-										

Groundwater Observations

Project Number: 29541

Site: NLWA Edmonton - EP monitoring

Date: 26/04/2012

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.60	6.89	4.29	26	5.56	998	4.14	14.7	Clear slightly brown purge
BH102	3.50	5.87	2.37	14	-	-	-	-	Clear slightly brown purge
BH103									No Access - Covered by Roll on/off skip
BH104									No Access - New sorting facility conveyor in place
BH105									No Access - New Wood storage area (for chipping)
BH106	4.45	8.07	3.62	22	3.49	1085	9.69	11.9	Clear slightly brown purge
BH107	2.20	5.60	3.40	20	4.20	1205	5.39	12.2	Clear slightly brown purge
BH108									Not Installed
BH109	2.00	4.60	2.60	16					Grey slightly silty purge
BH110	3.00	6.65	3.65	22	7.53	1508	4.25	13.9	Clear slightly brown purge
BH111									Not drilled
BH112									Not drilled
BH113	2.27	6.30	4.03	24	5.70	1584	4.59	15.7	Clear slightly brown purge, slight sewage odour
BH114	1.80	6.85	5.05	30	6.35	1682	4.16	12.0	Clear slightly brown purge
BH115	2.70	7.07	4.37	26	6.25	1532	4.92	11.6	Clear slightly brown purge
BH116	2.77	5.80	3.03	18	6.95	1170	4.98	11.9	Clear slightly grey purge
BH117	2.69	9.95	7.26	44	7.21	1356	4.35	12.0	Clear slightly brown purge
BH118	3.68	5.75	2.07	12.4	6.97	1571	3.55	11.7	Clear purge
BH119	3.73	5.97	2.24	13	6.95	1907	3.69	12.5	Clear purge
BH120	3.83	7.14	3.31	20	6.26	1516	3.61	12.8	Clear purge
BH121	4.05	6.25	2.20	13	7.24	971	4.00	11.9	Clear slightly brown purge. Cover needs reconcreting
BH122	5.46	8.85	3.39	20	6.60	1171	3.80	12.7	Clear slightly grey purge
BH123	2.85	6.95	4.10	25	6.51	1377	3.42	12.8	Clear slightly grey purge. Duplicate sample taken
BH124	3.90	7.05	3.15	19	6.57	1120	3.97	11.6	Clear slightly brown purge. New watterra valve fitted
BH201	7.20	22.10	14.90	89	5.54	672	5.04	14.0	Grey, silty purge. Dry @30litres
BH202	2.65	19.85	17.20	103	6.65	1866	8.85	13.7	Grey, silty purge. Dry @30litres
BH203	6.97	23.07	16.10	97	7.03	585	3.56	11.5	Grey, silty purge. Dry @30litres
BH204	8.70	12.90	4.20	25	7.99	1070	3.51	12.7	Grey, silty purge

Groundwater Observations

Project Number: 29541

Site: NLWA Edmonton - EP monitoring

Date: 12/07/2012

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.60	6.86	4.26		5.75	1098		17.6	Clear sample
BH102	3.49	7.82	4.33		5.96	977		16.4	Cover damaged, 1 bolt missing
BH103									No Access - Covered by Roll on/off skip
BH104									No Access - New sorting facility conveyor in place
BH105									No Access - New Wood storage area (for chipping)
BH106	4.47	8.03	3.56		4.44	1132		12.9	Clear, silty brown purge
BH107	2.24	5.54	3.30		5.36	1257		14.1	Cover damaged, 2 bolts missing - replacement required
BH108									Not Installed
BH109	1.58	4.52	2.94		6.22	1882		15.8	Clear silty brown purge
BH110	2.74	6.60	3.89		6.66	1339		16.5	Clear purge
BH111									Not drilled
BH112									Not drilled
BH113	2.24	6.24	4.00		5.92	1484		17.1	Brown silty cloudy purge
BH114	1.79	6.80	5.01		6.19	1494		13.9	Clear silty brown purge
BH115	2.56	7.05	4.49		6.64	1489		14.3	Clear silty brown purge
BH116	2.67	5.80	3.13		6.57	1096		13.3	Clear silty brown purge
BH117	2.66	5.93	3.27		6.70	1302		15.3	Clear silty brown purge
BH118									Could not locate due to grass
BH119	3.35	5.95	2.60		6.33	1733		14.6	Clear purge
BH120	3.45	7.12	3.67		6.19	1502		14.8	Clear purge
BH121	3.60	6.25	2.65		7.06	895		13.7	Clear silty brown purge
BH122	4.95	8.83	3.88		6.43	1068		13.7	Clear purge
BH123	3.38	7.03	3.65		6.09	1420		13.1	Clear
BH124	3.43	7.03	3.60		6.18	903		12.9	Clear
BH201									
BH202									
BH203									
BH204									

Groundwater Observations

Project Number: 29541

Site: NLWA Edmonton - EP monitoring

Date: 30/10/2012

Monitoring Point	DTW	DTB	Water Column	Purge Vol	pH	EC	DO	Temp.	Notes
	(mbgl)	(mbgl)	(m)	(l)		(µS)	(mg/l)	(°C)	
BH101	2.88	6.88	4.00	241			4.76	14.0	Clear sample - good condition
BH102	3.74	6.78	3.00	181			3.28	14.8	Clear sample - 1 bolt missing
BH103									No Access - Covered by Roll on/off skip
BH104									No Access - New sorting facility conveyor in place
BH105									No Access - New Wood storage area (for chipping)
BH106	4.79	8.03	3.20	191			6.72	12.1	Clear sample - good condition
BH107	2.57	5.78	3.20	191			6.25	13.6	
BH108									Not Installed
BH109	2.07	4.50	2.40	151			2.66	12.4	Grey cloudy sample - good condition
BH110	2.92	6.55	3.60	241			4.41	15.7	Clear Sample - good condition
BH111									Not drilled
BH112									Not drilled
BH113	2.50	6.30	3.80	228			2.61	14.4	Cloudy sample - good condition
BH114	2.05	6.78	4.70	30			3.18	13.0	Clear sample - good condition - duplicate taken
BH115	2.90	5.90	3.00	181			5.77	12.3	Clear sample - good condition
BH116	2.92	5.78	2.80	151			6.07	12.3	Grey silty sample - good condition
BH117	2.79	7.05	4.20	252			4.91	12.2	Grey cloudy purge - good condition
BH118	3.52	5.68	2.10	12.6			5.29	11.8	Clear sample - good condition
BH119	3.58	5.95	2.40	151			4.46	13.7	Grey sample - good condition
BH120	3.70	7.10	3.40	211			3.38	12.9	Clear sample - good condition
BH121	3.95	6.20	2.20	13			2.70	12.6	Clear sample - decapitated
BH122	5.34	8.82	3.50	241			3.48	12.2	Clear sample - good condition
BH123	3.80	7.02	3.20	201			3.02	12.9	Clear sample - good condition
BH124	3.72	7.02	3.20	201			1.84	12.9	Clear sample - good condition
BH201									
BH202									
BH203									
BH204									

Groundwater Observations

Project Number: 29541

Site: NLWA Edmonton - EP monitoring

Date: 23/01/2013

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.78	6.95	4.17	25	9.52	1046	5.31	13.7	
BH102	3.70	7.80	4.10	24	9.58	961	4.02	12.8	
BH103									No access. Under skip.
BH104									No Access
BH105									Under wood pile
BH106	4.59	8.00	3.41	20	8.86	1066	4.53	9.7	
BH107	2.36	5.55	3.19	19	9.08	1235	5.02	10.4	
BH108									Not Installed
BH109	1.99	4.52	2.53	15	9.16	1184	4.51	10.1	
BH110	2.90	6.60	3.70	22	9.50	1492	4.22	13.3	
BH111									Not drilled
BH112									Not drilled
BH113	2.43	6.23	3.80	22	9.83	1483	5.11	13.2	
BH114	1.97	6.80	4.83	28					
BH115	2.65	7.02	4.37	26	9.03	1324	4.33	10.1	
BH116	2.85	5.76	2.91	17	9.20	1256	4.12	9.7	
BH117	2.82	5.98	3.16	19	9.14	1175	4.72	10.8	
BH118	3.33	5.70	2.37	14	8.82	1366	4.66	10.5	
BH119	3.53	5.95	2.42	14					Couldn't sample - under car
BH120	3.65	7.10	3.45	20	8.54	1508	4.64	12.1	
BH121	3.76	6.20	2.44	14	9.97	986	5.95	11.4	
BH122	5.19	8.60	3.41	20	9.07	1075	5.12	11.5	
BH123	-	-	-	-	-	-	-	-	Unable to locate in snow.
BH124	3.67	7.08	3.41	20	9.17	1021	4.58	10.1	Slight sulphur odour
BH201	5.95	22.00	16.05	95	10.05	599	7.52	10.4	
BH202	2.60	20.00	17.40	102	10.85	1757	7.89	7.2	
BH203	6.89	17.11	-	-	-	-	-	-	Unable to sample.
BH204	8.45	11.00	2.55	15	10.14	983	6.81	10.9	

Groundwater Observations

Project Number: 29541
Site: NLWA Edmonton - EP monitoring
Date: 03/04/2013

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.82	6.88	4.06	24	8.72	1672	5.47	12.3	
BH102	3.70	7.77	4.07	24	8.48	1017	4.40	13.8	
BH103	2.38	6.83	4.45	26	7.00	1802	4.73	18.8	
BH104									No Access
BH105									No Access
BH106	4.63	7.98	3.35	20	7.66	1017	5.37	12.1	Sulphur Odour
BH107	2.39	5.54	3.15	19	7.51	1338	4.04	11.2	
BH108									Not Installed
BH109	2.05	4.54	2.49	15	7.61	556	6.13	10.2	
BH110	2.93	6.59	3.66	22	8.28	1197	4.79	12.4	
BH111									Not drilled
BH112									Not drilled
BH113	2.42	6.22	3.80	22	7.16	1320	4.56	15.3	
BH114	1.97	6.98	5.01	30	7.85	1452	4.28	10.8	
BH115	2.48	7.13	4.65	27	7.41	834	6.13	11.0	
BH116	2.79	5.77	2.98	18	7.76	976	5.90	11.1	
BH117	2.82	5.94	3.12	18	7.68	864	5.82	10.8	
BH118	3.37	5.67	2.30	14	8.00	1003	5.60	11.4	
BH119	3.52	6.02	2.50	15	8.49	1870	5.78	10.1	
BH120	3.66	7.09	3.43	20	7.99	1189	5.09	12.7	
BH121	3.80	6.27	2.47	15	8.04	880	5.48	11.1	
BH122	5.24	8.70	3.46	20	8.04	929	5.75	11.6	
BH123									Couldn't find, burried under concrete spill
BH124	3.70	7.05	3.35	20	8.27	938	6.27	10.1	
BH201	5.92	22.10	16.18	95	7.53	583	5.23	12.0	Ran Dry
BH202	2.57	20.00	17.43	103	7.36	1454	9.26	9.9	Ran Dry
BH203	6.95	23.85	16.90	100					Ran Dry - Waterra Lost
BH204	8.49	12.72	4.23	25	6.93	926	8.48	9.3	Ran Dry

Groundwater Observations

Project Number: 29541 **Site:** NLWA Edmonton - EP monitoring **Date:** 29-30/07/13

Monitoring Point	**DTW**	**DTB**	**Water Column**	**Purge Vol**	**pH**	**EC**	**DO**	**Temp.**	**Notes**
	(mbgl)	**(mbgl)**	**(m)**	**(l)**		**(µS)**	**(mg/l)**	**(°C)**	
BH101	-	-	-	-	-	-	-	-	Unable to remove borehole cover
BH102	3.42	7.80	4.38	26	7.12	1012	7.81	14.2	Brown/cloudy water.
BH103	-	-	-	-	-	-	-	-	Beneath skip. No access.
BH104									No Access
BH105									No Access
BH106	-	-	-	-	-	-	-	-	Beneath car. No access.
BH107	2.52	5.56	3.04	18	7.43	1219	7.67	14.4	Brown/cloudy water.
BH108									Not Installed
BH109	1.95	4.52	2.57	15	7.12	1249	7.85	14.7	Brown/cloudy water.
BH110	2.74	6.60	3.86	23	7.66	1258	5.94	17.5	Clear water
BH111									Not drilled
BH112									Not drilled
BH113	2.26	6.26	4.00	24	7.78	1281	5.98	15.1	Brown/cloudy water.
BH114	1.85	6.82	4.97	29	7.75	1024	10.14	14.8	Brown/cloudy water. Duplicate sample.
BH115	2.71	7.07	4.36	26	7.63	1101	8.13	14.9	Brown/cloudy water.
BH116	-	-	-	-	-	-	-	-	Unable to locate in vegetation.
BH117	2.73	5.93	3.20	19	6.39	877	9.24	14.1	Brown/cloudy water.
BH118	3.41	5.68	2.27	13	7.82	1156	7.84	13.9	Clear water.
BH119	3.49	5.98	2.49	15	7.69	1103	7.51	14.2	Brown/cloudy water.
BH120	3.61	7.11	3.50	21	7.54	1366	7.46	14.6	Black/silty water.
BH121	3.83	6.26	2.43	14	7.73	780	7.69	13.5	Brown/cloudy water.
BH122	5.27	8.72	3.45	20	7.59	1080	8.59	15.3	Clear water.
BH123									Couldn't find, burried under concrete spill
BH124	3.72	7.04	3.32	20	7.72	816	7.84	13.3	Brown/cloudy water.
BH201	5.88	22.00	16.12	95	8.21	891	9.67	15.1	Clear water.
BH202	2.57	20.00	17.43	103	8.33	834	10.01	14.4	Perged dry after 30l. Clear water
BH203	6.23	23.50	-	-	-	-	-	-	Unable to sample
BH204	8.50	12.50	4.00	24	7.41	875	9.55	15.0	Dark grey/sandy.

Monitoring Point	Round 4 - 01/04/2013			Round 5 - 01/07/2013			Round 6 - 01/10/2013			Round 7 - 01/01/2014		
	DTW (mbgl)	DTB (mbgl)	Notes	DTW (mbgl)	DTB (mbgl)	Notes	DTW (mbgl)	DTB (mbgl)	Notes	DTW (mbgl)	DTB (mbgl)	Notes
BH101	2.82	6.88	Brown/cloudy water.	-	-	Unable to remove borehole cover	2.82	6.87	Slightly brown, turbid.	2.34	6.86	Clear
BH102	3.70	7.77	Brown/cloudy water.	3.42	7.80	Brown/cloudy water.	3.65	7.78	Clear with sl. brown tint.	-	-	Borehole destroyed, covered by concrete
BH103	2.38	6.83	Brown/cloudy water.	-	-	Beneath skip. No access.	-	-	Borehole located but found to be blocked.	-	-	Beneath skip. No access.
BH104			No Access			No Access			No Access			No Access
BH105			No Access			No Access			No Access			No Access
BH106	4.63	7.98	Sulphur Odour	-	-	Beneath car. No access.	4.78	8.03	Slightly brown, turbid.	4.15	8.02	Pale Yellow- grey Colour, Clear, Sulphur smell
BH107	2.39	5.54	Brown/cloudy water.	2.52	5.56	Brown/cloudy water.	2.54	5.54	Slightly brown, turbid.	1.92	5.56	Pale Yellow- grey Colour, Clear, Sulphur smell- damaged headworks
BH108			Not Installed			Not Installed			Not Installed			Not Installed
BH109	2.05	4.54	Brown/cloudy water.	1.95	4.52	Brown/cloudy water.	1.98	4.54	Brown, turbid.	1.56	4.57	Clear, Sulphur smell
BH110	2.93	6.59	Clear.	2.74	6.60	Clear water	2.77	6.56	Yellow tint.	2.48	6.61	
BH111			Not drilled			Not drilled			Not drilled			Not drilled
BH112			Not drilled			Not drilled			Not drilled			Not drilled
BH113	2.42	6.22	Brown/cloudy water.	2.26	6.26	Brown/cloudy water.	2.43	6.23	Sl. hydrocarbon sheen. Grey, turbid with some sediment.	2.01	6.28	grey colour, sulphur smell
BH114	1.97	6.98	Brown/cloudy water.	1.85	6.82	Brown/cloudy water. Duplicate sample.	1.93	6.87	Clear.	1.53	6.69	Pale Yellow Colour, Clear, Sulphur smell
BH115	2.48	7.13	Brown/cloudy water.	2.71	7.07	Brown/cloudy water.	2.69	7.07	Clear.	2.20	7.13	Pale Yellow Colour, Clear, Sulphur smell
BH116	2.79	5.77	Grey cloudy.	-	-	Unable to locate in vegetation.	2.85	5.77	Grey sediment.	2.38	5.85	Pale Yellow Colour, Clear, Sulphur smell
BH117	2.82	5.94	Brown/cloudy water.	2.73	5.93	Brown/cloudy water.	2.79	5.97	Slightly brown, turbid.	2.38	5.93	Pale Yellow Colour, Clear, Sulphur smell
BH118	3.37	5.67	Slightly cloudy.	3.41	5.68	Clear water.	3.32	5.66	Sl. white tint.	2.30	5.74	Pale Yellow Colour, Clear, Sulphur smell
BH119	3.52	6.02	Brown/cloudy water. Sulphur odour.	3.49	5.98	Brown/cloudy water.	3.43	5.96	Green / yellow tint.			No access- covered by trailor
BH120	3.66	7.09	Black/brown cloudy water.	3.61	7.11	Black/silty water.	3.54	7.11	Sl. grey tint.	3.16	7.18	Pale Yellow Colour, Clear, Sulphur smell
BH121	3.80	6.27	Brown/cloudy water.	3.83	6.26	Brown/cloudy water.	3.69	6.20	Slightly brown, turbid.	3.23	6.25	
BH122	5.24	8.70	Sl. brown cloudy water.	5.27	8.72	Clear water.	5.17	8.69	Slightly brown, turbid.	4.71	8.71	Clear, Sulphur smell DUPLICATE 1
BH123			Couldn't find, burried under concrete spill			Couldn't find, burried under concrete spill			Couldn't find, burried under concrete spill			Couldn't find, burried under concrete spill
BH124	3.70	7.05		3.72	7.04	Brown/cloudy water.	3.64	7.04	Sulphur odour. Milky colour, turbid.	3.18	7.06	Clear, Sulphur smell

Key:

DTW	Depth to Water
DTB	Depth to Base
▨	Borehole not monitored

Groundwater Observations

DO meter not operational

Project Number: 29541 **Site:** NLWA Edmonton - EP monitoring **Date:** 30/01/2014

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.34	6.86	4.52	27	10.87	1403		13.2	Clear
BH102	-	-	-	-	-	-	-	-	Borehole destroyed
BH103	-	-	-	-	-	-	-	-	Cant find borehole
BH104									No Access
BH105									No Access
BH106	4.15	8.02	3.87	23	10.12	1212		13.1	Pale Yellow- grey Colour, Clear, Sulphur smell
BH107	1.92	5.56	3.64	22	10.16	1054		12.5	Pale Yellow- grey Colour, Clear, Sulphur smell- damaged headworks
BH108									Not Installed
BH109	1.56	4.57	3.01	18	9.41	1769		12.2	Clear, Sulphur smell
BH110	2.48	6.61	4.13	25	10.51	1467		13.8	
BH111									Not drilled
BH112									Not drilled
BH113	2.01	6.28	4.27	26	10.29	1267		15.2	grey colour, sulphur smell
BH114	1.53	6.69	5.16	31	9.33	1464		11.5	Pale Yellow Colour, Clear, Sulphur smell
BH115	2.20	7.13	4.93	30	9.22	1217		11.3	Pale Yellow Colour, Clear, Sulphur smell
BH116	2.38	5.85	3.48	21	9.45	1222		11.9	Pale Yellow Colour, Clear, Sulphur smell
BH117	2.38	5.93	3.55	21	9.53	1275		11.6	Pale Yellow Colour, Clear, Sulphur smell
BH118	2.30	5.74	3.44	21	9.07	899		11.2	Pale Yellow Colour, Clear, Sulphur smell
BH119									No access- covered by trailor
BH120	3.16	7.18	4.02	24	6.92	1534		12.3	Pale Yellow Colour, Clear, Sulphur smell
BH121	3.23	6.25	3.02	18	9.16	951		11.7	
BH122	4.71	8.71	4.00	24	8.55	1043		12.4	Clear, Sulphur smell DUPLICATE 1
BH123									Couldn't find, burried under concrete spill
BH124	3.18	7.06	3.88	23	8.88	841		11.6	Clear, Sulphur smell
BH201	6.84	22.62	15.79	95	10.73	491		13.7	DUPLICATE 2. Purged 25l as well dried
BH202	2.77	20.09	17.32	104	10.19	1324		11.3	Grey cloudy, sulphur smell
BH203	5.50								Blocked - no sample
BH204	8.24	12.51	4.27	26	9.13	1062		11.0	

Groundwater Observations

Project Number: 29541

Site: NLWA Edmonton - EP monitoring

Date: 29/05/2014 & 09/06/2014

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	2.63	6.85	4.22	25	7.03	1154	1.66	16.4	
BH103									Can't locate, possibly buried
BH104	3.24	7.24	4.00	50	6.90	1810	2.17	14.9	Not sampled for a while, purged 6x volume
BH106	4.54	7.97	3.43	20	7.06	1510	3.24	13.9	
BH107	2.31	5.54	3.23	30	7.10	941	1.57	13.6	No headworks, has bung. Purged additional volume
BH109	1.91	4.55	2.64	16	7.03	1770	1.90	14.4	
BH110	2.76	6.60	3.84	23	7.01	1660	1.47	16.6	
BH113	2.24	6.24	4.01	24	6.99	1444	1.88	16.5	
BH114	1.80	6.80	5.01	29	6.98	1910	1.84	13.8	
BH115	2.60	7.14	4.54	27	6.76	1480	2.09	13.9	
BH116	2.71	5.82	3.12	18	6.77	1392	1.95	14.2	Sulphur/Decomposing Smell
BH117	2.68	5.97	3.30	19	6.86	1660	1.75	13.4	
BH118	3.35	5.68	2.33	14	6.93	1600	1.98	14.2	
BH119	3.45	5.97	2.52	30	6.89	2890	1.61	14.6	Black water initially, insecure headworks. Purged 6x volume
BH120	3.56	7.12	3.56	21	6.48	1920	1.48	14.2	Sulphur/Decomposing Smell
BH121	3.76	6.30	2.55	15	6.76	1129	1.93	13.8	Sulphur/Decomposing Smell
BH122	5.17	9.73	4.56	27	5.56	1402	3.78	13.0	Sulphur/Decomposing Smell
BH123									Burried under concrete
BH124	3.62	7.04	3.42	20	6.30	863	2.93	12.9	Sulphur/Decomposing Smell. Duplicate 1
BH302	3.48	8.50	5.02	30	6.66	1771.00	1.43		Sampled on 9th of June 2014, installed 3rd June

Groundwater Observations

Project Number:	29541		**Site:**	NLWA Edmonton - EP monitoring		**Date:**	05/11/2014	

Monitoring Point	DTW (mbgl)	DTB (mbgl)	Water Column (m)	Purge Vol (l)	pH	EC (µS)	DO (mg/l)	Temp. (°C)	Notes
BH101	3.97	6.92	2.95	5.89	8.36	881	3.40	18.1	Purged from silty to clear
BH103									Destroyed - mapped in the location of new concrete
BH106	6.14	7.97	1.83	10.77	8.41	1254	4.41	12.90	Grey and silty
BH107	4.02	5.50	1.48	8.71	8.44	748	2.52	14.17	Purged grey to clear
BH109	2.82	4.59	1.77	10.42	8.30	1850	4.43	15.07	Woodlice in headworks
BH110	3.08	6.69	3.61	21.25	8.37	1162	2.42	17.06	Purged silty to clear
BH113	3.47	6.28	2.81	16.54	8.34	947	1.95	16.39	Silty brown, did not clear
BH114	3.09	6.85	3.76	22.14	8.47	893	2.15	15.17	Clear
BH115	3.64	7.11	3.47	20.43	8.41	984	2.57	12.15	Grey and silty
BH116	3.94	5.86	1.92	11.30	8.07	1420	4.40	12.72	
BH117	3.95	5.96	2.01	11.83	8.11	1510	3.93	12.99	Grey and silty
BH118	3.44	5.72	2.28	13.42	7.94	1167	2.66	13.11	Clear
BH119	3.67	6.02	2.36	13.87	8.00	2210	3.14	14.42	
BH120	3.72	7.15	3.44	20.22	7.57	1520	5.34	13.67	
BH121	3.81	6.29	2.49	14.63	7.82	765	2.86	12.85	
BH122	5.26	9.73	4.47	26.32	7.60	1139	3.22	12.38	
BH124	3.71	7.04	3.33	19.61	12.85	670	2.72	12.79	Grey and silty
BH302	4.58	8.47	3.90	22.93	8.39	905	2.91	17.98	

Appendix D: Kempton Park Gravel numerical groundwater model

Technical note:

NLWA Edmonton EcoPark Energy Recovery Facility: Groundwater Flow Impacts in Kempton Park Gravels

1. Introduction

The construction of excavated waste bunkers for the temporary storage of incoming waste prior to incineration is proposed as part of the Energy Recovery Facility (ERF).

The proposed floor level of these structures is at 2.5mAOD, approximately 10m below the existing ground level and as such, the excavations are likely to extend through the shallow site cover of Alluvium and Made Ground and into the underlying Kempton Park Gravels (35180rr010i3) which are designated as a secondary aquifer.

The precise design of the foundations for the bunker structures is not yet finalised, however, because of the saturated nature of the gravels an impermeable structure such as a coffer dam or sheet pile wall is likely to be necessary.

Construction of such a structure is likely to result in local modification of groundwater flow patterns and hydraulic gradients around the bunker structures which in turn may affect flows to surface water bodies such as the Lee Navigation, Enfield Ditch and Salmon's Brook which bound the site to the east and west.

In order to investigate and quantify the potential impacts upon groundwater flow around the bunker structures, a groundwater model has been developed of the Edmonton EcoPark Energy Recovery Facility site and surrounding area.

This technical note summarises the development of the groundwater model and the potential impacts upon groundwater flow patterns in the Kempton Park Gravels.

2. Model Area and discretisation

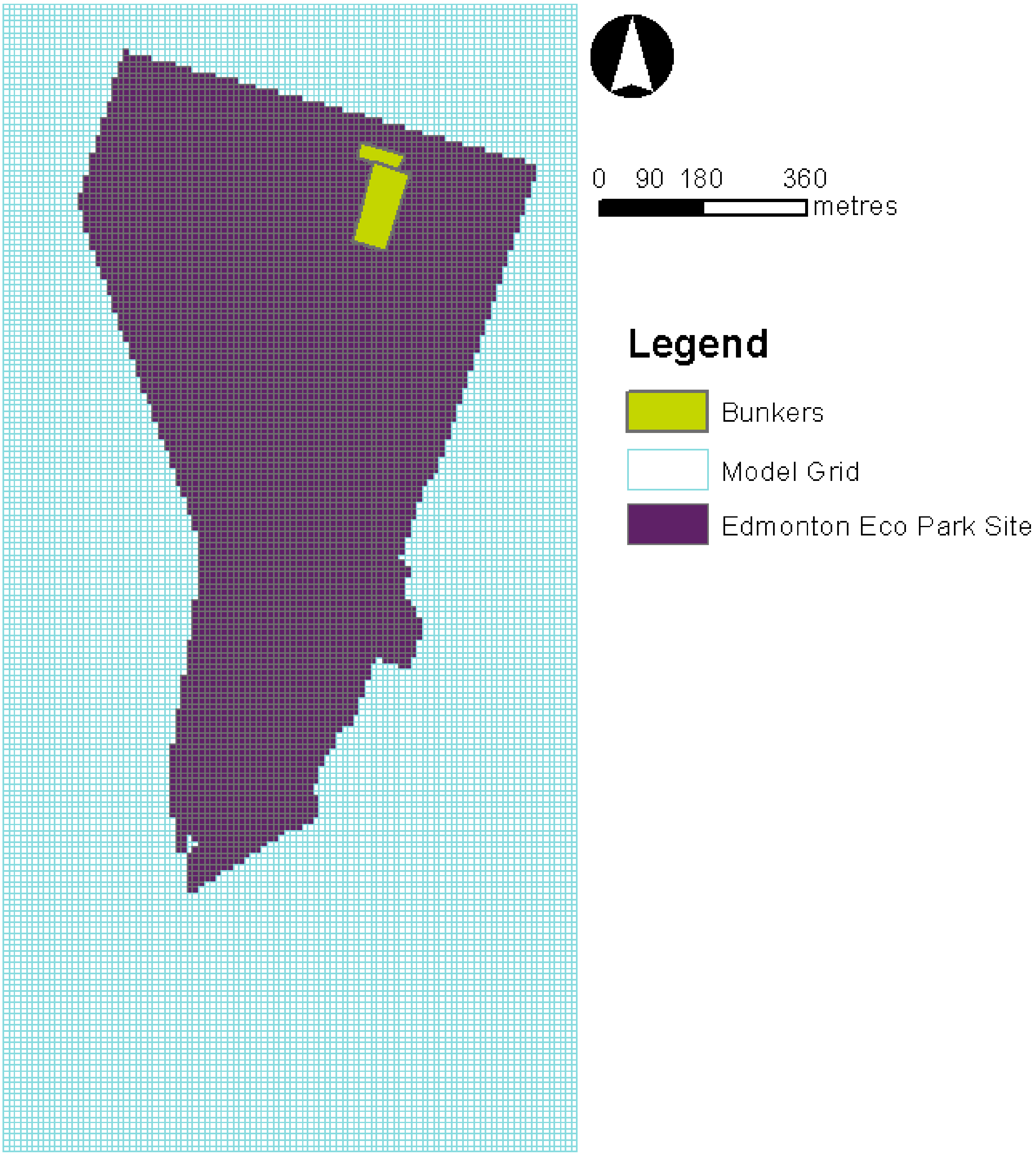
The spatial extent of the model area is indicated in Figure 2.1. The model area comprises a 1000 by 500 m area centred upon the proposed ERF with the lower left corner located at NGR 53500 192000.

The model area was selected so that it covered the entire Edmonton EcoPark site and allowed for a buffer area so as to avoid potential boundary effects that might influence model results in the area of interest around the proposed waste bunkers.

The model has been developed using the USGS software MODFLOW-2005 version 1.9 (Harbaugh, 2005), which is an industry standard family of codes capable of modelling groundwater flow in porous media using a finite difference formulation. Extension packages allow a wide variety of boundary conditions and groundwater behaviours to be simulated.

A 5 m model grid has been assigned such that the model area comprises 200 rows and 100 columns to give a total of 20000 model cells in each model layer.

Figure 2.1 Model Area and NLWA site boundary



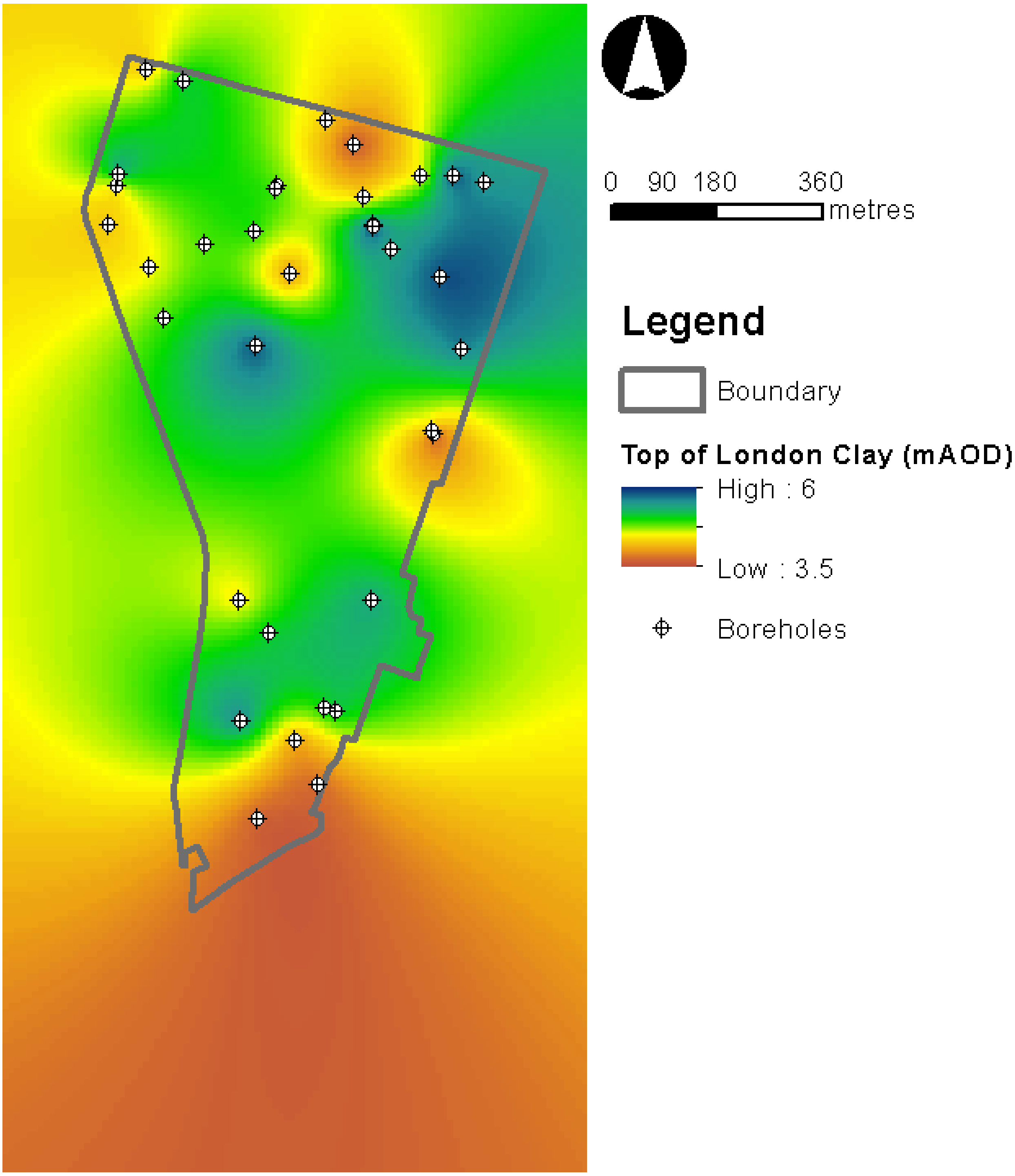
2.1 Vertical Discretisation

The groundwater model comprises two separate layers:

- An upper layer representing the Alluvium and Made Ground as delineated by topography and site investigation data; and
- A lower layer representing the Kempton Park Gravel aquifer, the base of which is delineated by the depth to London Clay as determined by intrusive site investigations

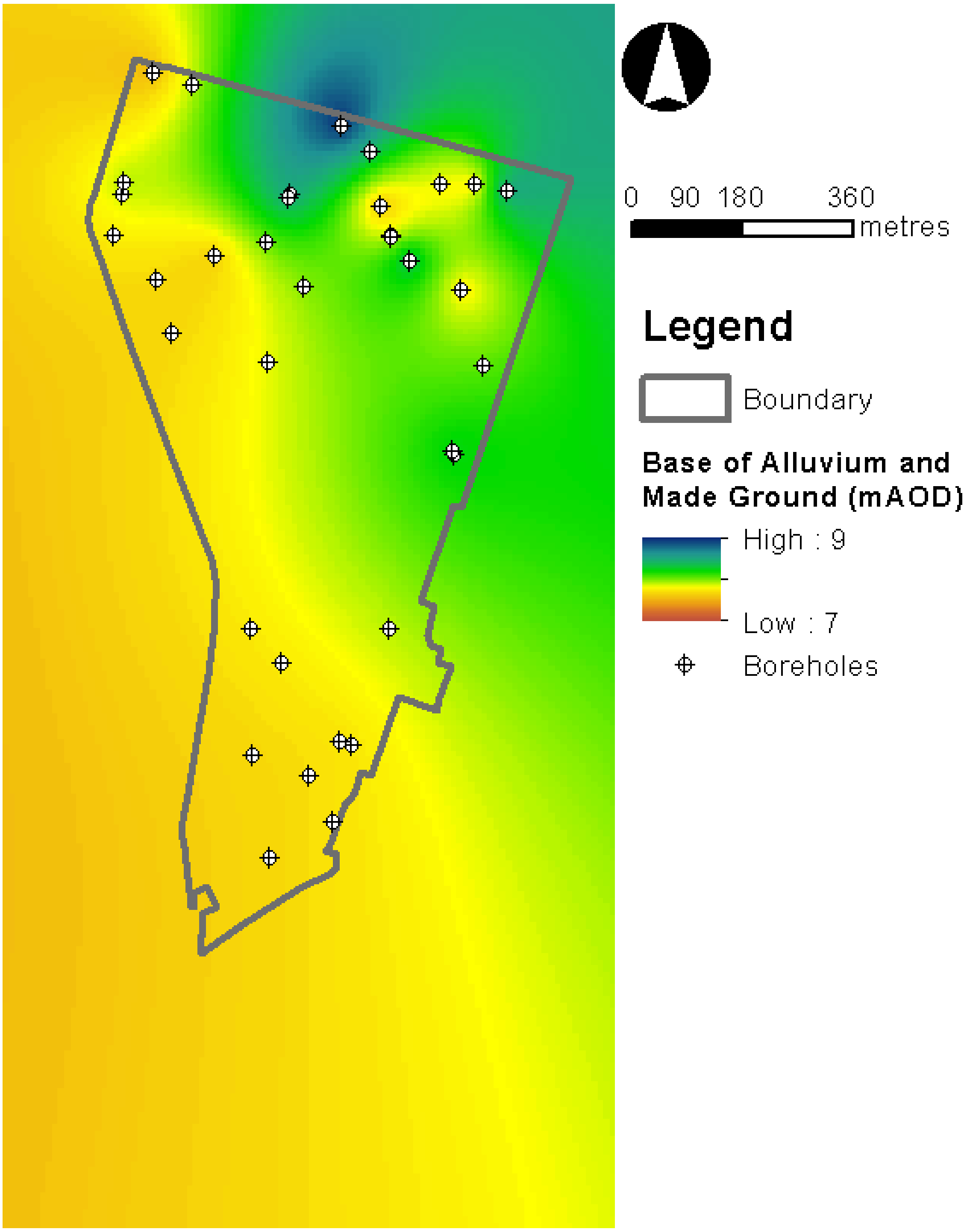
The elevation of the London Clay was determined by interpolation of depth to London Clay from the results of Amec Foster Wheeler site investigations between March 2011 and June 2014, using a simple Kriging technique. The results are given in Figure 2.2. It should be noted that this represents only one possible arrangement of the London Clay surface, which appears to laterally variable at this site.

Figure 2.2 Elevation of the London Clay



Similarly, the top of the Kempton Park Gravels has also been constrained based upon site investigation data collected between March 2011 and June 2014. The interpretation (Figure 2.3) indicates a general fall in elevation of the top of the gravels towards the south western part of the site, though locally higher elevation areas occur in the vicinity of the proposed bunker area.

Figure 2.3 Base of Alluvium and Made Ground (top of Kempton Park Gravels)

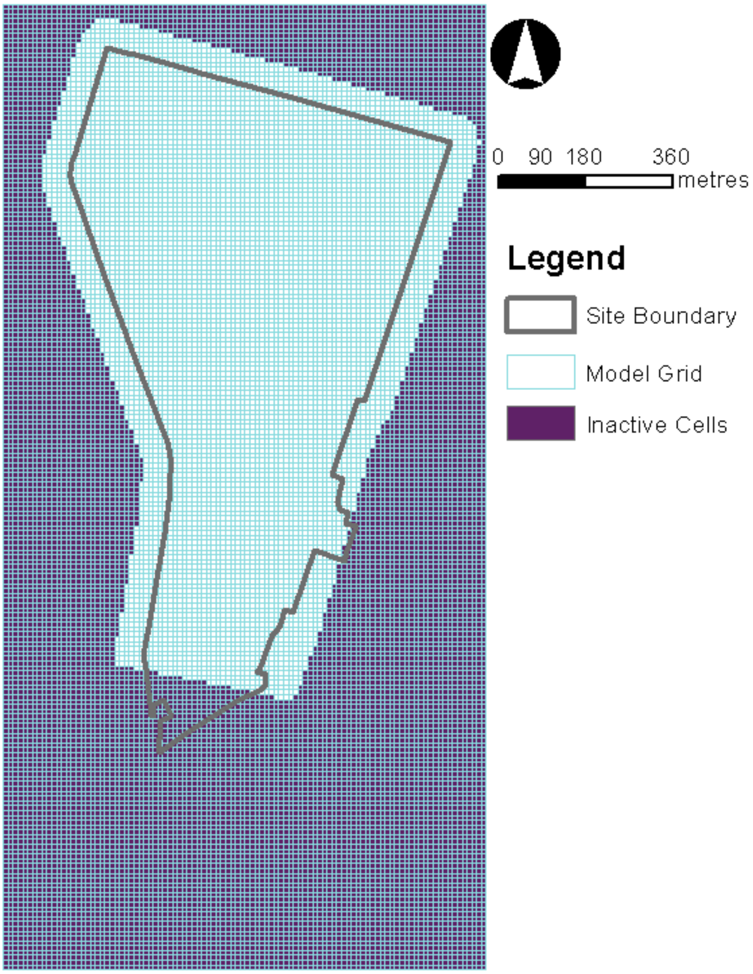


3. Model active Area and Boundaries

Owing to uncertainties in the geological and hydrogeological conditions outside of the site boundary the active area of the model (i.e. the extent of cells in which groundwater levels and flows are calculated) has been limited.

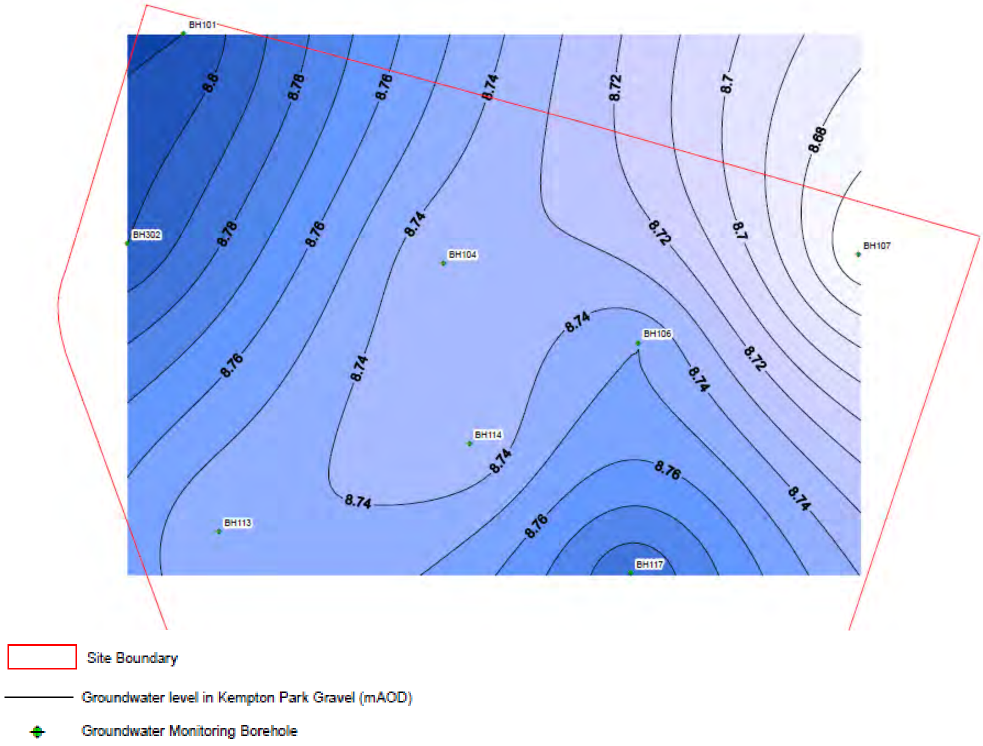
To delineate the active model area a 30 m buffer radius was applied to the site boundary such that the active area broadly mirrored the shape of the site and was then subsequently smoothed and refined by hand to reduce complexity of the active cell geometry so as to avoid any potential boundary effects. The same extent of active model cells has been applied in both layers (Figure 3.1).

Figure 3.1 Active Groundwater Model Area



The active model boundaries were also adjusted to be more consistent with conditions of groundwater flow at the site. Interpretative contouring of groundwater levels within the Kempton Park Gravels for groundwater conditions in 2014 indicates that groundwater flow directions are generally to the south or south-southwest sub-parallel to the long axis of the site. In the north groundwater elevations indicate flow directions from the northwest and northeast are convergent upon the centre of the site.

Figure 3.2 Contoured Groundwater Levels in KPG (May 2014)



3.1 Boundary Conditions

No flow boundary conditions (i.e. conditions assumed to be parallel to groundwater flow lines) were initially assumed along the northern boundary of the active model area in recognition that groundwater levels indicated convergent flows from the north east and north-west.

No flow boundary conditions were also assigned along the western boundary of the active model area since groundwater contouring indicated flow directions approximately parallel to the site boundary.

In the north-west, where groundwater flows were considered to be entering the site area, a constant head boundary condition was assigned. Initially a fixed hydraulic head of 8.85 mAOD was assigned.

Owing to the cover of low permeability alluvium, direct recharge to the Kempton Park Gravels beneath the site has not been simulated. Therefore, the only groundwater inflows and outflows to the model occur via the general head boundaries.

4. Model Hydraulic Properties

A series of aquifer tests in the Kempton Park Gravels were conducted in 8 No. monitoring wells across the site to determine aquifer properties. These comprised a series of short constant rate tests under low flow conditions with typical abstraction rates ranging from 0.1 to 0.16 l/s.

Groundwater elevations were measure prior to and following each test with the level within each borehole being record by a groundwater level logger running at a 1s frequency. Analysis of the test data was attempted using the Cooper-Jacob recovery method to estimate transmissivity and hydraulic conductivity.

Unfortunately, owing to very small drawdowns (<0.1m) and rapid recovery times, it was not possible to obtain robust measurements of the aquifer transmissivity using standard analysis techniques. Only a qualitative interpretation could be made that the rapid recovery and low drawdowns indicate a highly transmissive aquifer, which is consistent with a gravel formation.

Literature data for other aquifer tests in the Kempton Park Gravels indicate hydraulic conductivity in the range 0.3 – 30 m/d with transmissivity values up to 7200 m^2/d (e.g. Bricker and Bloomfield, 2014; Viridor, 2014).

For the purposes of the groundwater model the hydraulic conductivity of each aquifer layer was assumed to be homogenous and isotropic such that it could be represented with a single value for each layer, as follows:

- The Alluvium/Made ground was assigned an initial hydraulic conductivity of 3m/d; and
- The Kempton Park Gravels were assigned an initial hydraulic conductivity of 30m/d.

The model was designed to be run in steady state mode reflecting long term average conditions. As a result specific yield and storativity cancel out of the model groundwater flow equations as there is no net change in the groundwater storage. However, since the model requires these as input parameters a value for specific yield of 20% and specific storage of 1 x 10^{-5} have been assigned and are consistent with a clayey gravel aquifer.

5. Model Time Stepping and initial conditions

There are insufficient time-series data with regard to both groundwater levels and recharge distributions to justify development of a transient groundwater model. Instead the model was run on a steady state basis and thus comprises a single stress period and time step. A uniform initial head of 8.7 mAOD was used, which is broadly consistent with observed groundwater levels across the site.

The model was executed in MODFLOW-2005 v 1.9 and took approximately 5 seconds to run.

6. Model Refinement

The model was iteratively refined by comparing simulated groundwater levels to the observed groundwater levels at the position of 8 No. monitoring wells within the Kempton Park Gravels. Model fit was also evaluated by the sum of square model errors to observation data during each refinement step.

The overall spatial pattern of groundwater flow was also compared with interpreted groundwater conditions to ensure flow directions were realistic and consistent with the site conceptual understanding.

A summary of the Key refinement steps is presented in Table 6.1

Table 6.1 Summary of Model Refinement Steps

Model Run	Refinement Adjustments	Effects of Adjustment	Sum of Square Errors
1	Initial model run	Good model fit (within 0.1m) but some dry cells, suggest rerunning with initial heads at top of model to allow more natural drying (since rewetting is not active)	1.30 x 10^{-2}
2	Set initial heads to top of model	Almost the same fit as above suggesting initial heads have little impact	1.30 x 10^{-2}
3	Increased K from 30m/d in the gravel to 50m/d	Fit degraded though spatial pattern of heads is similar. Boundary conditions may be forcing gradients too much?	1.33 x 10^{-2}
4	Decreased K in gravel to 10m/d	Spatial pattern of heads similar, slightly improved overall residual fit	1.26 x 10^{-2}
5	Keep Layer 2 K at 10m/d, lower layer 1 K from 3m/d to 0.3m/d		1.28 x 10^{-2}

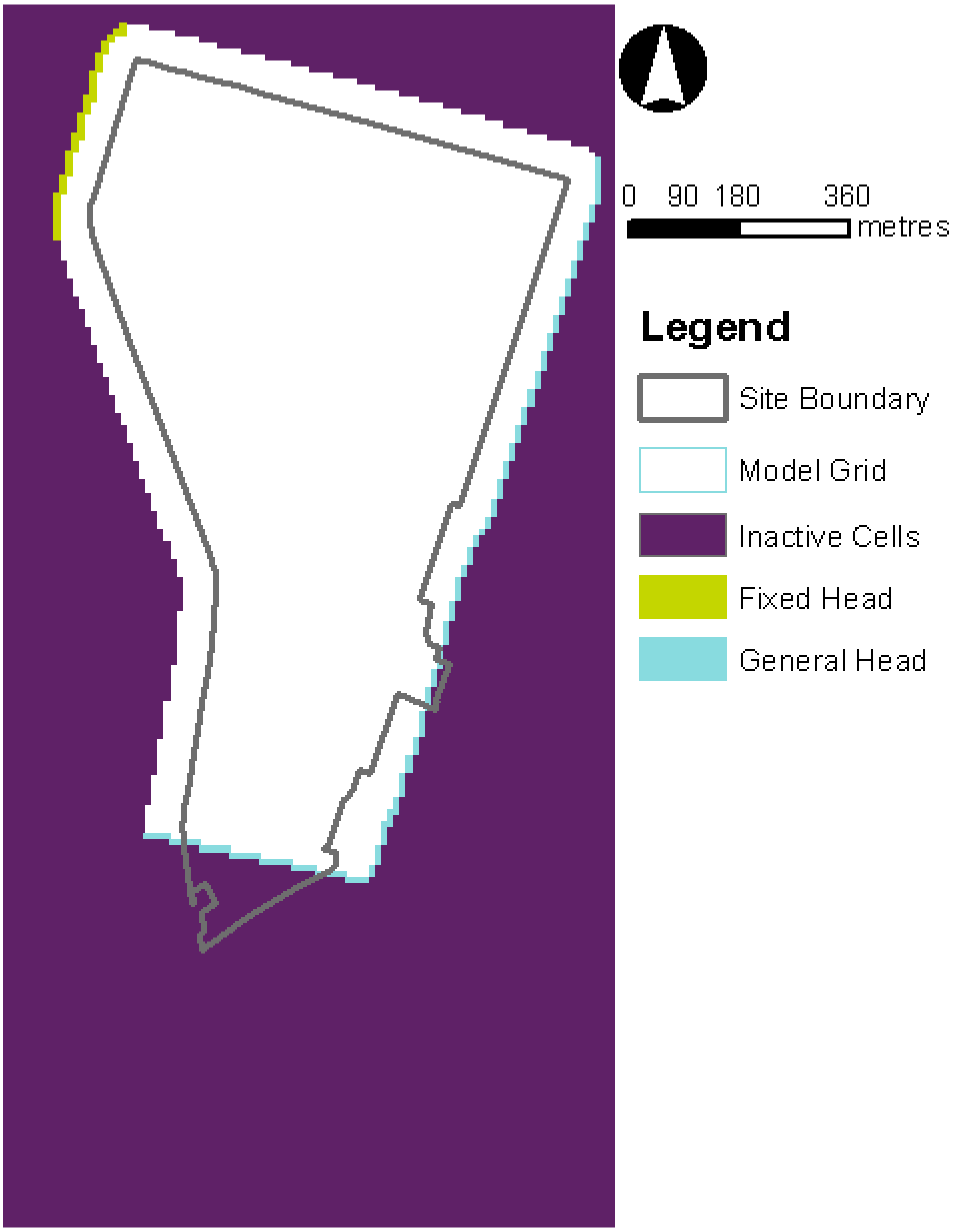
6	Revised GHB so that it reflects the fall in regional gradient to the south from ~8.7mAOD to 7.3mAOD,	General pattern of flows appears more realistic, though error to heads is greater, some further refinement of K (i./e. non uniform) might be required	9.81 x 10^{-1}
7	reduced K in made ground from 0.3 to 0.1m/d	Similar overall fit to the above suggesting that the model is not especially sensitive to the made ground value	9.85 x 10^{-1}
8	Increased GHB head by 0.4m to see if a better match to observed can be achieved (current match is a bit low)	Fit now pretty good, spatial pattern ok (generally similar to above and to mapped)	1.71 x 10^{-1}
9	New IBOUND (bas file) to represent proposed foundations		1.57 x 10^{-1}
10	Set K of Layer 2 (Gravels to 30m/d), all else unchanged	Sensitivity run to check hydraulic conductivity	1.55 x 10^{-1}
11	Set K of Layer 2 (Gravels) to 90m/d, all else unchanged	Sensitivity run to check hydraulic conductivity	1.47 x 10^{-1}
12	As Run 11 except reset BAS file to Run 002 (i.e. no bunkers)	Sensitivity run to check hydraulic conductivity	1.69 x 10^{-1}
13	As Run 10 except reset BAS file to Run 002 (i.e. no bunkers)	Sensitivity run to check hydraulic conductivity	1.72 x 10^{-1}

Following run 6 and in recognition that the general head boundary to the north west of the model may be having too strong of an influence on the groundwater levels, a number of changes were made to the arrangement of the general head boundary conditions. It was also recognised that the site may be hydraulic constrained between the Salmon's Brook in the west and north-west and by the Lee Navigation to the east. The general head boundaries were therefore modified such that new general head boundary condition was added along the eastern boundary of the active model area with assigned heads reflecting the regional flow direction in Kempton Park Gravels from north to south..

General Head boundary conditions are "Cauchy" second order boundary condition in which flux across the boundary is calculated dependent upon difference between the modelled groundwater head within the active area, the assigned boundary head and a conductance term which accounts for the hydraulic properties of the aquifer at the boundary. Such conditions allow flows to occur in either direction across the boundary. The conductance of the general head boundary conditions was calculated using the assigned hydraulic conductivity to each layer and the within cell thickness of the gravel and alluvial layers.

An additional general head boundary was also added at the southern extent of the active model area in order to allow groundwater flows to leave the model in this direction. The no flow boundary parallel to the Salmon's Brook, effectively assumed to be a flow line along the western border of the site was retained.

Figure 6.1 Refined Model Boundary Conditions



Whilst these changes resulted in an overall degradation of model the overall spatial pattern of flows remained consistent with interpreted flow directions.

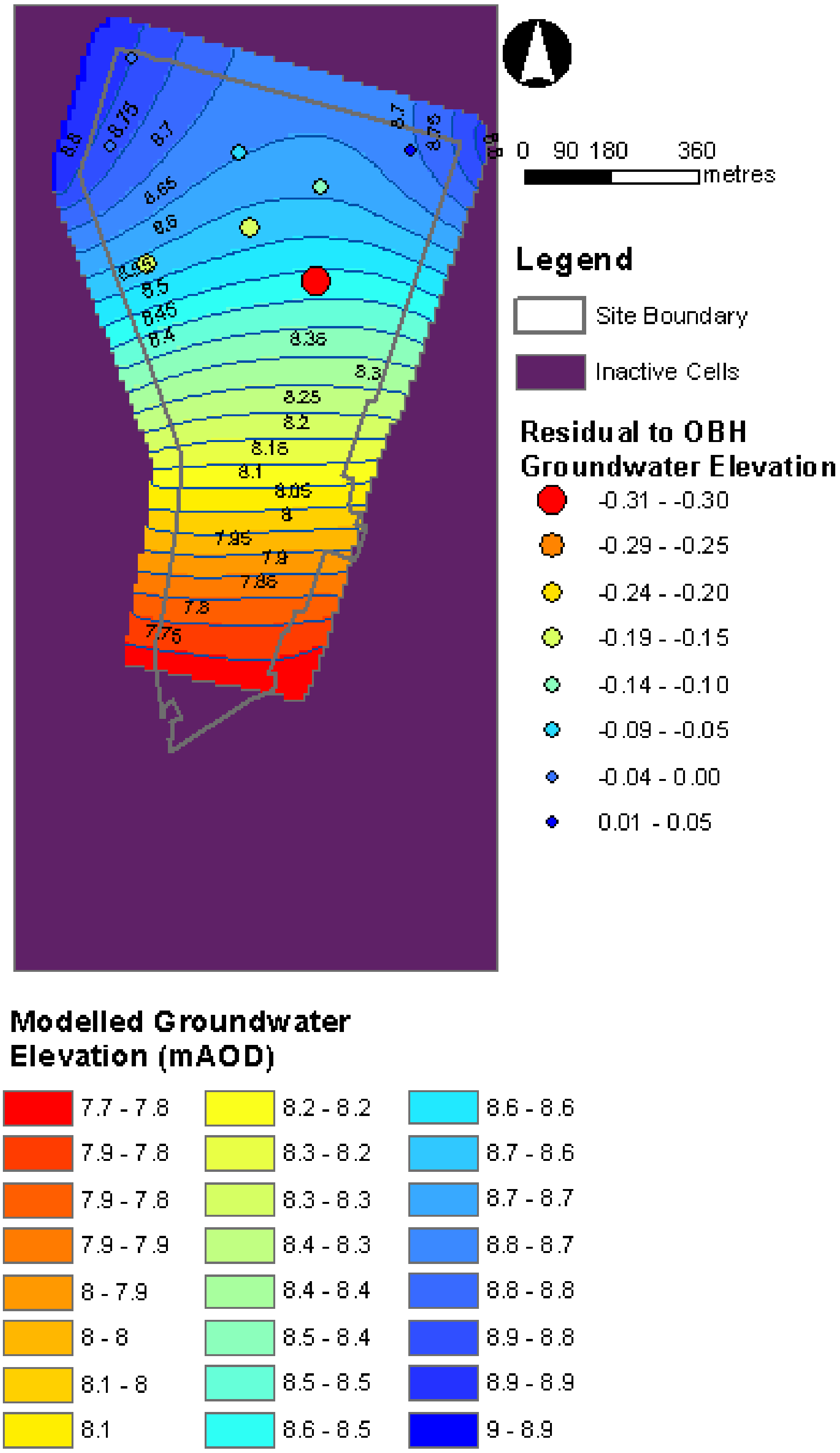
During refinement the model showed the greatest sensitivity to the parametrisation of the general head boundary and limited sensitivity to changes to the gravel or Alluvium hydraulic conductivity. These changes to hydraulic conductivity did not result in large changes to overall model fit. It should be noted that some fits to borehole data improved whilst others degraded.

No attempt was made to locally refine hydraulic conductivity in order to improve model fit to data at individual observation boreholes. Only global changes to layer hydraulic conductivity were made throughout the refinement.

7. Results

Model run 08 (Figure 7.1) was considered to provide a good overall fit to observed groundwater levels and general groundwater flow patterns and was, therefore, used for assessing the impact of the bunker. The final hydraulic conductivity parameters were 0.1 m/d in the Made Ground and Alluvium and 10 m/d in the Kempton Park Gravels, which is within the range of literature parameters identified.

Figure 7.1 Model Run 08 Results



Modelled heads at observation boreholes are generally slightly below observed levels, and square residuals are larger further south suggesting that a slight reduction in hydraulic conductivity would probably improve overall fit and better match hydraulic gradients. However, overall residuals are small (<0.5m) and further improvements are unlikely to be substantial. The overall pattern of groundwater flows also matches reasonably well to interpreted patterns of flow.

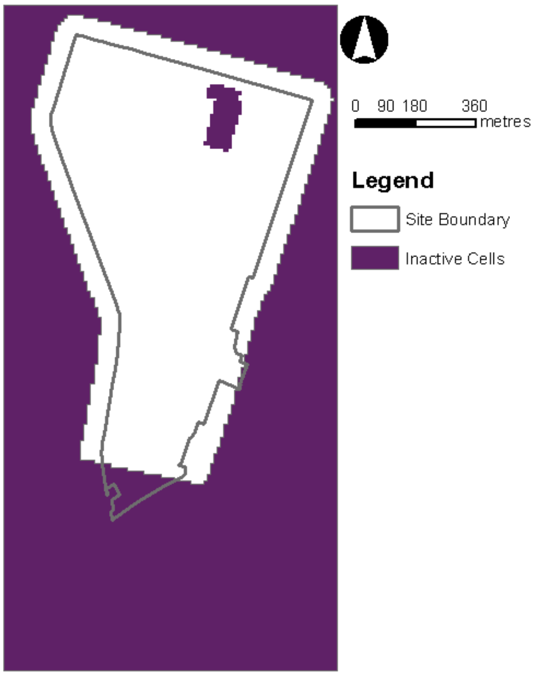
In the absence of local refinement to hydraulic conductivity the achieved fit is considered to be acceptable for comparative assessment of changes to the modelled hydraulic gradient as a result of the construction of the bunker.

7.1 Assessment of changes to hydraulic gradient

To assess the impact of the bunker construction the bunkers were simulated as inactive model cells in both layers such that groundwater will be diverted around the structure. The inactive cells simulates that bunker extends to the base of the KPG. The arrangement of the inactive cells is indicated in Figure 7.2.

Since the model is a steady state scenario no attempt has been made to simulate the construction phase of the bunkers.

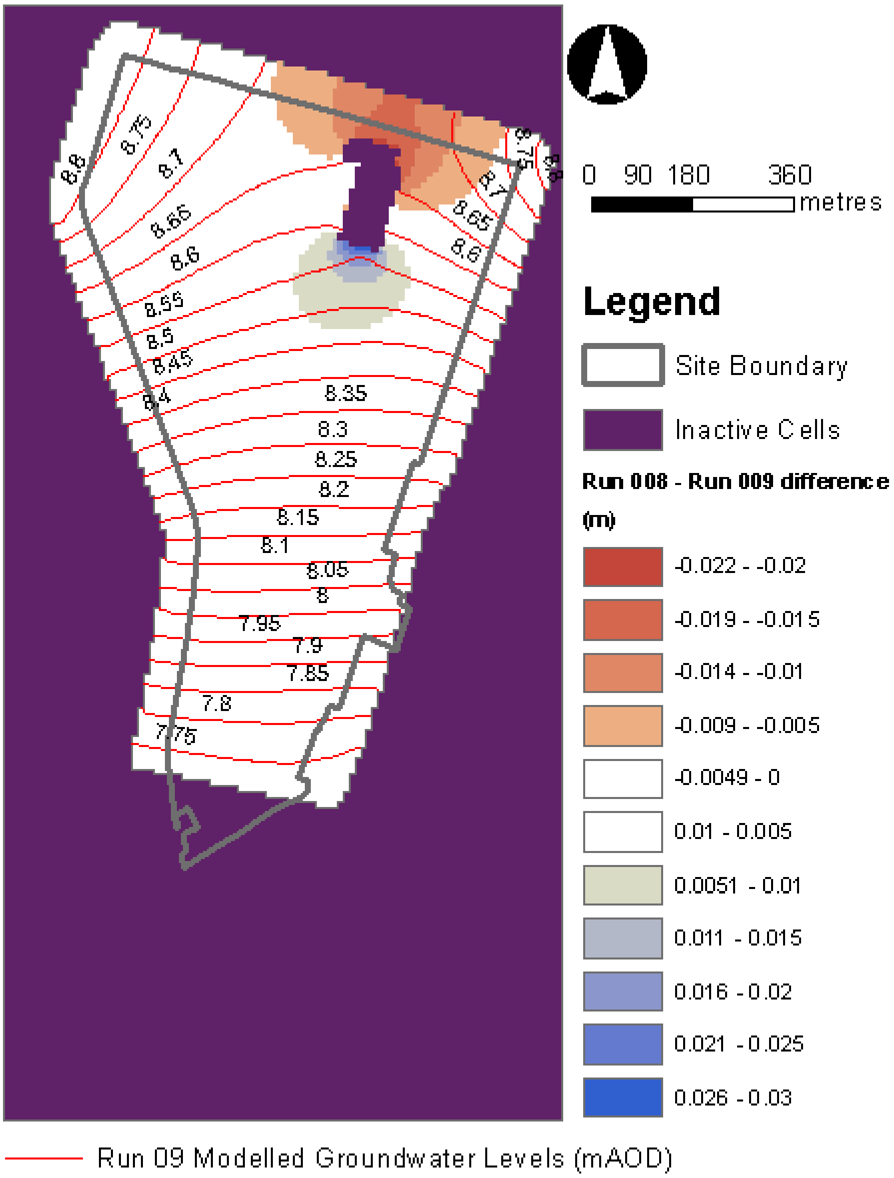
Figure 7.2 Adjustments to model inactive cells to simulate bunker construction



Following construction of the bunker structures (Figure 7.3) the model predicts that up-gradient groundwater levels will increase slightly by up to 0.02m in the area immediately north of the bunkers as a result of the backing up of water behind the structure. Conversely, groundwater levels to the south of the proposed bunkers are predicted to fall slightly by approximately the same amount.

The changes to groundwater elevation are predicted to be local (<150 m) to the bunker and are of small magnitude (within the likely range of measurement error on groundwater elevations). Beyond this distance groundwater elevations are predicted to be essentially identical (<0.005m difference).

Figure 7.3 Predicted change to hydraulic gradients and groundwater elevations following bunker construction (Run 09)



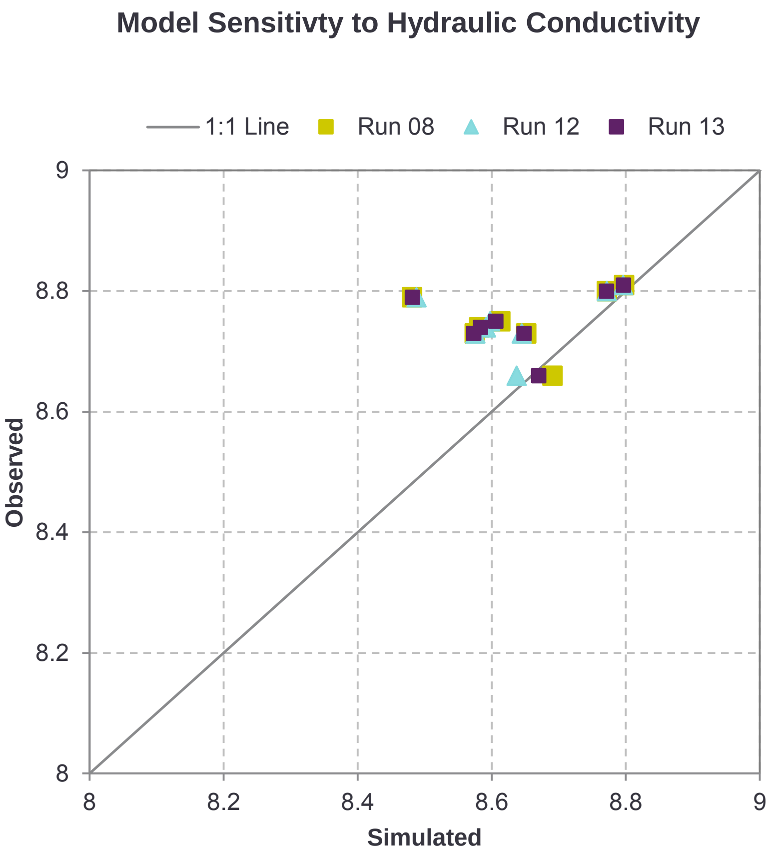
7.2 Sensitivity Runs

In recognition that site specific measurements of transmissivity could not be obtained, sensitivity assessments were carried out at two higher values of hydraulic conductivity within the Kempton Park Gravels at 30m/d and at 90m/d.

Increasing hydraulic conductivity tended to result in lower magnitude changes to groundwater elevations (<0.2m) although the effects are predicted to occur over a wider area.

In terms of model fit, the low overall sensitivity to hydraulic conductivity is illustrated by Figure 7.4 which plots observed groundwater levels against simulated. This indicates only minor changes in model fit to observations at different values of hydraulic conductivity.

Figure 7.4 Model sensitivity to changes in hydraulic conductivity



8. Summary

A groundwater model using MODFLOW-2005 has been constructed for the Edmonton EcoPark Energy Recovery Facility and immediate surrounding area. The model comprises two layers; the upper layer represents the shallow cover of Alluvium and Made Ground, the lower layer representing the Kempton Park Gravel aquifer. Layer elevations were determined from interpolation of site investigation data. Groundwater inflows and outflows were simulated using constant head and general head boundary conditions, no direct recharge is simulated. Hydraulic parameters were informed by literature data and model refinement suggested final values of 10m/d in the Kempton Park Gravels and 0.1m/d in the Alluvium. The model achieves a good fit to observations of groundwater levels within the Kempton Park Gravels and the spatial distribution of modelled heads and flow directions is consistent with interpretations of field data.

Assessments of the impact of constructing deep waste bunkers into the Kempton Park Gravel aquifer indicate that groundwater levels hydraulic gradients will be modified by up to 0.02m in the area immediately surrounding the facility.

Author

Simon Cook

Reviewer

Ben Fretwell

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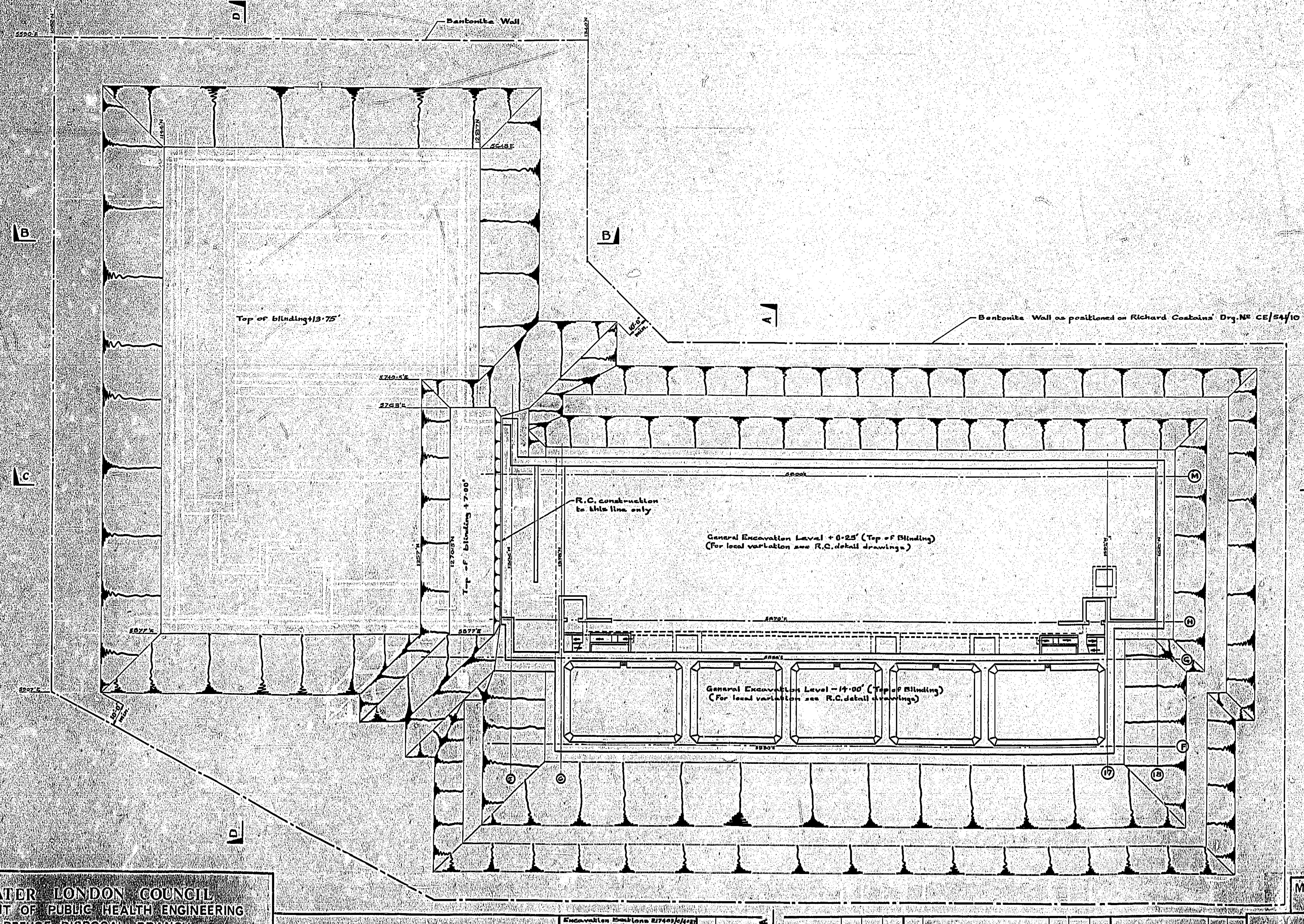
Management systems

This document has been produced by Amec Foster Wheeler Environment & Infrastructure UK Limited in full compliance with the management systems, which have been certified to ISO 9001, ISO 14001 and OHSAS 18001 by LRQA.

Appendix E: Energy from Waste facility design drawings

217403/C/4026



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DEPARTMENT OF PUBLIC HEALTH ENGINEERING
REFUSE DISPOSAL BRANCH

W S Atkins and Partners EPSOM ©

MAJOR INCINERATION PLANT
DEEPHAMS

EXCAVATION DETAILS

DRAWING REFERENCES	SUFFIX	REVISIONS	BY	DATE	CHECKED
Excavation Sections 217403/C/4027 Richard Costains' CE/541/10					

SUFFIX	REVISIONS	BY	DATE	CHECKED
A	Turbine Hall excavation revised	E Cox	25/4/67	

CONSTRUCTION
PRELIMINARY
ISSUED ONLY FOR ABOVE PURPOSE | DATE | PASSED

DRAWN E. Cox DATE
CHECKED DATE
SCALE 1:250
DRAWING NUMBER
217403/C/4026 A

NOTE:
To be read in conjunction with Drg. Nº 2174.03/C/4100.

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DEPARTMENT OF PUBLIC HEALTH ENGINEERING
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MAJOR INCINERATOR PLANT - DEEPHAMS

W S Atkins and Partners

BUNKERS
G.A. UP TO +6.00 LVL. 2174.03/C/4100
REINFT. DTLS. BASE SLAB 2174.03/C/4103, 4114
REINFT. DTLS. LONG WALL (TIPPING SIDE) 4105
" " " (BOILER HOUSE SIDE) 4106
" " END & DIVN WALLS 4107
" " ACCESS GALLERY 4110
G.A. AT +74.00 LVL. BOILER HOUSE 4111
G.A. UP TO +11.50 LVL 2174.03/C/4108
G.A. TIPPING SIDE WALL 4120.
DRAWING REFERENCES

SUFFIX	REVISIONS	BY	DATE	CHECKED
E.	ADDITION TO BUNKER WALL AT 71.00' LEVEL AMENDED	R.C.D.	8/3/69	

SUFFIX	REVISIONS	BY	DATE	CHECKED
D	Door threshold detail revised.	B.H.	3/68	
C	Future top wall level changed around 4 feed chutes now shown. Refuse code opening ... shown. ... recesses ... level.	M.H.	12-67	
B.	Further recesses added in longitudinal elevation. Tipping bay openings modified to suit latest requirements.	W.B.	28-4-67	B.H.
A	Details generally revised above +69.00 level	L.S.	13/4/67	B.H.

PRELIMINARY
ISSUED ONLY FOR ABOVE PURPOSE | DATE | PASSED

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BUNKERS
TYPICAL SECTIONS.

DRAWN R.J.W. DATE JAN. 67
CHECKED B.H. DATE 31/1/67
SCALE 1/8" & 1/2" = 1'-0"
DRAWING NUMBER 2174.03/C/4101 E.

GREATER LONDON COUNCIL
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MAJOR INCINERATION PLANT
DEEPHAMS

G.A. up to +58:00': 2174.03/C/4100
" , Typical Sections " 4101
G.A. Boiler House Basement " 4102.

DRAWING REFERENCES

SUFFIX	REVISIONS	BY	DATE	CHECKED
C	Recesses on line G levels amended & Nº type A now type B	M.H	12.67	
B	VERTICAL SPARGE PIPE HOLES ON GRID F NOW 4'0" FROM ℄ OF WALLS. REFUSE DOOR OPENINGS ON GRID F (ELEV A-A, SECTIONS E-E & B-B) NOW +58.00' 3'8" x 2'8" COVER (ELEV A-A & SECTION F-F NOW ON EXTERNAL FACE OF WALL	M.H	12.67	
A	RECESSES ADDED AT TOP OF WEST WALL PROTECTIVE L's TO SPARGE PIPE RECESSES DELETED; SECT G-G ADDED, MINOR MODS			

ISSUED ONLY FOR ABOVE PURPOSE	DATE	PASSED
CONSTRUCTION	3/11/67	
PRELIMINARY		

BUNKERS.

GENERAL ARRANGEMENT:- PLAN AT +74.50 LEVEL AND DETAILS OF SOUTH AND NORTH END WALLS.

DRAWN A.S. DATE 6.10.67
CHECKED DATE 10.10.67
SCALE 1/8", 1/4" = 1'0"

DRAWING NUMBER
2174.03/C/4119C

Appendix F: Initial groundwater risk assessment screening table

TITLE:	20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant

This spreadsheet comprises the following worksheets

Worksheet	
Node 1	HAZID for process water system
Node 2	HAZID for feedstock preparation
Node 3	HAZID for drainage system
Node 4	HAZID for gas system and hot water systems
Node 5	HAZID for Digestion and Pasteurisation System
Node 6	HAZID for rejects from pulper
Node 7	HAZID for odour scrubbers
Risk Matrix and Notes	Risk matrix and notes (e.g. consequence and likelihood scores)
Risk Look UP	Lookup table that links node risk with risk matix

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TITLE: **20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**

Date: 29-Jul-11

Description: Process Water System. Collects stores and distributes various liquors generated on site. Process water is a low strength liquor.

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
All concepts and comments shown here would equally apply to a 'dry' MBT-AD.

Drawings: GMWDA_ENP_G_6017_001, 002, 6013_001, 6016

						Before Safeguards			After Safeguards				
						Risk - Scenario/Event			**Risk - Ground Water**				
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**	Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Sampling causes spillage	Small quantity may be walked about	Impermeable surface.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	F-Slight	1-Remote	Low	SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Level controls incorrectly set causing overflow.	Significant quantity enters bund	Tiered level controls to provide safeguard. Overflows drain to bunded area.	Ensure adequate operator training.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Non-routine	Pipe flushing to clear blockages	Small quantity of process water is spilled.	Impermable surface and contained drainage system.	Ensure screens/pulpers remove contrary material.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Process Upsets	Foaming causes spillage	Small quantity enters bund or inside of building.	All overflows run to bunded areas or contained within building drainage system.	Ensure adequate operator training.	E-Minor	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Maintenance / Mechanical Hazards	Routine	Replacement of wear parts in pumps causes spillage.	Small quantity contained inside buildings	Impermable surface and contained drainage system.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Mixers lifted out of tanks with process water attached.	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Reactive	Failed wetted item requires replacement, causing spillage	Small quantity contained inside buildings	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate hosedown provision is made.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Acute	Process water tank T-1701 ruptures	Large quantity of process water enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	B-Massive	2-Highly Unlikely	High	F-Slight	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Acute	External pipework ruptures	Large quantity of process water enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	C-Major	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Acute	Internal pipework ruptures	Large quantity of process water enters building	Impermeable surface and contained drainage system.	Check building drainage system is sized to cope with this eventuality.	C-Major	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Minor unrepaired leaks	Small quantity enters bund or inside of building.	Impermeable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Undetected underground leaks	Small quantity of process water enters groundwater	All pipework above ground. Tank bases designed and constructed to BSI standards.	Where tanks require bottom drains, ensure pipework is encased in the concrete base.	D-Moderate	1-Remote	Low	**E-Minor**	1-Remote	Low	GW	The consequence of this risk is that small quantities of process water enters the underlying geology and ultimately groundwater. The quantities involved would have to be immeasurably small, otherwise they would be detected during normal operation.
Location Hazards	Weather	Storm event coincides with catastrophic tank failure.	Bund is overwhelmed, releasing polluted water into unbunded areas.	Design bund rainwater drainage system for 1 in 100 year storm.	Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)			#N/A	**E-Minor**	2-Highly Unlikely	Low	SW/GW	Frequency assumes this combines likelihood of 1:100 storm and likelihood of catastrophic failure.
	Weather	Rainfall	Any depostions on the external bunds may cause contamination of the rainwater.	Some rainwater used in the process. Excess rainwater discharged to surface water sewer.	Control system required to differentiate between water suitable for surface water sewer discharge and contaminated water that needs to be treated on site. Operators to be trained and motivated to keep contamination to a minimum. Consider integrating a SUDS system into the site.			#N/A		6-Highly Likely	Nil	SW/GW	Rainfall will dilute contaminants and correct design of drainage system will mean there is no impact.
	Traffic/Deliveries	Spillage during delivery	Contamination of rainwater.	Delivery areas separately bunded within main bund. Rainwater contamination control system and procedures.	Include oil interceptor on surface water drain connection. Ensure adequate operator training. Ensure tanker loading points drain back to the process water system.	E-Minor	4-Possible	Medium	**E-Minor**	1-Remote	Low	SW/GW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chemicals	Polyelectrolyte spillage	Small quantity may be walked about	Impermeable surface.	Ensure adequate hosedown provision is made.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low	SW/GW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund or inside of building, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.			#N/A	**C-Major**	1-Remote	Medium	GW	None of the materials that could leak into the groundwater could have more than a major effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low	SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE: **20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**

Date: 29-Jul-11

Description: Feedstock preparation. Organic fraction from Dano drums is washed clean, dry solids are adjusted and sludge is stored.

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
The details considered here could be significantly different for a 'dry' MBT-AD plant.

Drawings: GMWDA_ENP_G_6011_002, 003, 004, 6013_002

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Sampling causes spillage	Small quantity may be walked about	Impermeable surface. ABPR requirements segregate clean and dirty areas.	Ensure adequate hosedown provision is made and sludge sampling valves are appropriately sized and located.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Level controls incorrectly set causing overflow.	Significant quantity enters bund	Tiered level controls to provide safeguard. Overflows drain to bunded area.	Ensure adequate operator training.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Feed conveyor spillages	Small quantities of high strengh material is spilled.	Impermeable surface.	Use enclosed conveyors where practicable.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Non-routine	Pipe flushing to clear blockages	Small quantity of high strengh material is spilled.	Impermable surface and contained drainage system.	Ensure screens/pulpers remove contrary material.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Process Upsets	Foaming causes spillage	Small quantity enters bund or inside of building.	All overflows run to bunded areas or contained within building drainage system.	Ensure adequate operator training.	E-Minor	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Maintenance / Mechanical Hazards	Routine	Replacement of wear parts in pumps causes spillage.	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Mixers lifted out of tanks with sludge attached.	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Reactive	Falied wetted item requires replacement, causing spillage	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate hosedown provision is made.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Acute	Sludge buffer tank ruptures	Large quantity of thick sludge enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	D-Moderate	2-Highly Unlikely	Medium	**F-Slight**	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Acute	External pipework ruptures	Large quantity of thick sludge enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	D-Moderate	2-Highly Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Acute	Internal pipework ruptures	Large quantity of high strength material enters building	Impermable surface and contained drainage system.	Check building drainage system is sized to cope with this eventuality.	D-Moderate	2-Highly Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Minor unrepaired leaks	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Undetected underground leaks	Small quantity of thick sludge enters groundwater	All pipework above ground. Tank bases designed and constructed to BSI standards. Sludge tends to be self sealing.	Where tanks require bottom drains, ensure pipework is encased in the concrete base.	D-Moderate	1-Remote	Low	**F-Slight**	1-Remote	Low		GW	The consequence of this risk is that small quantities of sludge enters the underlying geology and ultimately groundwater. The immobility of this sludge means that only very small quantities can escape into the underlying geology.
Location Hazards	Weather	Storm event coincides with catastrophic tank failure.	Bund is overwhelmed, releasing polluted water into unbunded areas.	Design bund rainwater drainage system for 1 in 100 year storm.	Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)			#N/A	**F-Slight**	1-Remote	Low		SW/GW	Frequency assumes this combines likelihood of 1:100 storm and likelihood of catastrophic failure.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund or inside of building, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.			#N/A	**C-Major**	1-Remote	Medium		SW/GW	None of the materials that could leak into the groundwater could have more than a major effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low		SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE: 20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant

Date: 29-Jul-11

Description: Drainage system. Receives various low strength liquors and building washdowns

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
All concepts and comments shown here would equally apply to a 'dry' MBT-AD.

Drawings: GMWDA_ENP_G_6022

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Level controls incorrectly set causing overflow.	Significant quantity enters bund	Tiered level controls to provide safeguard. Overflows drain to bunded area.	Ensure adequate operator training.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Non-routine	None						#N/A			#N/A			
	Process Upsets	None						#N/A			#N/A			
Maintenance / Mechanical Hazards	Routine	Pumps lifted out of tanks with dranage water attached.	Small quantity enters bund or inside of building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate hosedown provision is made. Provide lay-dawn area above drainage sump.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Reactive	None						#N/A			#N/A			
Failures	Acute	Pump in sump fails, causing overlfow	Significant quantity enters bund	Duty standby pump system. Pump protection screen. All overflows run to impermeable bunded areas.	Ensure adequate operator training.	E-Minor	4-Possible	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	None						#N/A			#N/A			
	Chronic	Undetected underground leaks from pump sump	Small quantity of drainage water enters subsoil	Pump sump designed and constructed to BSI standards.	Regularly inspect sumps regarding cracks and structural integrity.	E-Minor	3-Unlikely	Medium	**E-Minor**	2-Highly Unlikely	Low		GW/SW	Fluids involved are likely to be very low in contamination.
Location Hazards	Weather	Excessive rainfall enters drainage sump.	Sump fills process water tank to excess and then overflows into bunded area.	Floor falls designed to minimise intrusive rain water. Bund adequately sized.	Consider rainwater removal from the bund and how this affects the drainage system.	E-Minor	3-Unlikely	Medium	**E-Minor**	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Subsidence/Heave	Breaches the impermeable sump.	Small quantity but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.	C-Major	1-Remote	Medium	**C-Major**	2-Highly Unlikely	Medium		GW/SW	None of the materials that could leak into the groundwater could have more than a major effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low		SW/GW	Direct risk to surface water, remote risk to groundwater.
	Power failure	Sump continues to fill by gravity flows.	Sump is overtopped	Overflows to bund. Alarm raised for power failure.	Ensure plc alarms out for power failure. Ensure operators have appropriate training.	E-Minor	4-Possible	Medium	**F-Slight**	3-Unlikely	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.

TITLE: **20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**

Date: 29-Jul-11

Description: Gas System and hot water systems. Cleans and dries the digester gas for supply to CHP and boiler plant that provides process heat in the form of hot water.

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
All concepts and comments shown here would equally apply to a 'dry' MBT-AD.

Drawings: GMWDA_ENP_G_6018_001, 002

						Before Safeguards			After Safeguards				
						Risk - Scenario/Event			**Risk - Ground Water**				
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**	Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Release of condensate from gas lines at points outside the condensate sump	Condensate is spilled on pervious ground	Most gas lines are within the site bund.	Design gas lines to obviate the need for secondary drain points	F-Slight	4-Possible	Medium	**F-Slight**	2-Highly Unlikely	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals, leakage (exfiltration) from drainage system or leakage occurs from the short sections of gas lines that may be outside the bunded area. Gas condensate is effectively distilled water with dissolved gases and minor contamination from digestate particulates and therefore poses little risk of contamination. Volumes are comparatively minute.
	Non-routine	None						#N/A					
	Process Upsets	Foam enters gas lines that then have to be washed out	Dirty water is spilled on pervious ground	Most gas lines are within the site bund.	Design gas lines so that washout points drain back to the site bund.	E-Minor	3-Unlikely	Medium	**F-Slight**	2-Highly Unlikely	Low		
Maintenance / Mechanical Hazards	Routine	Spillage during oil replacement on CHP.	Oil may land on pervious ground	CHP units are normally self bunded and/or are supplied with oil tanks to facilitate clean oil changes.	Specify CHP units with this requirement in mind.	E-Minor	3-Unlikely	Medium	**E-Minor**	2-Highly Unlikely	Low	GW	
	Reactive	None						#N/A					
Failures	Acute	Catastrophic failure of stored oil tank	Oil may land on pervious ground	Oil tanks are bunded.	Consider putting oil tanks in the bunded area.	D-Moderate	3-Unlikely	Medium	D-Moderate	1-Remote	Low	GW	
	Chronic	Unseen leak to condensate system	Condensate leaks onto pervious ground	Most gas lines are within the site bund.	Regular inspections of all gas lines.	F-Slight	4-Possible	Medium	**F-Slight**	2-Highly Unlikely	Low	GW	See above
Location Hazards	Weather	None						#N/A			#N/A		
	Subsidence/Heave	None						#N/A			#N/A		
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low	SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE: **20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**

Date: 29-Jul-11

Description: Digestion and Pasteurisation System. Treats feedstock sludge biologically to produce digester gas and digestate, heat treats the digestate to kill pathogens.

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
The details considered here could be significantly different for a 'dry' MBT-AD plant.

Drawings: GMWDA_ENP_G_6014_001, 002 & GMWDA_ENP_G_6015

						Before Safeguards			After Safeguards				
						Risk - Scenario/Event			**Risk - Ground Water**				
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**	Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Sampling causes spillage	Small quantity may be walked about	Impermeable surface within bund. Clean and dirty areas under ABPR requirements.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low	SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Non-routine	Pipe flushing to clear blockages	Small quantity of digestate is spilled.	Impermeable surface within bund. Clean and dirty areas under ABPR requirements.	Ensure screens/pulpers remove contrary material to reduce risk of blockages ocurring.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Process Upsets	Foaming causes spillage	Potentially large quantity of sludge enters bund.	All overflows run to impermeable bunded areas.	Operate digester as designed to reduce the risk of foaming.	E-Minor	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Maintenance / Mechanical Hazards	Routine	Replacement of wear parts in pumps causes spillage.	Small quantity contained inside bunded area.	Impermable surface and contained drainage system.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Routine	Oil spillage during compressor maintenance.	Small quantity of oil enters bund.	Impermable surface and contained drainage system.	Provide oil soak-up material on site. Use biodegradable oil.	E-Minor	4-Possible	Medium	**E-Minor**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Reactive	Failed wetted item requires replacement, causing spillage	Small quantity of digestate spilled into bunded area.	Impermeable surface within bund. Clean and dirty areas under ABPR requirements.	Ensure adequate hosedown provision is made.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Acute	Digestion tank ruptures.	Large quantity of digestate enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	B-Massive	2-Highly Unlikely	High	F-Slight	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Acute	External pipework ruptures	Large quantity of digestate enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	B-Massive	2-Highly Unlikely	High	F-Slight	1-Remote	Low	GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Minor unrepaired leaks	Small quantity of digestate enters bund.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low	GW/SW	see comments for previous nodes
	Chronic	Undetected underground leaks	Small quantity of digestate enters groundwater	All pipework above ground. Tank bases designed and constructed to BSI standards. Digestate tends to self seal.	Where tanks require bottom drains, ensure pipework is encased in the concrete base.	D-Moderate	2-Highly Unlikely	Medium	**F-Slight**	1-Remote	Low	GW	The consequence of this risk is that small quantities of sludge enters the underlying geology and ultimately groundwater. The immobility of this digestate means that only very small quantities can escape into the underlying geology.
Location Hazards	Weather	Storm event coincides with catastrophic tank failure.	Bund is overwhelmed, releasing polluted water into unbunded areas.	Design bund rainwater drainage system for 1 in 100 year storm.	Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)			#N/A	**E-Minor**	2-Highly Unlikely	Low	SW/GW	Frequency assumes this combines likelihood of 1:100 storm and likelihood of catastrophic failure.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund or inside of building, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.			#N/A	**C-Major**	1-Remote	Medium	GW	None of the materials that could leak into the groundwater could have more than a major effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low	SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE:	**20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**
Date:	29-Jul-11
Description:	Rejects from Pulper
Reference Documents	Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate. The details considered here could be significantly different for a 'dry' MBT-AD plant.
Drawings:	GMWDA_ENP_G_6011_005, & GMWDA_ENP_G_6012_001, 002

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational / Process Hazards	Routine	Sampling causes spillage	Small quantity of dirty paper/plastic/textile may be walked about	Impermeable surface within bund. Clean and dirty areas under ABPR requirements.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Routine	Feed conveyor spillages	Small quantity of dirty paper/plastic/textile is spilled.	Impermeable surface.	Use enclosed conveyors where practicable.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Non-routine	Pipe flushing to clear blockages	Small quantity of process water is spilled.	Impermable surface and contained drainage system.	Use purpose designed rejects handling equipment.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Routine	Level controls incorrectly set causing overflow.	Significant quantity is spilled.	Tiered level controls to provide safeguard. Spillage onto impermeable surface inside building. Overflows drain to bunded area.	Ensure adequate operator training.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
Maintenance / Mechanical Hazards	Routine	Replacement of wear parts in pumps causes spillage.	Small quantity contained inside building.	Impermable surface and contained drainage system.	Ensure adequate hosedown provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Routine	Oil spillage during hydraulic power pack maintenance.	Small quantity of oil is spilled on impervious building floor.	Impermable surface and contained drainage system.	Provide oil soak-up material on site. Use biodegradable oil.	E-Minor	4-Possible	Medium	**E-Minor**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Reactive	Failed wetted item requires replacement, causing spillage	Small quantity of dirty paper/plastic/textile is spilled.	Impermeable surface within building Clean and dirty areas under ABPR requirements.	Ensure adequate hosedown provision is made.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
Failures	Acute	Surge tank ruptures.	Large quantity of wet grit or screenings enters building.	Impermeable surface within building which sits in the bunded area.	Check rainwater drainage system is interlocked to a spillage detection system.	D-Moderate	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Acute	Internal pipework ruptures	Large quantity of wet grit or screenings enters building.	Impermeable surface within building which sits in the bunded area.	Check rainwater drainage system is interlocked to a spillage detection system.	D-Moderate	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
	Chronic	Minor unrepaired leaks	Small quantity of reject material enters building.	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. Material is dirty but quite dry and does not flow.
Location Hazards	Weather	Storm event coincides with catastrophic tank failure.	Bund is overwhelmed, releasing polluted water into unbunded areas.	Design bund rainwater drainage system for 1 in 100 year storm.				#N/A	**F-Slight**	1-Remote	Low		SW/GW	Frequency assumes this combines likelihood of 1:100 storm and likelihood of catastrophic failure. Comparatively small volumes involved.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund or inside of building, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.			#N/A	**E-Minor**	1-Remote	Low		GW	None of the materials that could leak into the groundwater could have more than a minor effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low		SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE: **20125 - NLWA - Edmonton - Emissions Hazard Identification (HAZID) from the AD Plant**

Date: 29-Jul-11

Description: Odour scrubbers.

Reference Documents Relevant PFDs, P&IDs and Layout Plan using the Reliance Street plant as a comparable surrogate.
All concepts and comments shown here would equally apply to a 'dry' MBT-AD.

Drawings: GMWDA_ENP_G_6019_001

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational / Process Hazards	Non-routine	Leakage during tanker delivery or removal of acid	Small quantity of acid is spilled.	Delivery takes place within designated area within bund.	Ensure deliveries occur in designated area and follow best practice.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Non-routine	Level controls incorrectly set causing overflow.	Small quantity enters bund	Tiered level controls to provide safeguard. Overflows drain to separate bunded area designed to contain acidic spillages.	Ensure adequate operator/ delivery driver training.	E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
Maintenance / Mechanical Hazards	Routine	Replacement of wear parts in pumps causes spillage.	Small quantity contained inside bunded area.	Impermeable surface and contained drainage system.	Ensure adequate operator training. Ensure adequate hosedown provision is made. Ensure primary bund around acid tanks are suitable for acid containment.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
	Reactive	Failed wetted item requires replacement, causing spillage	Small quantity of acid spilled into bunded area.	Impermeable surface within bund.	Ensure adequate operator training. Ensure adequate hosedown provision is made. Ensure primary bund around acid tanks are suitable for acid containment.	F-Slight	4-Possible	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
Failures	Acute	Acidic effluent tank ruptures.	Small quantity of acidic material enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system. Ensure primary bund for the acid tanks is large enough to deal with a rupture.	D-Moderate	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
	Acute	External pipework ruptures	Small quantity of acidic material enters bunded area	Impermeable bund.	Check rainwater drainage system is interlocked to a spillage detection system.	D-Moderate	2-Highly Unlikely	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
	Chronic	Minor unrepaired leaks	Small quantity of acidic material enters bunded area	Impermable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	E-Minor	3-Unlikely	Medium	F-Slight	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system. The quantity of acid held on site is small.
								#N/A			#N/A			
Location Hazards	Weather	Storm event coincides with catastrophic tank failure.	Primary and main bunds are overwhelmed, releasing polluted water into unbunded areas.	Design bund rainwater drainage system for 1 in 100 year storm.				#N/A	**F-Slight**	1-Remote	Low		SW/GW	Frequency assumes this combines likelihood of 1:100 storm and likelihood of catastrophic failure. Comparatively small volumes involved.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor.			#N/A	**D-Moderate**	1-Remote	Low		GW	None of the materials that could leak into the groundwater could have more than a major effect on the groundwater.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low		SW/GW	Direct risk to surface water, remote risk to groundwater.

Proposed Risk Matrix for NLWA Groundwater HAZID

Risk Management Controls		
27 - 36	**CRITICAL**	Risks must be reduced for Controlled Waters and other Risks. Significant and urgent actions required.
16 - 26	**HIGH**	Assess risk in more detail and look to reduce further, as appropriate. In accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
7 - 25	**MEDIUM**	Look to reduce further in accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
1 - 6	**LOW**	Continue to manage and monitor risksby effective Risk Management.

	LIKELIHOOD →					
Historical:	"Unheard of in the industry"	"Has occurred one or twice in the industry"	"Has occurred many times in the industry, but not in the Company"	"Has occurred once or twice in the Company"	"Has occurred frequently in the Company"	"Has occurred frequently at the location"
Frequency: (Continuous Operation)	Once every 10,000 - 100,000 years at location	Once every 1,000 - 10,000 years at location	Once every 100 - 1,000 years at location	Once every 10 - 100 years at location	Once every 1 - 10 years at location	More than once a year at location or continuously
Probability: (Single Activity)	1 in 100,000 - 1,000,000	1 in 10,000 - 100,000	1 in 1,000 - 10,000	1 in 100 - 1,000	1 in 10 - 100	> 1 in 10

	People	**Environment**	**Assets**	**Reputation**	**Legal Compliance**
GENERAL (HUMAN) CONSEQUENCE	>20 Fatalities (or Permanent Total Disabilities)	**GW**: Large scale impact (100's m). Exceedance of drinking water standards in PWS boreholes with need to shut down supply or implement additional treatment. Long term/permanent impact. **SW**: Large scale impact (100's to 1000's m). Exceedance of drinking water in abstraction with need to shut down supply or implement additional treatment. Deteriotation in ecological status of water body. Fish kill.	>£10m	International concern. Major ventures terminated. Company at stake	Criminal prosecution. Possible jail sentences for directors and senior officers. Heavy fines for the company
	4-20 Fatalities (or Permanent Total Disabilities)	**GW:** Large Scale (10-100 m) impact on river gravel with exceedance of water quality standards, impact on deeper Tertiary and Chalk aquifers with exceedance of driking water standards. Long term (months/years) Impact **SW:** Large scale (100's m) impact on surface water with exceedance of water quality standards. Fish kill in surface water. Potable abstractions need to be taken out of supply. Medium term impact (days/weeks)	£1-10m	Persistent national concern. Long term "brand" impact. Major ventures/asset operations severly restricted	Civil prosecution. Serious litigation, including class actions. Heavy fines.
	1-3 Fatalities (or Permanent Total Disabilities)	**GW:** Medium Scale (10's m) impact on river gravel aquifer with exceedance of water quality standards and impact on deeper Tertiary and Chalk aquifers with risk to groundwater abstractions. Medium term (months) impact **SW**: Medium scale (100's m) impact on surface water with exceedance of water quality standards. Fish kill. Short term (days/weeks) impact	£500k-1m	Medium term national concern. Minor venture or minor asset operations restricted or curtalled.	Major break of regulation. Major litigation and fines.
	Major injury/illness, Permanent Partial Disability or Lost Time Case	**GW**: Medium Scale (10's m) impact on river gravel aquifer, exceedance of water quality standards. Short term (weeks/months) impact. **SW**: Medium Scale (100's m) impact on surface water quality, exceedances of water quality standards. Medium term (days/weeks) impact.	£100-500k	National bad mention. Short term regional concern. Close scrutiny of asset level operations/future processes.	Serious breach of regulation. Investigation by regulatory authorities. Possible litigation and fines.
	Medical Treatment Case	**GW**: Localised (metres) impact on perched groundwater and/or sand and gravel aquifer. Short term (days/weeks) impact. **SW**: Localised (10's metres) impact on surface water, but no exceedance of water quality standards. Short term (days) impact.	£10-100k	Short term local concern. Some iimpact on asset level non-production activities.	Minor legal issues. Report provided to regulatory authorities. Low risk of litigation and fines.
	Slight Injury/Illness. First Aid	**GW**: No or localised (immediate area) impact on perched groundwater. Temporary Impact (days) **SW**: No or localised impact on surface water quality, but no exceedance of water quality standards. Temporary impact (hrs)	<£10k	Local mentional only. Quickly forgotten. Freedom to operate unaffected.	Minimal legal issues. Little or no scrutinyby regulatory authorities. No risk of litigation or fines.

		1 **Remote**	**2** **Highly Unlikely**	**3** **Unlikely**	**4** **Possible**	**5** **Likely**	**6** **Highly Likely**
A	**Catastrophic**	**16**	**22**	**27**	**31**	**34**	**36**
B	**Massive**	**11**	**17**	**23**	**28**	**32**	**35**
C	**Major**	**7**	**12**	**18**	**24**	**29**	**33**
D	**Moderate**	**4**	**8**	**13**	**19**	**25**	**30**
E	**Minor**	**2**	**5**	**9**	**14**	**20**	**26**
F	**Slight**	**1**	**3**	**6**	**10**	**15**	**21**

Risk Ranking

	1-Remote	**2-Highly Unlikely**	**3-Unlikely**	**4-Possible**	**5-Likely**	**6-Highly Likely**
A-Catastrophic	**High**	**High**	**Critical**	**Critical**	**Critical**	**Critical**
B-Massive	**Medium**	**High**	**High**	**Critical**	**Critical**	**Critical**
C-Major	**Medium**	**Medium**	**High**	**High**	**Critical**	**Critical**
D-Moderate	**Low**	**Medium**	**Medium**	**High**	**High**	**Critical**
E-Minor	**Low**	**Low**	**Medium**	**Medium**	**High**	**High**
F-Slight	**Low**	**Low**	**Low**	**Medium**	**Medium**	**High**

To asssist in setting action priorities the following was used for determining them.

	ACTION PRIORITIES	MEANING
1	High	The team considered that these actions should be given the highest priority and would have the biggest impact on risk reduction when implemented
2	Medium	These actions were important to reduce risks but did not merit the higher category in terms of priority.
3	Low	These actions were lower on the list because it was considered that whilst they were worth implementing but the exisitng mitigation measures / operational practice was sufficiently good that the risk reduction over a longer period could be tolerated

	1-Remote	2-Highly Unlikely	3-Unlikely	4-Possible	5-Likely	6-Highly Likely
A-Catastrophic	High	High	Critical	Critical	Critical	Critical
B-Massive	Medium	High	High	Critical	Critical	Critical
C-Major	Medium	Medium	High	High	Critical	Critical
D-Moderate	Low	Medium	Medium	High	High	Critical
E-Minor	Low	Low	Medium	Medium	High	High
F-Slight	Low	Low	Low	Medium	Medium	High

Consequence	Likelihood	Combination	Outcome
A-Catastrophic	1-Remote	A-Catastrophic1-Remote	High
B-Massive	1-Remote	B-Massive1-Remote	Medium
C-Major	1-Remote	C-Major1-Remote	Medium
D-Moderate	1-Remote	D-Moderate1-Remote	Low
E-Minor	1-Remote	E-Minor1-Remote	Low
F-Slight	1-Remote	F-Slight1-Remote	Low
A-Catastrophic	2-Highly Unlikely	A-Catastrophic2-Highly Unlikely	High
B-Massive	2-Highly Unlikely	B-Massive2-Highly Unlikely	High
C-Major	2-Highly Unlikely	C-Major2-Highly Unlikely	Medium
D-Moderate	2-Highly Unlikely	D-Moderate2-Highly Unlikely	Medium
E-Minor	2-Highly Unlikely	E-Minor2-Highly Unlikely	Low
F-Slight	2-Highly Unlikely	F-Slight2-Highly Unlikely	Low
A-Catastrophic	3-Unlikely	A-Catastrophic3-Unlikely	Critical
B-Massive	3-Unlikely	B-Massive3-Unlikely	High
C-Major	3-Unlikely	C-Major3-Unlikely	High
D-Moderate	3-Unlikely	D-Moderate3-Unlikely	Medium
E-Minor	3-Unlikely	E-Minor3-Unlikely	Medium
F-Slight	3-Unlikely	F-Slight3-Unlikely	Low
A-Catastrophic	4-Possible	A-Catastrophic4-Possible	Critical
B-Massive	4-Possible	B-Massive4-Possible	Critical
C-Major	4-Possible	C-Major4-Possible	High
D-Moderate	4-Possible	D-Moderate4-Possible	High
E-Minor	4-Possible	E-Minor4-Possible	Medium
F-Slight	4-Possible	F-Slight4-Possible	Medium
A-Catastrophic	5-Likely	A-Catastrophic5-Likely	Critical
B-Massive	5-Likely	B-Massive5-Likely	Critical
C-Major	5-Likely	C-Major5-Likely	Critical
D-Moderate	5-Likely	D-Moderate5-Likely	High
E-Minor	5-Likely	E-Minor5-Likely	High
F-Slight	5-Likely	F-Slight5-Likely	Medium
A-Catastrophic	6-Highly Likely	A-Catastrophic6-Highly Likely	Critical
B-Massive	6-Highly Likely	B-Massive6-Highly Likely	Critical
C-Major	6-Highly Likely	C-Major6-Highly Likely	Critical
D-Moderate	6-Highly Likely	D-Moderate6-Highly Likely	Critical
E-Minor	6-Highly Likely	E-Minor6-Highly Likely	High
F-Slight	6-Highly Likely	F-Slight6-Highly Likely	High

Appendix G: Hydrogeological Risk Assessment tables

TITLE:	**NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**													
Date:	05-Mar-15													
Description:	EfW Bunker													
Drawings:						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Maintenance / Mechanical Hazards	Routine	Spillage during cleaning or maintenance	Small quantity contained inside building	Impermeable surface and contained drainage system.	Ensure adequate operator training.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Chronic	Undetected underground leaks	Small quantity of process/waste water enters groundwater	Regular examination of bunker floor and walls which is part of SPMP and designed and constructed to BSI standards.	Structure examination and groundwater monitoring as detailed by the EPR SPMP	D-Moderate	3-Unlikely	Medium	**E-Minor**	1-Remote	Low		GW	The consequence of this risk is that small quantities of process water enters the underlying geology and ultimately groundwater. The quantities involved would have to be immeasurably small, otherwise they would be detected during normal operation.
Location	Subsidence/Heave	Subsidence/ Heave	Causes a leak and breaches the impermeable bunker walls	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor. Monitor bunker condition daily.	D-Moderate	3-Unlikely	Medium	**D-Moderate**	1-Remote	Low		GW	The consequence of this risk is that small quantities of process water enters the underlying geology and ultimately groundwater. The quantities involved would have to be immeasurably small, otherwise they would be detected during normal operation.
Post Demolition	Location	Ground returned to hydrogeological 'like for like' materials	Groundwater flow barrier removed in the KPG and flow returned. Possible local change in hydraulic gradients.	Restoration design will consider groundwater flow through the gravels	Groundwater level monitoring will be undertaken as part of the EPR SPMP	F-Slight	3-Unlikely	Low	**F-Slight**	3-Unlikely	Low		GW	Positive residual effect as barrier to flow is removed from the KPG.

TITLE: **NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**

Date: 05-Mar-15

Description: ERF Bunker

Drawings:

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational	Routine	Mounding of KPG groundwater behind the bunker	Change in hydraulic gradient in the KPG	Modelling and hydrogeological assessment before design to ensure significant change is not identified.		E-Minor	3-Unlikely	Medium	**F-Slight**	1-Remote	Low		GW/SW	No residual risk to groundwater identified with numerical modelling identifing small local change in groundwater levels
Construction	Construction	Dewatering during construction	Dewatering of KPG during construction and possible mobilisation of contaminants within the KPG and to the Salmon Brook	Best practice methodology and construction design to minimise effect on aquifer and dewatering volumes would be controlled and tested.	Monitoring of groundwater and surface water would be included in the COCP	E-Minor	4-Possible	Medium	**E-Minor**	2-Highly Unlikely	Low		GW/SW	Temporary construction activity with low risk therefore no residual effects considered.
Construction	Construction	Reducing the thickness of the London Clay	Possible vertical pathways created through the London Clay where its thinned allowing groundwater to reach the Lambeth group during construction and allowing potential pathway if bunker failure	Bunker has been located in an area where the London Clay is thickest and a minimum of 5m thickness of London Clay will be retained below the Bunker	Bunker is constructed in the northeast of the site.	C-Major	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low		GW	Residual risk to groundwater is minimised due to location and construction design and methodology.
Construction	Construction	Corrosion of bunker exterior walls to allow vertical pathway	Potential pathway for contamination to the groundwater receptors	Bunker will be constructed to BSI standards for the site conditions	BSI standards and best practice construction methodology	D-Moderate	3-Unlikely	Medium	**D-Moderate**	1-Remote	Low		GW	Residual risk to groundwater is minimised as considered in the construction design and methodology.
Maintenance / Mechanical Hazards	Routine	Spillage during cleaning or maintenance	Small quantity contained inside buildings	Impermeable surface and contained drainage system.	Ensure adequate operator training.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Chronic	Undetected underground leaks	Small quantity of process/waste water enters groundwater	Regular examination of bunker base and walls which is part of SPMP and designed and constructed to BSI standards.	Structure examination and groundwater monitoring as detailed by the EPR SPMP	D-Moderate	3-Unlikely	Medium	**D-Moderate**	1-Remote	Low		GW	The consequence of this risk is that small quantities of process water enters the underlying geology and ultimately groundwater. The quantities involved would have to be immeasurably small, otherwise they would be detected during normal operation.
Location	Subsidence/Heave	Causes a leak and breaches the impermeable bunker walls	Small quantity enters groundwater	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor. Monitor bunker condition daily.	D-Moderate	3-Unlikely	Medium	**D-Moderate**	1-Remote	Low		GW	Bunker would have considered subsidence and heave in its design and therefore the likelihood of the leak reaching groundwater is considered to be unlikely. If significant subsidence occurred this would be detected in the regular bunker examination and the source would therefore be removed before failure.

TITLE: **NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**

Date: 05-Mar-15

Description: Ash Recycling Area

Drawings:

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Failures	Chronic	Cracks or breach in hardstanding	Small quantity of water Infiltrating through the ash may allow small quantity of process water to enter groundwater.	Infiltration through the ash will be reduced where possible as part of EPR. Process area hardstanding will have been regular inspected as part of the EPR. Overground flow is all captured in closed surface drainage system.	Ensure daily monitoring during periods of intensive rainfall.	E-Minor	4-Possible	Medium	**E-Minor**	1-Remote	Low		GW	This will be monitored as part of the site EPR
Location	Subsidence/Heave	Cause a leak and breaches the hardstanding	Small quantity of water Infiltrating through the ash may allow small quantity of process water to enter groundwater.	Infiltration through the ash will be reduced where possible as part of EPR. Process area hardstanding will have been regular inspected as part of the EPR. Overground flow is all captured in closed surface drainage system.	Ensure daily monitoring during periods of intensive rainfall.	E-Minor	3-Unlikely	Medium	**E-Minor**	1-Remote	Low		GW	This will be monitored as part of the site EPR

TITLE: **NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**

Date: 04-Mar-15

Description: Fuel Storage, pipes and pumps

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Operational	Routine	Pump use accidental spill				F-Slight	5-Likely	Medium	F-Slight	1-Remote	Low		SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Traffic/Deliveries	Spillage during delivery	Contamination of rainwater.	Delivery areas bunded Rainwater contamination control system and procedures.	Include oil interceptor on surface water drain connection. Ensure adequate operator training. Ensure tanker loading points drain back to the process water system.	E-Minor	4-Possible	Medium	**E-Minor**	1-Remote	Low		SW/GW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Maintenance / Mechanical Hazards	Routine	Maintenance of tank, pipes or pump causes spill	Small quantity enters bund or inside of building.	Impermeable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	F-Slight	5-Likely	Medium	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
Failures	Chronic	Minor unrepaired leaks	Small quantity enters bund or inside of building.	Impermeable surface and contained drainage system and/or within the bunded area.	Ensure adequate financial and staffing provision is made.	F-Slight	3-Unlikely	Low	**F-Slight**	1-Remote	Low		GW/SW	Residual risk to groundwater only arises if bund fails or overtops, leakage occurs through cracks/seals or leakage (exfiltration) from drainage system.
	Chronic	Undetected underground leaks	Small quantity of process water enters groundwater	All pipework above ground. Tank bases designed and constructed to BSI standards.	Where tanks require bottom drains, ensure pipework is encased in the concrete base.	D-Moderate	1-Remote	Low	**E-Minor**	1-Remote	Low		GW	The consequence of this risk is that small quantities of process water enters the underlying geology and ultimately groundwater. The quantities involved would have to be immeasurably small, otherwise they would be detected during normal operation.
Location	Weather	Rainfall	Any depositions on the external bunds may cause contamination of the rainwater.	Some rainwater used in the process. Excess rainwater discharged to surface water sewer.	Control system required to differentiate between water suitable for surface water sewer discharge and contaminated water that needs to be treated on site. Operators to be trained and motivated to keep contamination to a minimum.			#N/A		6-Highly Likely	Nil		SW/GW	Rainfall will dilute contaminants and correct design of drainage system will mean there is no impact.
	Subsidence/Heave	Causes a leak and breaches the impermeable surfaces	Small quantity enters bund or inside of building, but drains into subsoil.	All structures designed and constructed to BSI standards.	If ground conditions dictate, use a specialist design and build contractor. Monitor bund condition daily.			#N/A	**C-Major**	1-Remote	Medium		GW	None of the materials that could leak into the groundwater could have more than a *major* effect on the groundwater because the failure mode of a properly constructed bund will be such that the volumes of material that could leak past the failed bund will be low.
Other Hazards	Any Other Hazards / Issues	Fire	Large amounts of water used which could be contaminated.	Large parts of the site are bunded or impermeable.	Include fire containment and sprinkler systems. Consider providing sealed surface and adequate drainage outside of bund (e.g. tarmac roadways)	C-Major	3-Unlikely	High	**D-Moderate**	1-Remote	Low		SW/GW	Direct risk to surface water, remote risk to groundwater.

TITLE: **NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**

Date: 12-May-15

Description: Perched Groundwater in Made Ground

Drawings:

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Construction	Construction	Dewatering during construction	Water storage and disposal leaks/discharge to sw/gw	Water storage and disposal to be undertaken using best practice and contaminated waters discharged within closed drainage system	Construction and design undertaken using the latest environmental guidance	E-Minor	3-Unlikely	Medium	**E-Minor**	2-Highly Unlikely	Low		GW/SW	Temporary construction activity with low risk therefore no residual effects considered.
Construction	Piling	Puncturing the Alluvium/London Clay and allowing perched groundwater to flow to underlying aquifers	Potential source of contamination and highly vulnerable waters entering underlying aquifers	Piling design and installation using best practice installation methodology	Construction and design undertaken using the latest guidance: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention	B-Massive	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low		GW	Residual risk to groundwater is minimised as risk considered in the pilling design and piling methodology.
Construction	Excavations and artificial pathways created along underground services	Puncturing the Alluvium/London Clay and allowing perched groundwater to flow to underlying aquifers	Potential source of contamination and highly vulnerable waters entering underlying aquifers	Excavations and installation of services using best practice construction methodology	Construction and design undertaken using the latest environmental guidance	C-Major	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low		GW	Residual risk to groundwater is minimised as risk considered in the design and construction methodology.
Construction	Construction and demolition groundworks	Puncturing the Alluvium, or groundworks in locations where no alluvium present, allowing perched groundwater to flow to KPG	Potential source of contamination and highly vulnerable waters entering KPG	Dewatering or flow barrier for Made Ground groundwater using best practice construction methodology	Construction and demolition methodology undertaken using the latest environmental guidance	C-Major	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low		GW	Residual risk to groundwater is minimised as risk considered in the construction methodology.

TITLE:	**NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**													
Date:	05-Mar-15													
Description:	EfW infill soils													
Drawings:						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Construction	Excavations and artificial pathways created along underground services	New pathways for infiltration and leaching of possible contamination within the soils	Small quantity of water Infiltrating through the Made Ground and entering groundwater.	Excavations and installation of services using best practice construction methodology	Construction design using the EA Prevention of Pollution Guideline and activities will be avoided where any potential for contamination cannot be controlled.	E-Minor	3-Unlikely	Medium	**E-Minor**	2-Highly Unlikely	Low		GW	Residual risk to groundwater is minimised as risk considered in the design and construction methodology.

NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment

05-Mar-15

Groundwater in KPG

					Before Safeguards			After Safeguards					
					Risk - Scenario/Event			**Risk - Ground Water**					
Guide word	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Construction	Dewatering during construction	Water storage and disposal leaks/discharge to sw/gw	Water storage and disposal to be undertaken using best practice and contaminated waters discharged within closed drainage system	Construction and design undertaken using the latest environmental guidance	E-Minor	3-Unlikely	Medium	**E-Minor**	2-Highly Unlikely	Low			Temporary construction activity with low risk therefore no residual effects considered.
Piling	Puncturing the London Clay and allowing perched groundwater to flow to underlying aquifers	Potential source of contamination and highly vulnerable waters entering underlying aquifers	Piling design and installation using best practice installation methodology	Construction and design undertaken using the latest guidance: Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention	B-Massive	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low			Residual risk to groundwater is minimised as considered in the piling design and methodology.
Excavations and artificial pathways created along underground services	Puncturing the London Clay and allowing perched groundwater to flow to underlying aquifers	Potential source of contamination and highly vulnerable waters entering underlying aquifers	Excavations and installation of services using best practice construction methodology	Construction and design undertaken using the latest environmental guidance	B-Massive	3-Unlikely	High	**E-Minor**	2-Highly Unlikely	Low			Residual risk to groundwater is minimised as considered in the construction design and methodology.
Construction	Dewatering during construction	Dewatering of KPG during construction and possible mobilisation of contaminants within the KPG and to the Salmon Brook	Best practice methodology and construction design to minimise effect on aquifer and dewatering volumes would be controlled and tested.	Monitoring of groundwater and surface water would be included in the COCP	E-Minor	4-Possible	Medium	**E-Minor**	2-Highly Unlikely	Low		GW/SW	Temporary construction activity with low risk therefore no residual effects considered.

TITLE: **NLWA - Edmonton - Hazard Identification (HAZID) & Risk Assessment**

Date: 05-Mar-15

Description: Made Ground Soils

Drawings:

						Before Safeguards			After Safeguards					
						Risk - Scenario/Event			**Risk - Ground Water**					
Hazard Category	**Guide word**	**Hazardous Scenario/ Event**	**Consequences**	**Safeguards**	**Recommendations**	**Sev**	**Freq**	**Risk**	**Sev**	**Freq**	**Risk**		Receptor (GW/SW)	Comment
Construction	Stockpiling	Leaching and runoff from Surface stockpiling of soils	Small quantity of water Infiltrating through the stockpile may allow small quantity of contaminants to enter groundwater or overland flow to surface water.	Best practice methodology for management of construction material and excavations following EA Prevention of Pollution Guidelines.	Stockpiling undertaken using the EA Prevention of Pollution Guideline and activities will be avoided where any potential for contamination cannot be controlled.	D-Moderate	4-Possible	High	**E-Minor**	2-Highly Unlikely	Low		GW/SW	Temporary construction activity with low risk therefore no residual effects considered.

NORTH LONDON WASTE AUTHORITY

NORTH LONDON HEAT AND POWER PROJECT

ENVIRONMENTAL STATEMENT: VOLUME 2 APPENDIX 7.3 PILING RISK ASSESSMENT

AD06.02

North London Waste Authority

North London Heat and Power Project

Piling Risk Assessment

35180-36-LEA-REP-025

Issue | October 2015

Amec Foster Wheeler Environment & Infrastructure UK Ltd.

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Executive Summary

i.i.i Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler) was commissioned by North London Waste Authority (the Application) to undertake a piling risk assessment at Edmonton EcoPark. The Applicant is seeking a Development Consent Order (DCO) for the North London Heat and Power Project (the Project), which includes a proposed Energy Recovery Facility (ERF) and associated infrastructure to replace the existing Energy from Waste (EfW) facility. As part of the DCO application, an Environmental Statement (ES) has been undertaken. The Environment Agency (EA) has identified a piling risk assessment as a requirement to support the ES.

i.i.ii The Project consists of a proposed ERF in the northernmost section of the Edmonton EcoPark that will comprise:

a. a waste reception area;

b. a storage bunker;

c. the main combustion and boiler plant;

d. an ash recycling facility; and

e. a turbine, as well as administration buildings.

i.i.iii The waste stream will be derived from domestic and business sources and will not include separately collected hazardous wastes. In the south and east, a one storey Recycling and Fuel Preparation Facility (RFPF) and two storey EcoPark House office building are proposed. As part of the construction of the new waste facility and associated structures, piles are required to be installed.

i.i.iv The significant considerations from piling are:

a. introduction of new hazards at the Edmonton EcoPark;

b. creation of new pathways from sources of potentially polluting substances to the underlying Principal Aquifer (chalk) and public water abstraction from that aquifer (the Edmonton EcoPark lies within the inner Source Protection Zone (SPZ) for a public water abstraction); and

c. risk to sub-surface archaeology.

i.i.v The Edmonton EcoPark is generally flat and low-lying. It has been used as a waste management site since the 1960s.

i.i.vi The Edmonton EcoPark is underlain by Made Ground, a thin layer of Alluvium and then the Kempton Park Gravels (River Terrace Deposits), beneath this is the London Clay, Lambeth Group, Thanet Sands and Chalk.

i.i.vii The Kempton Park Gravels, Thanet Sands and the sandier horizons in the Lambeth Group are Secondary Aquifers and the Chalk is a Principal Aquifer.

i.i.viii The Edmonton EcoPark is within an inner (zone 1) and outer (zone 2) groundwater SPZ for a public water supply borehole at Chingford 400m east of the Edmonton EcoPark, which abstracts groundwater from the Chalk.

i.i.ix The low permeability layers in the Lambeth Group and the London Clay provide protection to the underlying Chalk by limiting downward movement of groundwater from the surface.

i.i.x In the centre of the Edmonton EcoPark, the London Clay is absent where it was removed to permit construction of the existing EfW bunker.

i.i.xi Groundwater is found at shallow depth in the Kempton Park Gravels and generally flows to the southwest.

i.i.xii Groundwater quality in the Chalk is anticipated to be good, reflecting its use for potable water supply. The Thanet Sand is commonly found to be in hydraulic connectivity to the Chalk and therefore its water quality is also anticipated to be good.

i.i.xiii There is some contamination in the Kempton Park Gravels and Lambeth Group (exceedences of water quality standards) for ammonium, chloride, sulphate, metals and metalloids (aluminium, arsenic, boron, cadmium, chromium, copper, mercury, iron, nickel, and selenium), phenols and vinyl chloride.

i.i.xiv The assessment considered the risks associated with piling on the underlying ground water and the transportation of contaminated soils into the underlying Thanet Sands. The assessment considers the risks in generic terms as the method of installation, structural load and subsequent length of the piles are not known. Further detailed risk assessment will be required to be undertaken by the appointed piling contractor when these details are known.

1 Introduction

1.1 Terms of reference and purpose of this report

1.1.1 Amec Foster Wheeler Environment & Infrastructure UK Ltd (Amec Foster Wheeler) has been commissioned by North London Waste Authority (the Applicant) to undertake a piling risk assessment at the Edmonton EcoPark.

1.1.2 The Applicant is seeking a Development Consent Order (DCO) for the North London Heat and Power Project (the Project), which includes a new Energy Recovery Facility (ERF) and associated infrastructure to replace the current Energy from Waste (EfW) facility. As part of the DCO application, an Environmental Statement (ES) has been undertaken. The Environment Agency (EA) has identified a piling risk assessment as a requirement to support the ES.

1.1.3 The DCO Application Site boundary includes a laydown area to the east and an area in the north-west related to the pump station pipework. This assessment has been undertaken for the Edmonton EcoPark only.

1.1.4 The report is primarily based on the Environment agency guidance detailed in Box 6.1 of National Groundwater and Contaminated Land Centre Report NC/99/73[1].

1.2 Summary of the proposed Project

1.2.1 The Project consists of a proposed ERF which will be developed in the northernmost section of the site and will comprise:

a. a waste reception area including a storage bunker;

b. the main combustion and boiler plant;

c. an ash recycling facility; and

d. a turbine, as well as administration buildings.

1.2.2 The waste stream will be derived from domestic and business sources and will not include separate hazardous wastes. The buildings currently in the north of the Edmonton EcoPark are to be demolished.

1.2.3 In the south of the Edmonton EcoPark a one storey Resource Recovery Facility (RRF) is proposed, and in the area to the east of the Edmonton EcoPark a two storey EcoPark House office building is proposed.

1.2.4 The existing EfW facility and below ground bunker will be demolished and backfilled, as well as the current Waste Water Treatment Plant once the proposed ERF is fully operational. Risk assessment and method statements for this aspect of the scheme will be dealt with under a separate report.

1.2.5 For the proposed construction, the significant considerations for groundwater are the creation of new pathways from sources of potentially polluting substances to the underlying Principal Aquifer (chalk) and public

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[1] National Groundwater and Contaminated Land Centre Report (2001) Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention

water abstraction from the aquifer due to the introduction of piled foundations. The Edmonton EcoPark lies within the inner Source Protection Zone (SPZ) for the public water abstraction which indicates that groundwater underlying the Edmonton EcoPark is within 50 day travel time to the abstraction.

1.2.6 From consultation with the Environment Agency (EA), the Project raised the following considerations for groundwater protection:

a. changes in groundwater levels in the Kempton Park Gravels due to the installation of an impermeable ERF bunker structure;

b. disturbance of groundwater flow in the Kempton Park Gravels as a result of the construction of an underground waste bunker for the proposed ERF that will fully penetrate that aquifer;

c. maintaining the protection to underlying, sensitive aquifers provided by the low permeability London Clay. The EA require that a minimum thickness of London Clay (5m) is maintained beneath the waste bunker and other deep structures; and

d. The potential for foundation piles to create pathways for migration of contaminants from the surface into sensitive aquifers underlying the London Clay.

1.3 Sources of information

1.3.1 This piling risk assessment is based on information contained in the reports listed in Table 1.1 and on publicly available sources of information. Previous reports comprise desk studies, site investigation reports and regulatory liaison.

Table 1.1 Sources of information

Report reference number	Report title	
Site investigations		
29541rr009i2 (March 2011)	Entec (now Amec Foster Wheeler), 2011. North London Waste Authority. ISDS Baseline Geo-environmental Site Investigation Report.	This investigation comprised the drilling and installation of 22 boreholes, and drilling of 34 window sample holes (the majority of which were also installed as groundwater monitoring points). Six boreholes were progressed into the Lambeth Group. The depths to this stratum were found to vary between 11.2m bgl, (0.36m above Ordnance Datum (AOD)) in the south of the Edmonton EcoPark, and 24.2m bgl (-12.45m AOD), in the north, indicating a marked variation in the thickness of the London Clay.
29541rr036i3 (February 2012)	AMEC, 2013. North London Waste Authority. ISDS Baseline Geo-environmental Supplementary Site Investigation Report.	The 2012 investigation was designed to provide clarification of the profile of the upper surface of the Lambeth Group by means of four boreholes progressed to the Lambeth Group to aid interpretation of the geological structure.
35180r010i2 (June 2014)	AMEC, 2014. North London Waste Authority. Geotechnical Ground Investigation.	This investigation, comprised of 13 boreholes, which were designed to provide further clarification of the geological structure and geotechnical properties of the geology beneath the north of the Edmonton EcoPark. Groundwater monitoring standpipes were installed at five locations, four within the Lambeth Group and one within the Kempton Park Gravels to supplement the existing groundwater monitoring network.
29541rr084i2 (December 2014)	Amec Foster Wheeler, 2015. North London Waste Authority. Supplementary Ground Investigation - Energy for Waste Area.	This investigation was undertaken to confirm the geology in the vicinity of the existing EfW facility. Two boreholes were drilled to between 8 and 25m bgl.
29541rr086i2 (December 2014)	Amec Foster Wheeler, 2015. North London Waste Authority. Geoenvironmental Desk Study and Supplementary Ground Investigation - Wharf Area	This was undertaken to investigate baseline geo-environmental ground conditions in the Wharf Area which is located along the eastern Edmonton EcoPark margin. Two boreholes were drilled to 25m bgl, one borehole was installed in the Kempton Park Gravels.
PEIR Vol 1 Appendix 5.3	Arup, 2015 Archaeology Desk Based Assessment	This was undertaken to investigate the historic environment at the Application Site.

1.3.2 All boreholes in the above studies were drilled using cable percussive methodology with 2 hour and 24 hour bentonite and grout seal approved by the EA, to ensure no pollutant pathways were created by the ground investigation boreholes.

2 Site location, descriptions and setting

2.1.1 The description provided in the following section is a summary to provide background information pertinent to this report. Further details are provided in the reports listed in Table 1.1.

2.1 Site location and description

Site Name and Address:	LondonWaste Ltd (LWL), EcoPark, Advent Way, Edmonton, London N18 3AG		
Grid Reference:	TQ 35750 92860	Site Area:	15.6 ha
Current Site Use:	Waste operations comprising: existing EfW facility, ash recycling facility, composting plant, waste transfer station and bulky waste recycling facility. There is also a lorry park and open landscaped areas.		
Proposed Site Project:	Waste operations comprising: proposed ERF and associated infrastructure		

2.1.1 This assessment has been undertaken for the Edmonton EcoPark, as shown in Figure 1.

2.1.2 The Environmental Impact Statement has been undertaken for the Development Consent Order (DCO) Application Site, shown in Figure 1, which includes a laydown area to the east of the Edmonton EcoPark and an area in the northwest related to the pump station pipework. As the groundwater data available is for the Edmonton EcoPark and no groundworks are anticipated at the Temporary Laydown Area or pump station area, this assessment has been undertaken on the Edmonton EcoPark only.

2.2 Site topography and existing land use

2.2.1 The Edmonton EcoPark is generally flat and low lying at approximately 11m Above Ordnance Datum (AOD), with the exception of raised areas in the northeast at approximately 14m AOD. The south of the Edmonton EcoPark, where the main entrance is located, is generally landscaped areas with surfaced roads and car parks. The main process areas of the Edmonton EcoPark are in the centre and north and there are further landscaping in the east. The main process plant can be divided into four operational areas:

a. Existing EfW Facility in the centre of the Edmonton EcoPark. It comprises a large building incorporating a tipping hall, waste storage bunkers and waste treatment technology;

b. Ash recycling facility to the north of the EfW area. It comprises a sheds and an open area of ash storage;

c. Composting plant in the north west of the Edmonton EcoPark. This area comprises several storage and composting sheds; and

d. Waste transfer station in the north eastern corner of the Edmonton EcoPark. It comprises storage areas for combustible waste (used to fuel the existing EfW facility), recyclables and non-recyclables.

2.2.2 The existing Edmonton EcoPark layout is shown on Figure 2.

2.3 Adjacent land use

2.3.1 The Edmonton EcoPark is in a commercial/industrial setting. Land uses adjoining the Edmonton EcoPark are outlined below:

Direction	Land uses
North	Immediately north of the Edmonton EcoPark are commercial/light industrial properties. Beyond these is the Deephams Sewage Treatment Works.
East	The Enfield Ditch borders the majority of the Edmonton EcoPark. Beyond this is 'Lee Park Way', an access road which forms part of National Cycle Route 1. The River Lee Navigation is immediately to the east of this road, then there is an area used for recycling construction and demolition wastes.
South	The North Circular (A406) is immediately to the south. Beyond this are commercial properties and the planned Meridian Water development scheme.
West	Salmon's Brook is immediately to the west. Beyond this is the Eley Industrial Estate.

2.4 Site history

2.4.1 This Edmonton EcoPark has been used as a waste management site since the late 1960s. The Edmonton EcoPark had very limited use prior to its current function, although the northern part of the Edmonton EcoPark was formerly occupied by sludge beds. The surrounding area, particularly to the south and west, has had significant industrial development from at least 1896.

2.5 Regional geology and hydrogeology

2.5.1 The British Geological Survey (BGS) boreholes and regional mapping record the geological sequence identified in Table 2.1 at the Edmonton EcoPark as Made Ground overlying natural deposits in the vicinity of the Edmonton EcoPark. The Edmonton EcoPark is mapped as London Clay overlain by superficial deposits of Alluvium. The published data indicates London Clay is approximately 7.5 to 10m bgl (below ground level). The thickness of the Lambeth Group and Thanet Sands is not identified for the Edmonton EcoPark, although BGS borehole records to the south-west of the Edmonton EcoPark identify the base of the Lambeth Group at 22m bgl and base of the Thanet Sand at 27m bgl. BGS borehole logs in the vicinity of Edmonton EcoPark record Chalk between 32.5m bgl and 36m bgl, whilst a borehole to the east of the Edmonton EcoPark identifies Chalk at 43m bgl.

Table 2.1 Regional geological summary and aquifer designation

Strata	Typical constituents	Estimated thickness	Aquifer status
Made Ground	Variable historic demolition rubble, including ash and clinker	Generally <5m	Not Applicable
Alluvium	Silty clay	Absent to <3m	Secondary Aquifer
Kempton Park Gravels (River Terrace Deposits)	Variably sandy, silty and clayey gravels	<5m	Secondary Aquifer
London Clay	Grey, occasionally sandy or silty clay	7.5-10m	Unproductive Strata
Lambeth Group (formerly known as the Woolwich & Reading Beds)	Grey, sandy clay	Unknown	Secondary Aquifer
Thanet Sand	Silty or clayey sand	Unknown	Secondary Aquifer
Upper Chalk	Off-white carbonaceous limestone with flints	>30m	Principal Aquifer

2.5.2 The Edmonton EcoPark falls within an EA-designated inner (zone 1) and outer (zone 2) groundwater Source Protection zone (SPZ) for a public water supply borehole at Chingford 400m east of the Edmonton EcoPark, as shown in Figure 4. The public water supply source abstracts groundwater from the Chalk aquifer which is defined as a principal aquifer by the EA. This aquifer is overlain by the Thanet Sands, Lambeth Group and London Clay. The low permeability layers in the Lambeth Group and the London Clay provide protection to the underlying Chalk by limiting downward movement of groundwater from the surface.

2.5.3 There are no licensed groundwater abstractions within 250m of the Edmonton EcoPark but four abstractions between 250m and 500m from the Application Site. In addition to the Chingford public water supply there is also a private potable water supply borehole located approximately 400m to the east. Three sites related to water bottling with a further site for general use are all located to the west within 500m of the Application Site.

2.6 Site geology

2.6.1 A summary of the ground conditions at the Edmonton EcoPark based on data obtained in ground investigations undertaken at the Edmonton EcoPark between March 2011 and December 2014 is provided in Table 2.2. Borehole logs are provided as appendices to the Hydrogeological Risk Assessment and a borehole location plan is presented as Figure 3.

Table 2.2 Site geological summary and aquifer designation

Strata	Typical constituents	Approximate thickness	Aquifer status
Made Ground	Variable historic demolition rubble, including ash and clinker	1.0 -7.5m	NA
Alluvium	Silty clay	Absent to 3.8m	Secondary Aquifer
Kempton Park Gravels (River Terrace Deposits)	Variably sandy, silty and clayey gravels	1.1 - 4.6m	Secondary Aquifer
London Clay	Grey, occasionally sandy or silty clay	0.7 - 18.1m	Unproductive Strata
Lambeth Group (formerly known as the Woolwich and Reading Beds)	Grey, mottled brown, sandy clay	Unknown	Secondary Aquifer
Thanet Sand	Silty or clayey sand	Unknown	Secondary Aquifer
Upper Chalk	Off-white carbonaceous limestone with flints	>50m	Principal Aquifer

2.6.2 Site investigation has confirmed the geological sequence. A thin layer of Alluvium was identified across much of the Edmonton EcoPark overlying the Kempton Park Gravels (River Terrace Deposits) but at a number of locations the Alluvium was absent. No water strikes were encountered in the Alluvium.

2.6.3 The Kempton Park Gravels underlies the Alluvium. They have a thickness of 1.1 to 4.6m (average 3m). The base of the Kempton Park Gravels (top of the London Clay) was between 3.5 and 7.9m AOD.

2.6.4 The London Clay was found to be a stiff to hard grey/brown silty clay with occasional flint gravel. The base of the London Clay falls from 3.2m AOD, in the south at BH402 to -12.5m AOD in the north of the Edmonton EcoPark at BH116); a difference of 15.6m over a distance of approximately 400m. This variation suggests a more complex structure than typically anticipated at the interface between these strata.

2.6.5 The Lambeth Group comprised very dense clayey sand and sandy clay with shell fragments with sandy silt and clay bands. The base of this stratum was not proven in exploratory holes. Sand layers were identified within the Lambeth Group and were often associated with water strikes.

2.7 Made Ground

2.7.1 Made Ground was encountered at all intrusive locations to a depth that varied between 6.9 and 9.5m AOD. All boreholes were drilled through hardstanding of asphalt or concrete, followed by hardcore and gravel. Beneath this Made Ground generally comprised clayey sand or gravelly, sandy clay, with brick and concrete. Asphalt and clinker were encountered in several boreholes and asbestos may be associated with these demolition materials. There was very little visual/olfactory evidence of contamination in the Made Ground, although hydrocarbon odours were noted in BH301 and BH308. Boreholes drilled within the EfW bunker excavation found Made Ground down to 2.1 to 4.5m AOD, which is much deeper than elsewhere on-site. This thickness is a result of the backfilling of the bunker after construction.

2.8 Natural ground

Alluvium

2.8.1 Alluvium was encountered beneath the Made Ground in the majority of locations but was absent at BH109, BH304, BH312, BH403 and BH404. It generally consisted of very soft to soft, silty, frequently organic clay, with soft fibrous peat present. The base of the alluvium where present, was at 6.4 to 9.0m AOD.

Kempton Park Gravels

2.8.2 This comprised medium dense silty, gravelly sand and silty sandy gravel. Gravels were predominantly flint. It was encountered at all locations with the exception of BH403 and BH404 in the existing EfW bunker area. The base was between 3.5 to 7.9m AOD.

London Clay

2.8.3 This stratum comprised firm to stiff clay with local laminations, silty clay and slightly sandy clay. The base varied from 3.2 to -12.5m AOD. Generally the London Clay is thickest in the northeast of the Edmonton EcoPark, varying from 10.8m at BH301 in the northwest to 17.9m at BH313 in the northeast. The London Clay thins to the south to 3.1m at BH124 and 0.7 m at BH402 in the Wharf area in the southeast, Figures 6 and 7 indicate the surface and base levels of the London Clay across the site.

2.8.4 Contours of the upper and lower surfaces of the London Clay, as well as the thickness of London Clay, are shown in Figures 5, 6 and 7. Geological cross-sections from south-southwest to north-north-east through the Edmonton EcoPark (Section A – A’) and from west to east across the proposed ERF area in the north of the Edmonton EcoPark (Section B – B’) are provided as Figure 8 and Figure 9 respectively. The location of the cross-sections is shown in Figure 5.

2.8.5 Cross section A - A’ shows that the base of the London Clay is shallowest in the southwest and deepest in the northeast.

2.8.6 Cross section B – B’ shows that the thickness of the London Clay is greatest towards the eastern Edmonton EcoPark boundary.

Lambeth Group

2.8.7 The Lambeth Group comprises very dense clayey sand and sandy clay with shell fragments, with some stiff to very stiff sandy silt bands. Boreholes were not sunk to the base of the stratum to prevent the creation of potential pathways to the Chalk aquifer. From the geological sequence identified from borehole logs to the southwest of the Edmonton EcoPark, the thicknesses of the Kempton Park Gravels and London Clay are similar to those recorded in the south of the Edmonton EcoPark. The off-site boreholes identify the base of the Lambeth Group at approximately 22m bgl (-11m AOD assuming a ground level of 11m AOD) and therefore its base may be at a similar depth to that in the south of the Edmonton EcoPark. Figures 8 & 9 show the significant variation in thickness of the Lambeth Group across the site, varying from approximately 17m towards the south of the site to approximately 7m towards the north. As the London Clay thickens in the north of the Edmonton EcoPark, the base of the Lambeth Group is anticipated to be at a lower elevation there. The borehole logs indicated that the Lambeth Group had increased sand content with depth, which could indicate an increased hydraulic conductivity and a possible hydraulic connection with the underlying Thanet Sands.

3 Hydrogeology

3.1 Groundwater levels

Made Ground

3.1.1 The Made Ground is not designated as an aquifer. There were several water strikes within the Made Ground. These are likely to be perched water in waterbearing strata overlying the clays and low permeability peaty silt layers within the Alluvium. These water-bearing Made Ground layers are laterally discontinuous and are not in hydraulic connection with the Kempton Park Gravel Aquifer.

Alluvium

3.1.2 The Alluvium is a Secondary A Aquifer. No water strikes were encountered in the Alluvium at the Edmonton EcoPark. Due to the low permeability of the peaty silts, this layer does not appear to transfer water but rather act as an aquiclude or aquitard and is likely to provide some protection to the underlying aquifer, where present.

Kempton Park Gravels

3.1.3 The Kempton Park Gravels is also a Secondary A Aquifer. They have been identified in all boreholes as water bearing, with the exception of BH403 and BH404 where it is believed that the gravels were removed to permit excavation for the existing EfW bunker. Groundwater levels are between 7.12 and 9.45m AOD. Groundwater level data for 2012 to 2014 has been interpreted to understand flow directions. Flow was generally in a southerly to south-south-westerly flow direction. The flow direction in November 2014 showed a change due to a decrease in water levels across the north of the Edmonton EcoPark and was to the north across the northern part of the Edmonton EcoPark, but a general south-south-westerly flow direction in the southern half of the Edmonton EcoPark. This indicates flow off-site through the northern boundary at that time. Groundwater contours for May 2014 and November 2014 are shown in Figure 10 and Figure 11.

3.1.4 The Kempton Park Gravels are absent around the existing EfW bunker. It is believed that they were excavated during construction of the bunker and that the resulting void was backfilled with gravelly clay and clayey sand and gravel. Water strikes in BH403 and BH404 in the backfill were at a similar level to groundwater level in the Kempton Park Gravel. This may indicate a hydraulic connection between the Kempton Park Gravel and backfill. No further water strikes or groundwater inflows were recorded below this depth.

London Clay

3.1.5 The London Clay is categorised as Unproductive Strata. No water strikes or water bearing strata were identified within the London Clay on-site.

3.1.6 The results of laboratory permeability testing indicate that the London Clay has a low permeability (mean value 2.9×10^{-11}m/s) across the Edmonton EcoPark. The London Clay is therefore an aquitard that provides protection to the underlying aquifers by limiting vertical movement of groundwater.

3.1.7 The London Clay thins from the north to the south of the Edmonton EcoPark. The areas where the London Clay is thickest provide the greatest protection to the underlying aquifers. In the existing EfW bunker excavation area, the London Clay is absent. It is believed that the London Clay was excavated in this location.

Lambeth Group

3.1.8 The Lambeth Group is a Secondary A Aquifer. Beneath the Edmonton EcoPark it consists of clayey sand and sandy clay and sandy silt layers. Water strikes were encountered in the sandy silt layers. However, the sand layers do not appear to be laterally continuous across the Edmonton EcoPark.

3.1.9 Groundwater level monitoring in the Lambeth Group is limited to four boreholes (BH201, BH202, BH203 and BH204) for which data is available for 2011 and 2012. Groundwater levels are recorded between 8.6m AOD and 3.61m AOD. These boreholes monitor groundwater at different depths but are all within sandy silt layers. There does not appear to be any consistency in the levels, suggesting that there is not any lateral hydraulic connectivity across the Edmonton EcoPark in this stratum. However, this interpretation is based on a limited data set. The base of the Lambeth Group has not been proven on-site.

3.1.10 The results of laboratory permeability testing on samples of silty clay found low hydraulic conductivity (mean 9.02×10^{-11}m/s), similar to the London Clay. These results indicate that the Lambeth Group clays are likely to provide protection to underlying aquifers, where present.

Chalk and Thanet Sand Formations

3.1.11 No site-specific information is available for the Thanet Sand or Chalk Formations. These formations are believe to be in hydraulic connection with each other. Groundwater flow directions within the deeper Chalk aquifer are likely to be towards abstraction wells to the east.

4 Summary of groundwater quality, ground contamination and ground gas

Introduction

4.1.1 The groundwater quality, ground contamination and ground gas assessment was undertaken as part of the hydrogeological risk assessment, the summary provided below is extracted from Amec Foster Wheeler report 35180-16/LON-REP-006 NLWA Hydrogeogical risk assessment, dated May 2015.

Groundwater quality

4.1.2 Groundwater monitoring has been undertaken at the site during site investigations and as part of Environmental Permitting to characterise groundwater quality and establish baseline concentrations for potentially polluting substances.

4.1.3 Site-specific groundwater quality monitoring data is limited to the Kempton Park Gravels and the Lambeth Group.

4.1.4 Groundwater quality in the deeper aquifers (Thanet Sands and Chalk) is anticipated to be good, reflecting its use for potable water supply.

4.1.5 Groundwater quality in the Kempton Park Gravels is the most likely to have been affected by contamination from the existing site operations and from neighbouring sites due to its proximity to surface activities.

Ground contamination

Made Ground

4.1.6 Leachate samples for Made Ground soils were screened against the Drinking Water Standards (DWS) and fresh water Environmental Quality Standards (EQS). Concentrations of ammonium, dissolved metals (aluminium, arsenic, boron, iron, lead, mercury and nickel) and total cyanide exceeded DWS and dissolved metals (cadmium, chromium, copper and zinc) exceeded the fresh water EQS. This is consistent with the parameters that exceeded these standards in the Kempton Park Gravel aquifer and indicate Made Ground may be a source of contamination to shallow groundwater.

Kempton Park Gravels

4.1.7 Ammonium, chloride, sulphate, metals and metalloids (aluminium, arsenic, boron, cadmium, chromium, copper, mercury, iron, nickel, and selenium), phenols and vinyl chloride have been found above DWS and/or EQS. There is no drinking water standard for total Polycyclic Aromatic Hydrocarbons PAH but they were detected above in two samples.

Lambeth Group

4.1.8 Groundwater in the Lambeth Group shows water quality standard exceedances of ammonium in every sample and some exceedances for sulphate, chloride, aluminium, chromium, iron and selenium.

4.1.9 The concentration of ammonium is highest in the northeast which may imply an off-site source to the north. However, these concentrations may represent a natural baseline and may indicate that groundwater in the Lambeth Group is under reducing (low quantity of oxygen) conditions.

Ground gas

4.1.10 A ground gas assessment was conducted in 2011 covering up to 33 locations across the Edmonton EcoPark over nine monitoring rounds.

4.1.11 A semi-quantitative approach was adopted for the assessment of ground gas data, following CIRIA C665. In order provide a conservative assessment, a Gas Screening Values (GSV) for the Edmonton EcoPark have been calculated by taking the maximum borehole flow rate (l/hr) (including peak flow) and multiplying it with the maximum gas concentration (per cent) at each location. The calculation is carried out for both methane and carbon dioxide and the worst case GSV adopted. The GSV is used to determine the Characteristic Situation (CS), as detailed in the guidance document.

4.1.12 Elevated carbon dioxide and/or methane concentrations were recorded in locations WS110, WS111, WS117, WS122, WS124 and WS130. CS2 typically applies at these locations (see Figure 3 for monitoring locations).

4.1.13 As a result of the presence of methane and carbon dioxide in some areas of the Edmonton EcoPark, the risk assessment identified that CS2 applies, or should be applied, in some areas of the Edmonton EcoPark. This classification provides guidance on the requirement for gas protection measures in future buildings.

5 Piling risk assessment

5.1 Introduction

5.1.1 This piling risk assessment only deals with piling operations at the Edmonton EcoPark in general terms as the method of construction has not yet been defined; a further assessment will be required once the method of piling is determined. This piling risk assessment should be used to inform the most appropriate method. The piling risk assessment considers two scenarios,

a. Piling into the London Clay terminating the toe of the pile above the base of the London Clay and above the deeper aquifers; and

b. Piling through the London Clay and terminating in the underlying Lambeth group.

5.1.2 The piling risk assessment considers the six potential pollution scenarios defined in EA (EA) report NC/99/73 Piling and penetrative ground improvement methods on land affected by contamination: Guidance on pollution prevention. Method specific risk assessments will be undertaken by the piling Contractor prior to the commencement of piling on site as this is beyond the scope of this report. The six EA potential pollution scenarios are:

1. creation of preferential pathways, through a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer;
2. creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface;
3. direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface;
4. direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration);
5. the driving of solid contaminants down into an aquifer during pile driving; and
6. contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.

5.1.3 Furthermore the piling risk assessment will assess the potential impact of the piling operations on the sub-surface archaeology.

5.2 Piling methods

5.2.1 For the purposes of the risk assessment Driven pre-cast concrete, Continuous Flight Auger (CFA) and Continuous Helical Displacement (CHD) piles have been reviewed.

5.3 Driven pre-cast concrete

5.3.1 Driven pre-cast concrete piles are manufactured off-site with reinforcement as required for the appropriate design situation in standard lengths. These reinforced concrete sections are driven into the ground using a hydraulic hammer until the required design length or design resistance is achieved. Where depths greater than the standard lengths are required driven pre-cast piles can be jointed. Figure 5.1 below details the installation process.

5.3.2 Pre-cast piles are essentially a displacement type pile with no appreciable arisings.

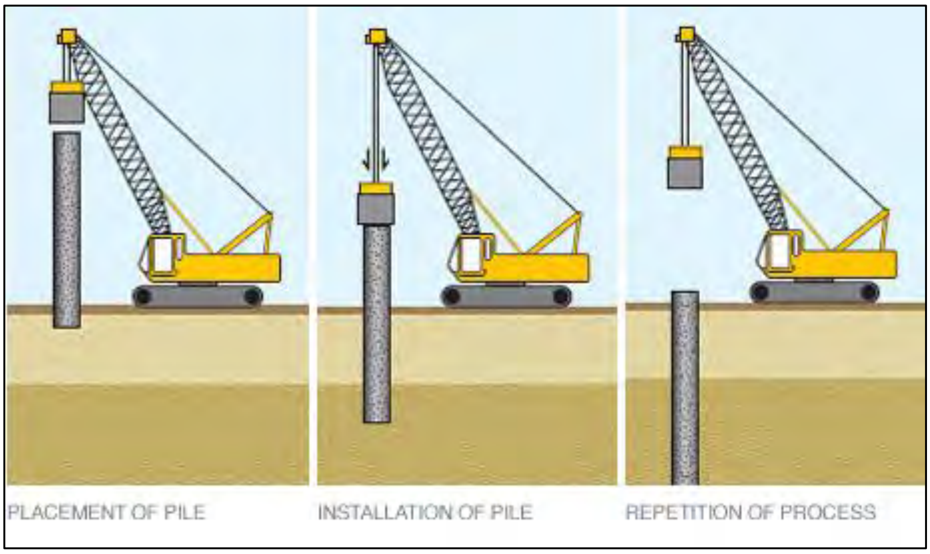


Figure 5.1 Driven Pile installation process (source: www.dutchfoundation.com)

5.4 Continuous Flight Auger

5.4.1 CFA piles are formed by drilling a CFA into the ground. The sides of the hole are supported at all times by the soil-filled auger, eliminating the need for temporary casing or bentonite slurry. Upon reaching the required depth, sand-cement grout or concrete is pumped down the hollow stem as the auger is steadily withdrawn. Reinforcement is placed immediately after withdrawal of the auger.

5.4.2 When the grout head is established, extraction is commenced at a rate consistent with grout supply. Positive rotation of the auger is necessary to retain the drilling spoil and to ensure that the grout fills the entire pile cross section. The grout pressure must be sufficiently high and the auger must not be extracted too fast. Otherwise, drilling spoil can enter into the freshly placed grout, resulting in a soil-contaminated pile shaft.

5.4.3 The CFA pile is essentially a non-displacement type pile i.e. material needs to be removed from the ground in order for the pile to be constructed. Hence, there is limited risk of damage to adjacent foundations or underground utilities from ground displacement or densification of loose sands, as can occur with displacement piles. Another advantage is that CFA piles can be installed with little vibrations or noise. Should problems occur during pile construction, it is relatively simple to re-drill and install the pile at the same location, thereby eliminating the need to redesign the pile group or the pile caps. Figure 5.2 below details the installation process.

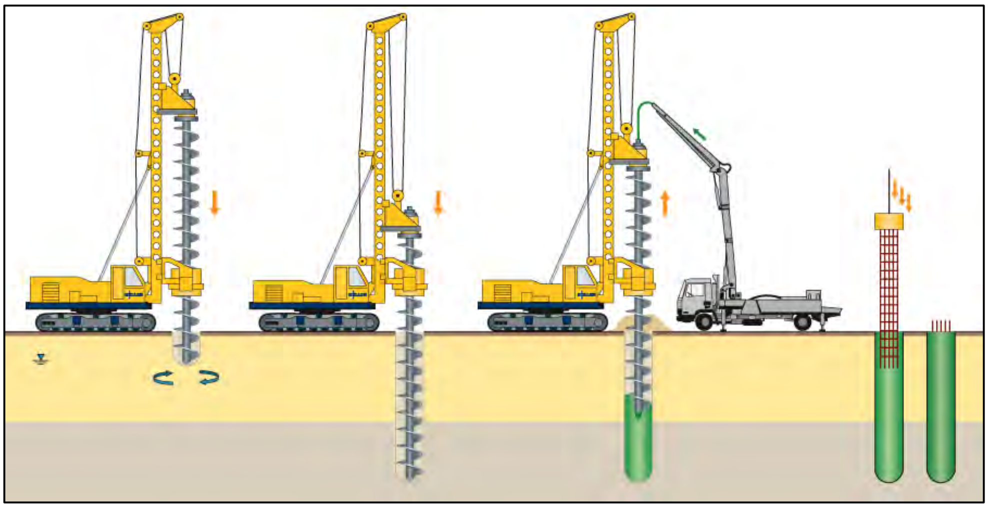


Figure 5.2 CFA Pile Installation Process (source: www.kellerholding.com)

5.5 Continuous Helical Displacement

5.5.1 CHD piles are bored piles which displace the soil through which it is constructed with no appreciable arisings.

5.5.2 The multi-flight shaft is drilled to the design depth and concrete is then pumped through the hollow stem of the shaft whilst the auger is reverse rotated and withdrawn forming a fluid concrete multi-flight shaft to ground level. Figure 5.3 below details the installation process.

5.5.3 Reinforcement is placed immediately after withdrawal of the auger.

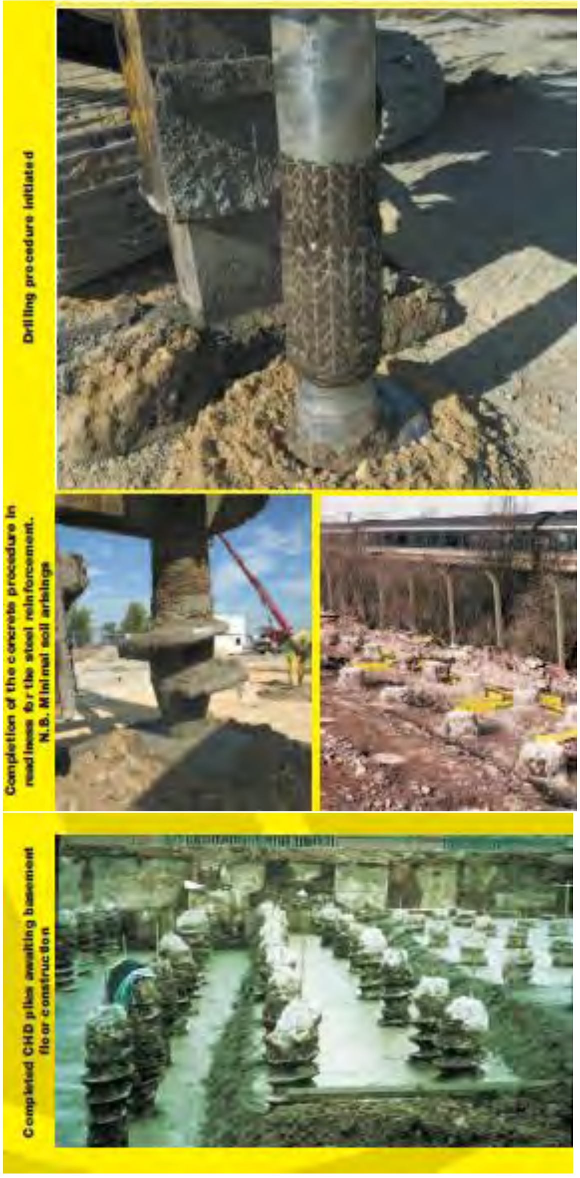


Figure 5.3 CHD Installation Process (source: www.roger-bullivant.co.uk)

5.6 Risk matrix

5.6.1 The risk matrix combines the likelihood of a hazard event occurring with the impact of the event to derive an overall risk. The likelihood and impact categories are summarised below.

5.6.2 The risk register is a means of documenting perceived risks and their importance and recording actions taken to manage them. The key elements of a geotechnical risk register are as follows:

a. identify the geotechnical risks;

b. identify the methods of construction that may be incorporated into the project;

c. scale the risks according to severity and impact;

d. based on the severity of each risk, decide on the type of action;

e. identify how each risk should be managed;

f. record the actions taken to manage the risk;

g. reassess the severity of each risk taken after action has been taken; and

h. review the risk register at regular intervals and communicate.

5.6.3 The risk register is a live document and should be reviewed on a regular basis and at the end of each stage of the project.

5.6.4 The risk matrix combines the likelihood of a hazard event occurring with the consequence of the event to derive an overall risk (low, moderate, high, critical). The likelihood and consequence categories are summarised in Table 5.1 and 5.2 respectively and the combined risk table is set out in Table 5.3.

Table 5.1 Likelihood of an event

	Likelihood					
	1	**2**	**3**	**4**	**5**	**6**
	Remote	**Highly unlikely**	**Unlikely**	**Possible**	**Likely**	**Highly likely**
Historical:	‘Unheard of in the industry’	‘Has occurred once or twice in the industry’	‘Has occurred many times in the industry, but not in the Company’	‘Has occurred once or twice in the Company’	‘Has occurred frequently in the Company’	‘Has occurred frequently at the location’
Frequency: (continuous operation)	Once every 10,000 - 100,000 years at location	Once every 1,000 - 10,000 years at location	Once every 100 - 1,000 years at location	Once every 10 - 100 years at location	Once every 1 - 10 years at location	More than once a year at location or continuously
Probability: (single activity)	1 in 100,000 - 1,000,000	1 in 10,000 - 100,000	1 in 1,000 - 10,000	1 in 100 - 1,000	1 in 10 - 100	> 1 in 10

Table 5.2 Environmental consequence of an event

Consequence		Description
A	Catastrophic	GW: Large scale impact (100s m). Exceedance of DWS in PWS boreholes with need to shut down supply or implement additional treatment. Long term/permanent impact.
B	Massive	SW: Large scale impact (100s to 1,000s m). Exceedance of drinking water in abstraction with need to shut down supply or implement additional treatment. Deterioration in ecological status of water body. Fish kill.
C	Major	GW: Large Scale (10-100m) impact on river gravel with exceedance of water quality standards, impact on deeper Tertiary and Chalk aquifers with exceedance of DWS. Long term (months/years) impact.
D	Moderate	SW: Large scale (100s m) impact on surface water with exceedance of water quality standards. Fish kill in surface water. Potable abstractions need to be taken out of supply. Medium term impact (days/weeks).
E	Minor	GW: Medium Scale (10s m) impact on river gravel aquifer with exceedance of water quality standards and impact on deeper Tertiary and Chalk aquifers with risk to groundwater abstractions. Medium term (months) impact.
F	Slight	SW: Medium scale (100s m) impact on surface water with exceedance of water quality standards. Fish kill. Short term (days/weeks) impact.

Table 5.3 Risk matrix

		1	2	3	4	5	6
		Remote	**Highly Unlikely**	**Unlikely**	**Possible**	**Likely**	**Highly Likely**
A	**Catastrophic**	**16**	**22**	**27**	**31**	**34**	**36**
B	**Massive**	**11**	**17**	**23**	**28**	**32**	**35**
C	**Major**	**7**	**12**	**18**	**24**	**29**	**33**
D	**Moderate**	**4**	**8**	**13**	**19**	**25**	**30**
E	**Minor**	**2**	**5**	**9**	**14**	**20**	**26**
F	**Slight**	**1**	**3**	**6**	**10**	**15**	**21**

Risk Management Controls		
27 - 36	**CRITICAL**	Risks must be reduced for Controlled Waters and other Risks. Significant and urgent actions required.
16 - 26	**HIGH**	Assess risk in more detail and look to reduce further, as appropriate. In accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
7 - 25	**MEDIUM**	Look to reduce further in accordance with the ALARP principle for HSE Risks, identification of management control measures and further safeguards.
1 - 6	**LOW**	Continue to manage and monitor risksby effective Risk Management.

5.7 Risk register

Table 5.4 Piling risk register – piles terminating in the London Clay Formation

Stage	Risk no.	Hazard	Prior to RCM			Risk Control Measure (RCM)	After RCM		
			Probability (P)	Impact (I)	Risk (PXI)		Probability (P)	Impact (I)	Risk
Driven Piling in to London Clay	01	Creation of preferential pathways, through a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer	4	E	14	Piles are to be terminated in the low permeability London clay with no interaction with the underlying aquifer with a minimum cover depth from the toe of the pile to the top of the Lambeth group.	2	E	5
Driven Piling in to London Clay	02	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
Driven Piling in to London Clay	03	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface	4	E	14	Driven piles to be utilised, displacing the soil, therefore no appreciable soil arisings are anticipated.	1	E	1
Driven Piling in to London Clay	04	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3
Driven Piling in to London Clay	05	The driving of solid contaminants down into an aquifer during pile driving	5	E	20	Piles are to be terminated in the low permeability London clay with no interaction with the underlying aquifer.	2	E	5
Driven Piling in to London Clay	06	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout	4	E	14	Piles are to be pre-cast concrete no wet concrete to be used.	1	E	2
Driven Piling in to London Clay	07	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium. Use an alternative method of piling to reduce the radial influence from the piling process.	2	E	5
CFA piling in to London Clay	08	Creation of preferential pathways, through low a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer.	4	E	14	Piles are to be terminated in the low permeability London clay with no interaction with the underlying aquifer.	2	E	5

Stage	Risk no.	Hazard	Prior to RCM			Risk Control Measure (RCM)	After RCM		
			Probability (P)	Impact (I)	Risk (PXI)		Probability (P)	Impact (I)	Risk
CFA piling in to London Clay	09	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
CFA piling in to London Clay	10	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface	4	E	14	All site personnel to be briefed on contamination risk and appropriate PPE to be worn.	2	E	5
CFA piling in to London Clay	11	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3
CFA piling in to London Clay	12	The driving of solid contaminants down into an aquifer during pile driving.	5	E	20	CFA piles replace the soil column as material is removed from the pile bore, no material should be transported down the pile as the pile shaft remains supported throughout the construction. Piles are to be terminated in the low permeability London Clay.	2	E	5
CFA piling in to London Clay	13	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	4	E	14	Piles are to be terminated in the low permeability London Clay.	1	E	2
CFA piling in to London Clay	14	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium.	2	E	5
CHD piling in to London Clay	15	Creation of preferential pathways, through low a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer.	4	E	14	Piles are to be terminated in the low permeability London clay.	2	E	5
CHD piling in to London Clay	16	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
CHD piling in to London Clay	17	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface	4	E	14	CHD piles densify the soils and displace as the auger is rotated creating little to no arisings.	1	E	1
CHD piling in to London Clay	18	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3

Stage	Risk no.	Hazard	Prior to RCM			Risk Control Measure (RCM)	After RCM		
			Probability (P)	Impact (I)	Risk (PXI)		Probability (P)	Impact (I)	Risk
		materials (where the secondary effects are to increase the potential for contaminant migration).							
CHD piling in to London Clay	19	The driving of solid contaminants down into an aquifer during pile driving.	5	E	20	CHD piles to terminate in the London Clay above the aquifer.	2	E	5
CHD piling in to London Clay	20	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	4	E	14	Piles are to be terminated in the low permeability London Clay.	1	E	2
CHD piling in to London Clay	21	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium.	2	E	5

Table 5.5 Piling risk register – piles terminating in the Lambeth Group

Stage	Risk No	Hazard	Prior to RCM			Risk Control Measure (RCM)	After RCM		
			Probability (P)	Impact (I)	Risk (PXI)		Probability (P)	Impact (I)	Risk
Driven Piling through London Clay	22	Creation of preferential pathways, through low a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer.	4	E	14	Driven piles have the potential to transport contaminants beneath to toe of the pile that has been driven through the contaminated ground. Use an alternative piling method, CFA/CHD	2	E	5
Driven Piling through London Clay	23	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
Driven Piling through London Clay	24	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface.	4	E	14	Driven piles to be utilised, displacing the soil, therefore no appreciable soil arisings are anticipated.	1	E	1
Driven Piling through London Clay	25	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3
Driven Piling through London Clay	26	The driving of solid contaminants down into an aquifer during pile driving.	5	E	20	Alternative method of piling required, CFA or CHD.	2	E	5
Driven Piling through London Clay	27	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	4	E	14	Piles are to be pre-cast concrete no wet concrete to be used.	1	E	2
Driven Piling through London Clay	28	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium.	2	E	5
CFA piling through London Clay	29	Creation of preferential pathways, through low a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer.	4	E	14	Sleeve piles through made ground and sealing into the London Clay.	2	E	5
CFA piling through London Clay	30	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
CFA piling through London Clay	31	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface.	4	E	14	All site personnel to be briefed on contamination risk and appropriate PPE to be worn.	2	E	5

Stage	Risk No	Hazard	Prior to RCM			Risk Control Measure (RCM)	After RCM		
			Probability (P)	Impact (I)	Risk (PXI)		Probability (P)	Impact (I)	Risk
CFA piling through London Clay	32	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3
CFA piling through London Clay	33	The driving of solid contaminants down into an aquifer during pile driving	5	E	20	Unlike driven piling CFA piles do not produce down drag of materials. Good on site control and monitoring to reduce the likelihood of flighting (a process where upper material is drawn into the pile bore from the surrounding ground from over rotation of the auger).	2	E	5
CFA piling through London Clay	34	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	4	E	14	Monitoring of grout/concrete volumes during construction and an appropriate mix to be detailed.	1	E	2
CFA piling through London Clay	35	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium.	2	E	5
CHD piling through London Clay	36	Creation of preferential pathways, through low a low permeability layer (aquitard), to allow potential contamination of an underlying aquifer.	4	E	14	Sleeve piles through potentially contaminated made ground.	2	E	5
CHD piling through London Clay	37	Creation of preferential pathways, through a low permeability surface layer, to allow upward migration of landfill gas, soil gas or contaminant vapours to the surface.	3	F	6	No landfills noted across the site, however risk from made ground a potential issue, monitoring during construction to be undertaken.	2	F	3
CHD piling through London Clay	38	Direct contact of the site workers and others with contaminated soil arisings which have been brought to the surface.	4	E	14	CHD piles densify the soils and displace as the auger is rotated creating little to no arisings.	1	E	1
CHD piling through London Clay	39	Direct contact of the piles or engineered structures with contaminated soil or leachate causing degradation of pile materials (where the secondary effects are to increase the potential for contaminant migration).	3	F	6	Piles to be designed in accordance with BRE SD-1 Concrete in aggressive ground.	2	F	3
CHD piling through London Clay	40	The driving of solid contaminants down into an aquifer during pile driving.	5	E	20	Unlike driven piling CHD piles do not produce down drag of materials. Good on site control and monitoring to reduce the likelihood of flighting (a process where upper material is drawn into the pile bore from the surrounding ground from over rotation of the auger).	2	E	5

Stage	**Risk No**	**Hazard**	**Prior to RCM**			**Risk Control Measure (RCM)**	**After RCM**		
			Probability (P)	**Impact (I)**	**Risk (PXI)**		**Probability (P)**	**Impact (I)**	**Risk**
CHD piling through London Clay	41	Contamination of groundwater and, subsequently, surface waters by concrete, cement paste or grout.	4	E	14	Monitoring of grout/concrete volumes during construction and an appropriate mix to be detailed.	1	E	2
CHD piling through London Clay	42	Disturbance/damage to sub-surface archaeology.	4	E	14	A targeted borehole survey to determine the likelihood of archaeology in the alluvium.	2	E	5

6 Conclusions

6.1.1 As detailed in Section 5 the piling risk register has consider the six potential pollution scenarios defined in EA for piles terminating within the London Clay Formation and for piles constructed through the London Clay Formation but terminating in the Lambeth Group.

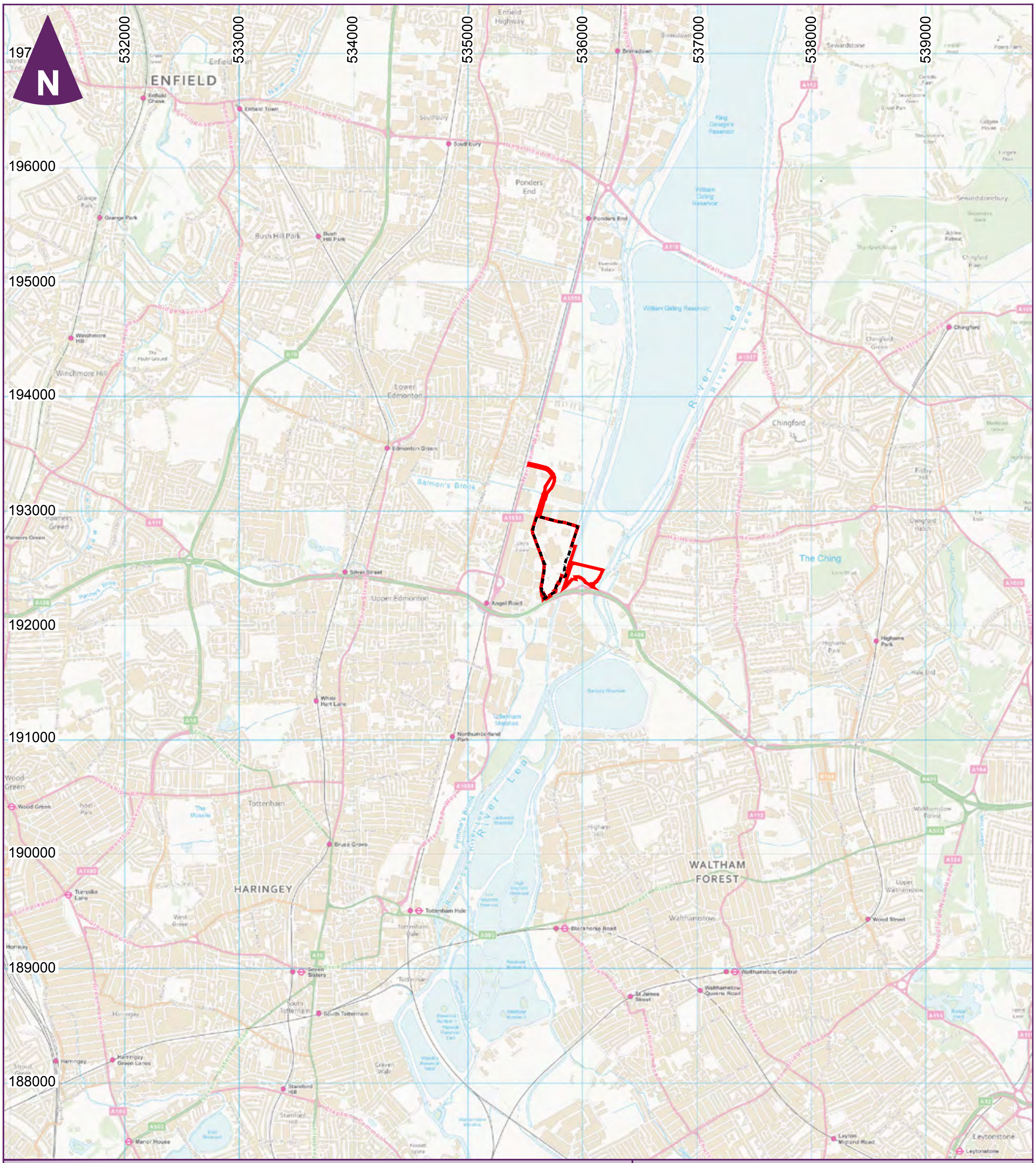
6.1.2 The risk register indicates that for the six EA defined potential pollution scenarios for piles terminating in the London Clay formation piling is a potential low risk foundation solution, furthermore driven pre-cast, CFA and CHD piles are all low risk operations. Although still low risk, CFA piles have a higher risk than the other methods of potential contaminants reaching ground surface and contacting with site staff as it is a replacement not a displacement system.

6.1.3 The risk register indicates that there is an increased risk of potentially transporting contaminated material and creating a preferential pathway when utilising a driven pre-cast pile and terminating in the Lambeth Group and this is therefore not a recommended piling method for this scenario however the remaining two piling methods remain low risk.

6.1.4 It is therefore recommended that where possible the piles are to be terminated in the London Clay formation. Where potentially high structural loads are to be supported additional piles with a larger nominal diameters may be required in order to achieve this, as overall this is the considered the lowest risk. If piles are to be constructed within the Lambeth group then CFA and CHD piling methods offer the lowest risk.

6.1.5 This report is undertaken to give general risks associated with the piling works and is to be used to help inform on the preferred piling method, however a detailed risk assessment will need to be undertaken by the piling contractor when structural loads are known and the need for piling through the London Clay Formation has been determined through detailed design.

Figures



Key

🟥	Application site boundary
▬ · ▬	Edmonton EcoPark Operational site boundary

0 km 3 km

Scale 1:50,000 @ A3

Client

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north london waste authority

Piling Risk Assessment

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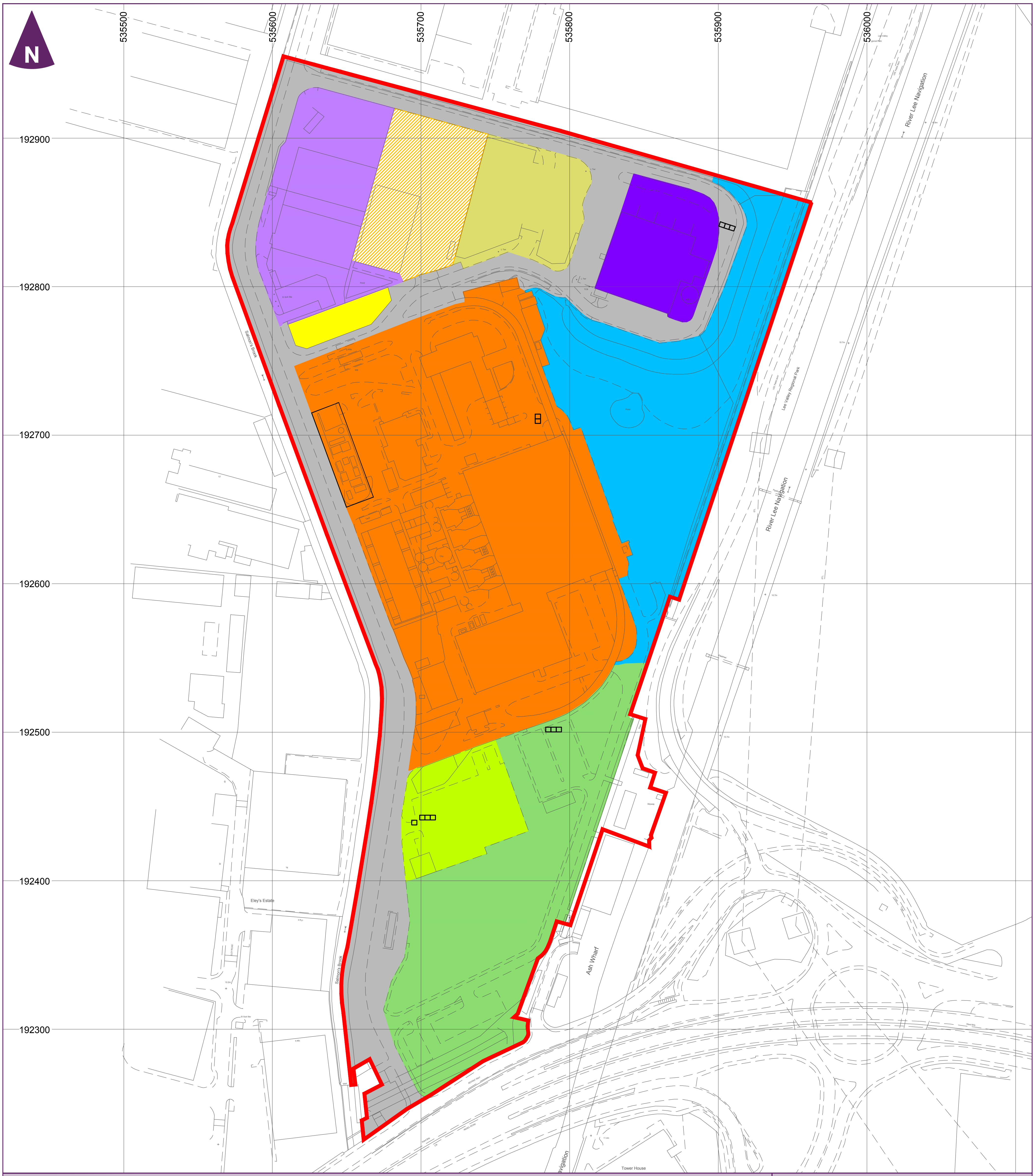
Figure 1
Site location

August 2015

35180-New57.dwg robec



Key

- ▭ Edmonton EcoPark Operational site boundary
- 🟪 Composting plant
- ▨ Ash recycling facility
- 🟨 Disused area
- 🟨 Materials recycling facility
- 🟪 Waste transfer station
- 🟦 Eastern landscaped area
- 🟧 Incinerator area
- 🟩 Lorry park
- 🟩 Southern landscaped area
- ⬜ Mains access roads* and softstanding/service runs

* There are other on-site roads within the incinerator and southern landscaped area

0 m 150 m

Scale 1:2500 @ A3

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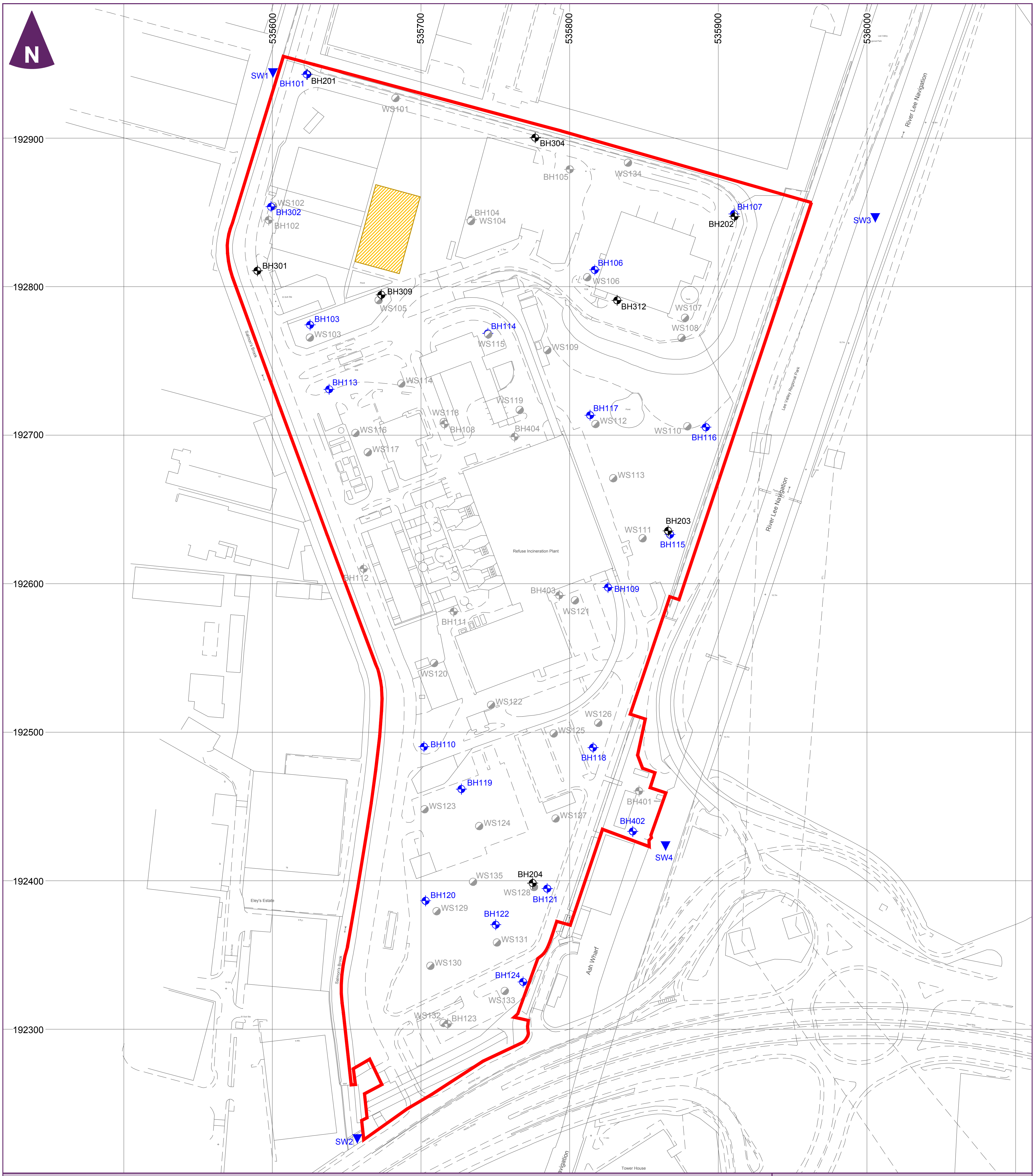
Figure 2
Site layout

August 2015

35180-New58.dwg robec



Key

▬	Edmonton EcoPark Operational site boundary
⊕	Groundwater monitoring borehole (KPG)
⊕	Groundwater monitoring borehole (Lambeth)
⊕	Borehole not installed/ decommissioned/ selected for monitoring
◐	Window sample not installed/ decommissioned/ selected for monitoring
▼	Surface water sampling location
▨	Area with an underlying protective membrane

0 m 150 m

Scale 1:2500 @ A3

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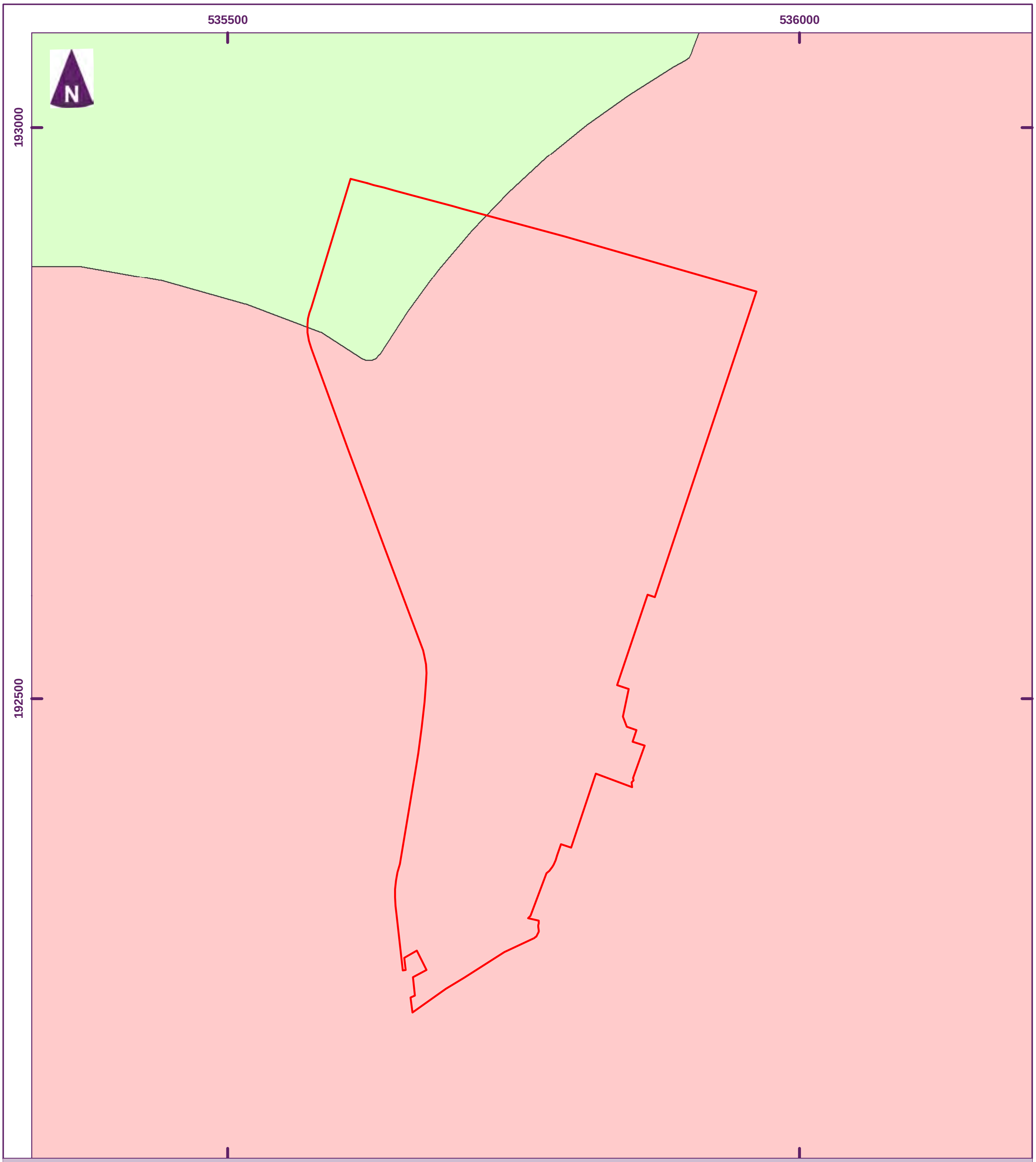
Figure 3
Borehole location plan

August 2015

35180-New59.dwg robec



Key

▭ Edmonton EcoPark Operational site boundary

Source Protection Zones

🟥 SPZ 1

🟩 SPZ 2

0 50 100 200 Metres

Scale at A4: 1:5,000

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Figure 4
Source Protection Zones

September 2015

35180-Rea26a.mxd parkj

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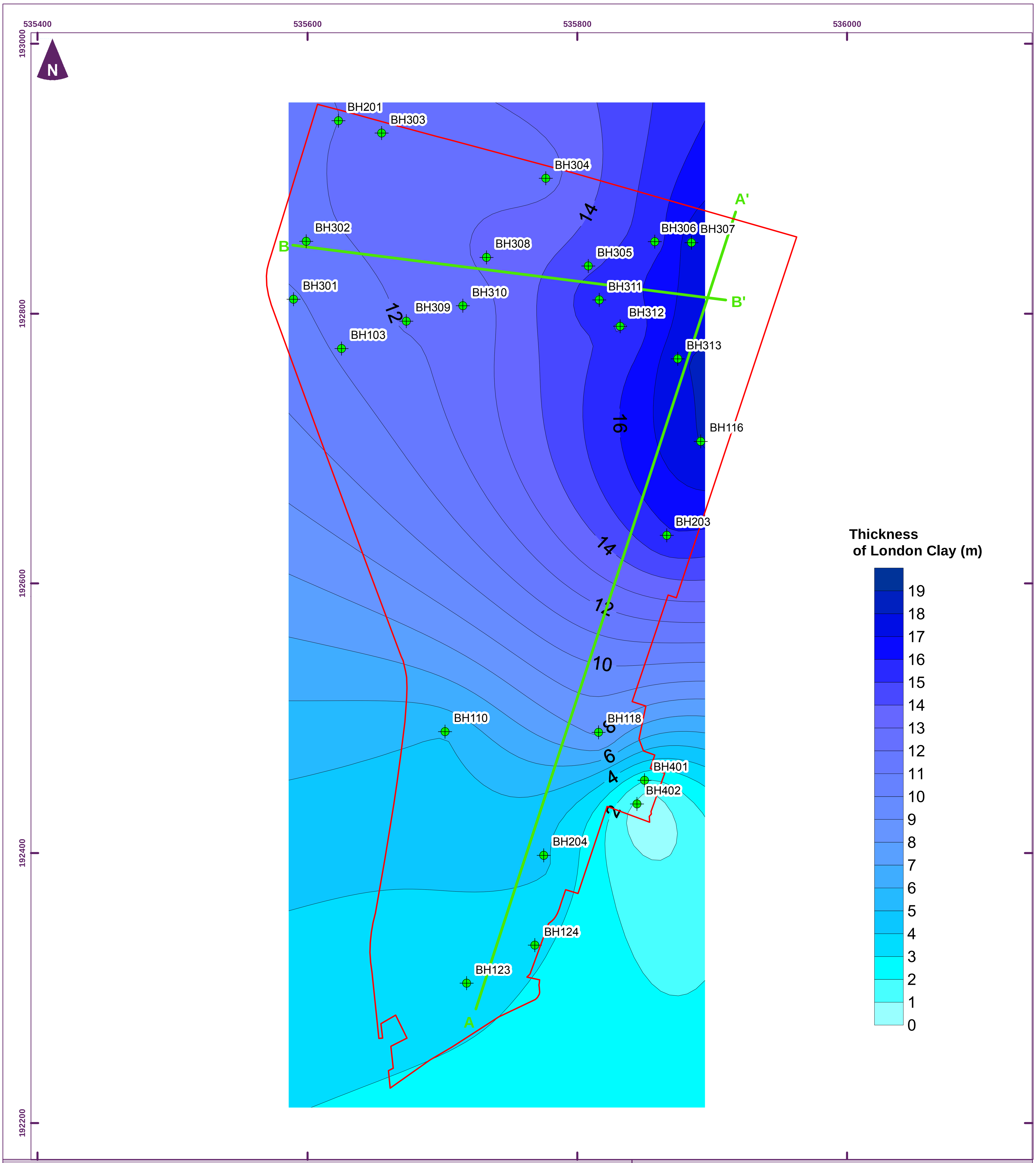

Key

▭ Edmonton EcoPark Operational site boundary

⊕ Site Investigation Borehole
(Note: Only boreholes used to generate contours are shown on this figure)

— Geological Cross Sections

— Thickness of London Clay (m)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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Figure 5
Thickness of London Clay and geological cross section location

August 2015

35180-New61.mxd parkj

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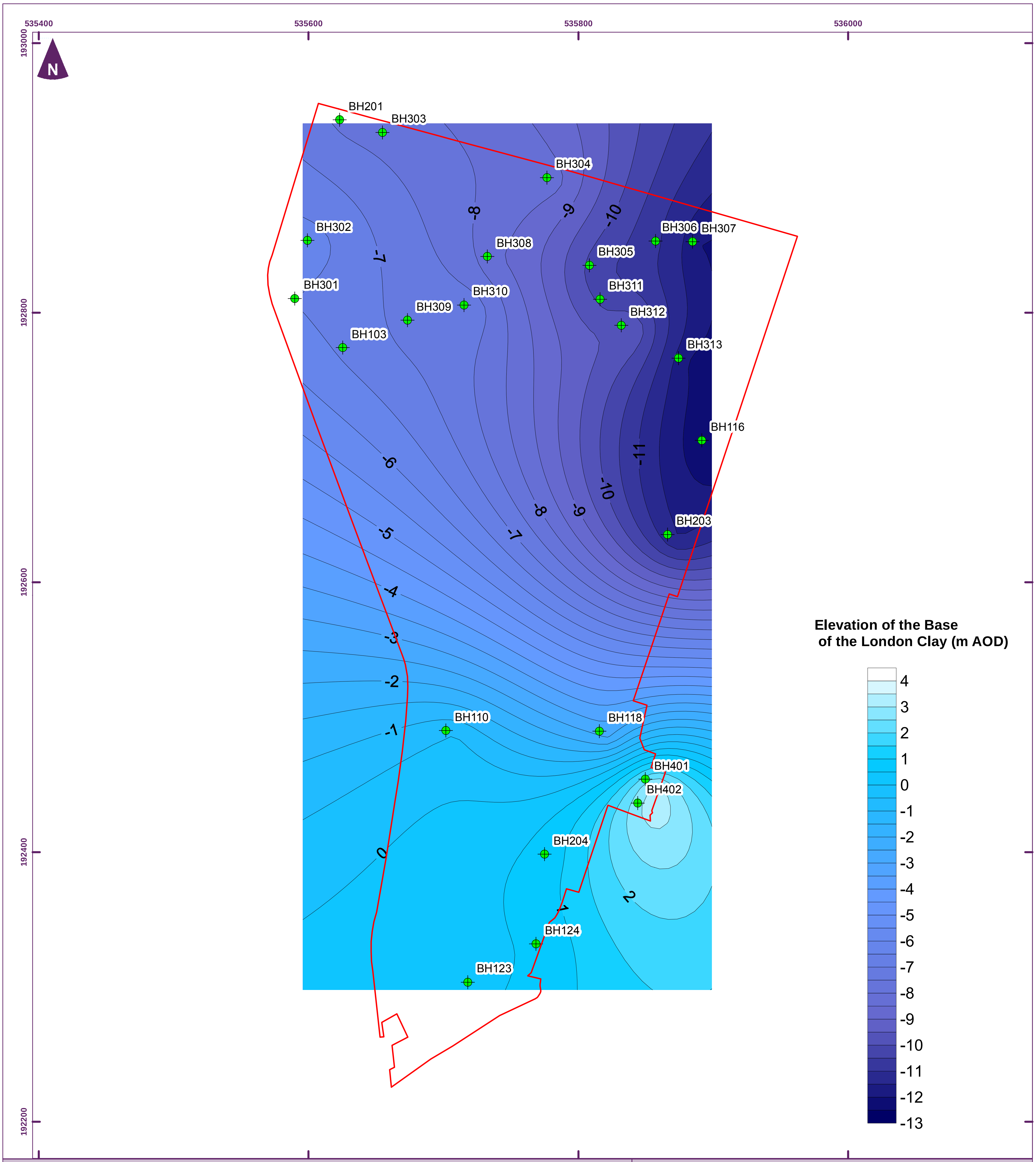

Key

▭ Edmonton EcoPark Operational site boundary

⊕ Site Investigation Borehole
(Note: Only boreholes used to generate contours are shown on this figure)

— Base of London Clay (m)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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Figure 6
Base of the London Clay

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35180-New62.mxd parkj

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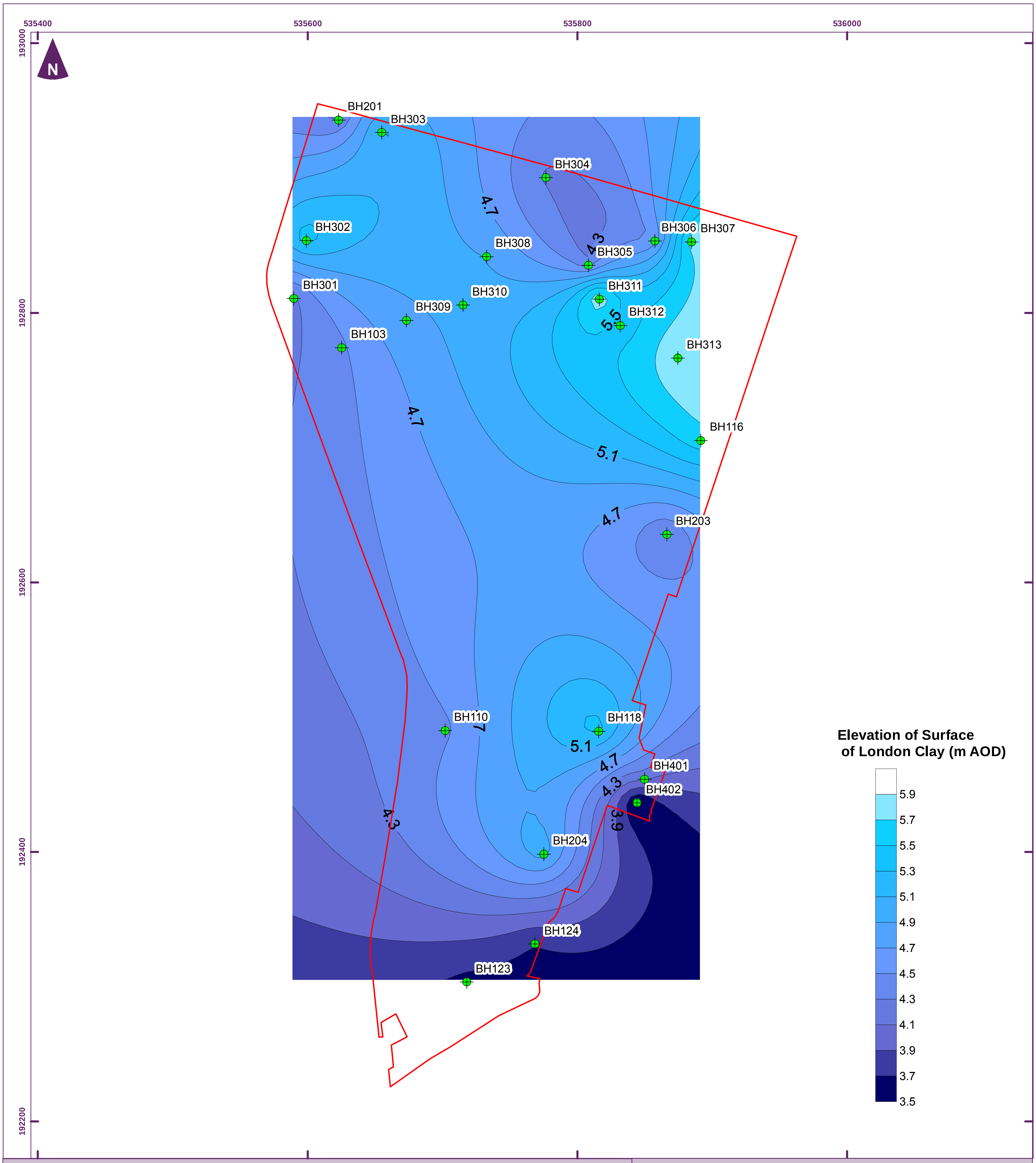

Key

🟥	Edmonton EcoPark Operational site boundary
⊕	Site Investigation Borehole (Note: Only boreholes used to generate contours are shown on this figure)
—	Surface of London Clay (m)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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Figure 7
Surface of the London Clay

August 2015

35180-New63.mxd parkj

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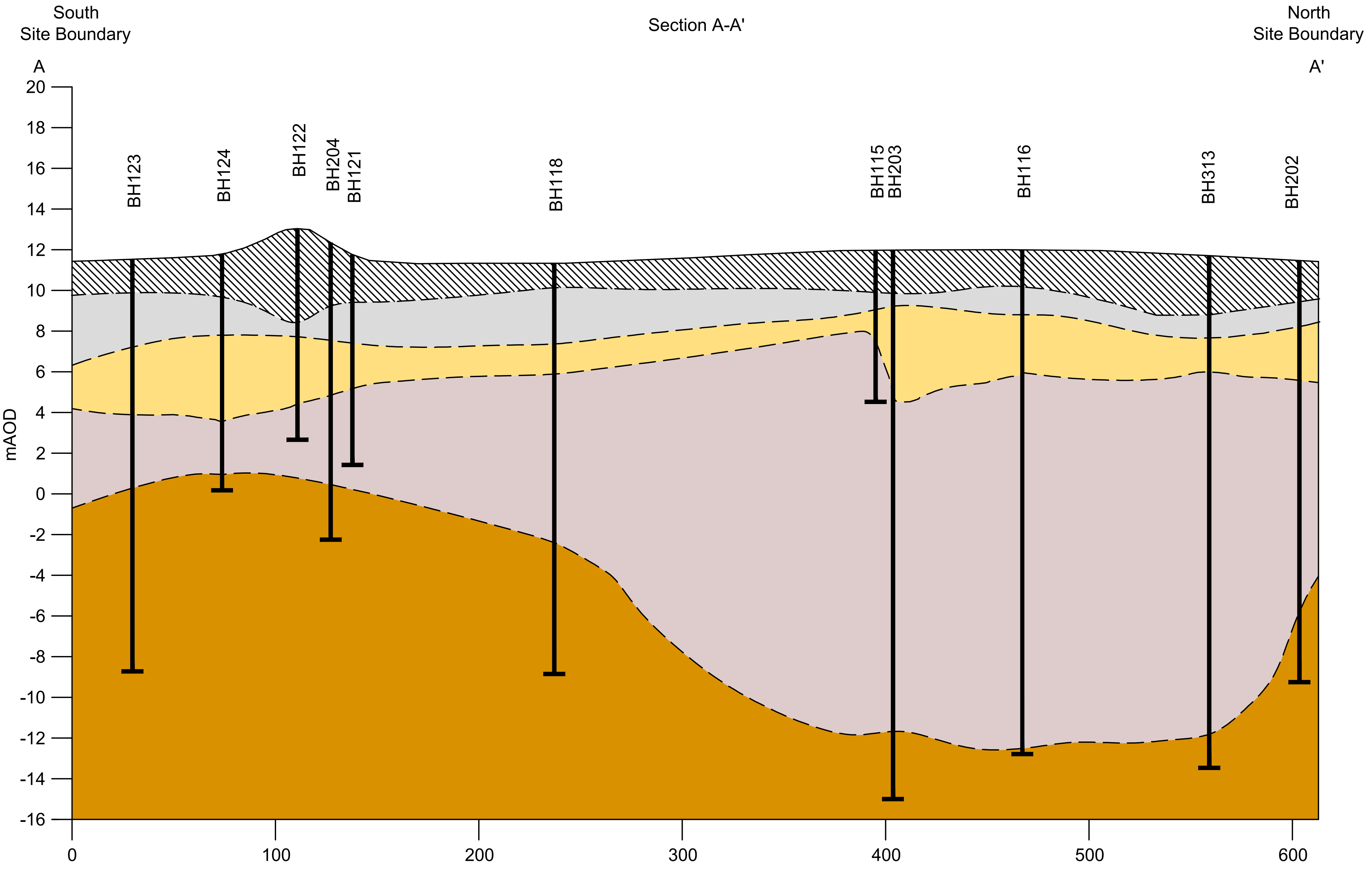

Key

- ▨ Made Ground
- ▭ Alluvium
- 🟨 Kempton Park Gravel
- ▭ London Clay
- 🟧 Lambeth Group
- – – – Assumed strata boundary

0 m 150 m
Scale 1:2500 @ A3
10 x vertical exaggeration

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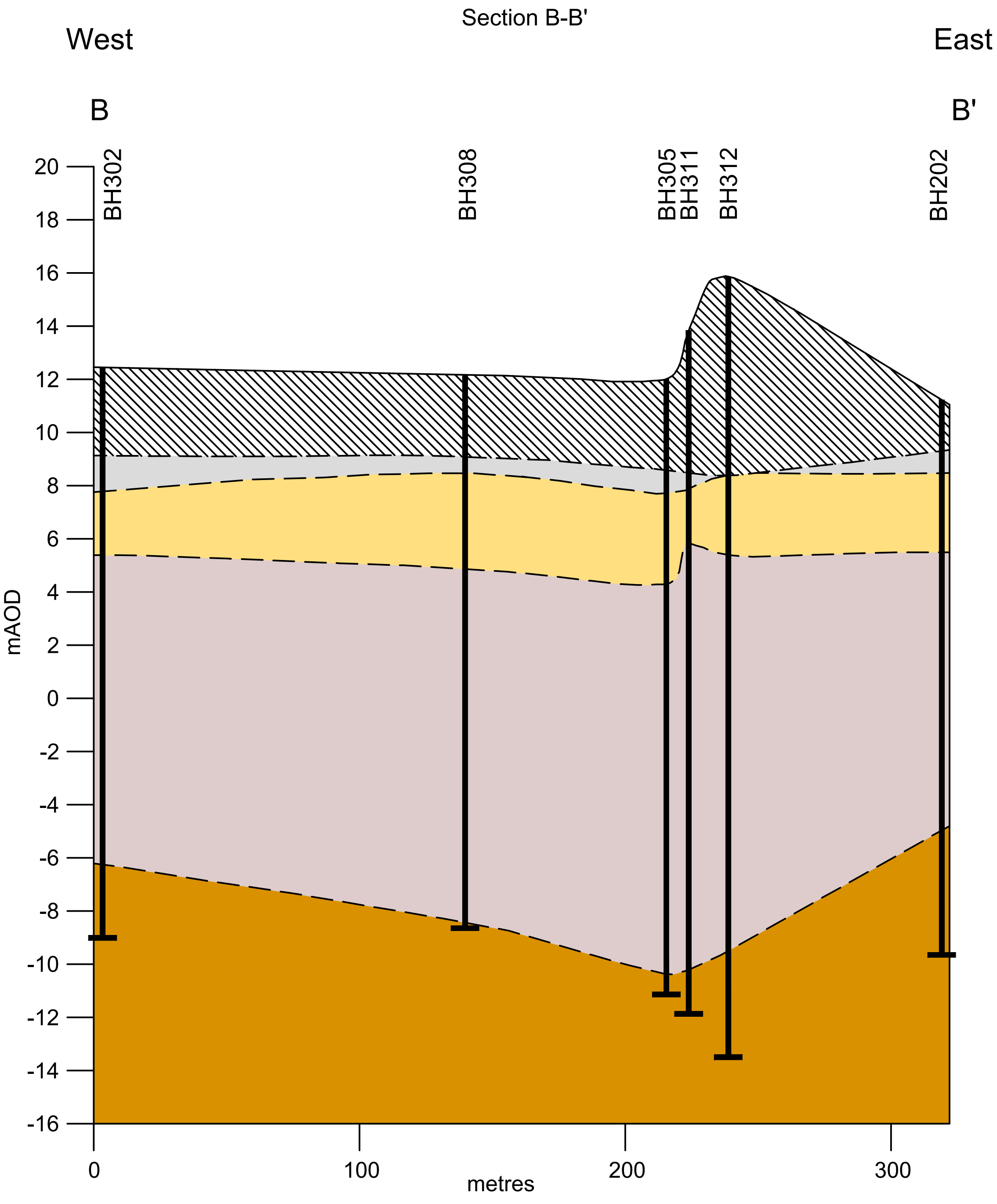
Figure 8
Cross section B-B'

August 2015 35180-New64.dwg robec



Key

▨	Made Ground
▩	Alluvium
🟨	Kempton Park Gravel
▩	London Clay
🟧	Lambeth Group
— — —	Assumed strata boundary

0 m 150 m
Scale 1:2500 @ A3
10 x vertical exaggeration

Client

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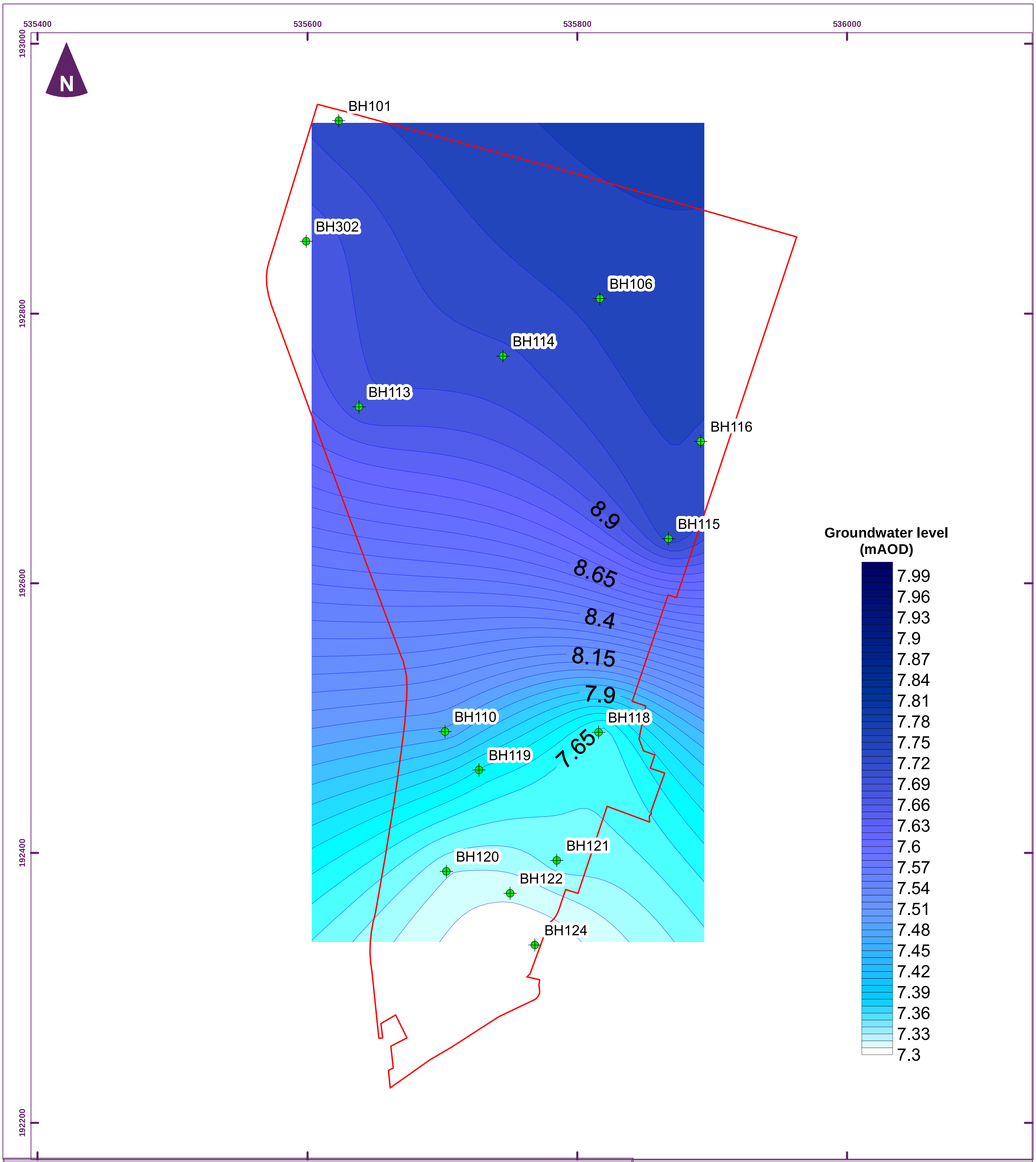
Figure 9
Cross section B-B'

August 2015
35180-New65.dwg robec



Key

🟥	Edmonton EcoPark Operational site boundary
●	Borehole (Note: Only boreholes used to generate contours are shown on this figure)
—	Groundwater level in Kempton Park Gravel (mAOD)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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Figure 10
Groundwater levels in Kempton Park Gravel (May 2014)

August 2015

35180-New66.mxd parkj

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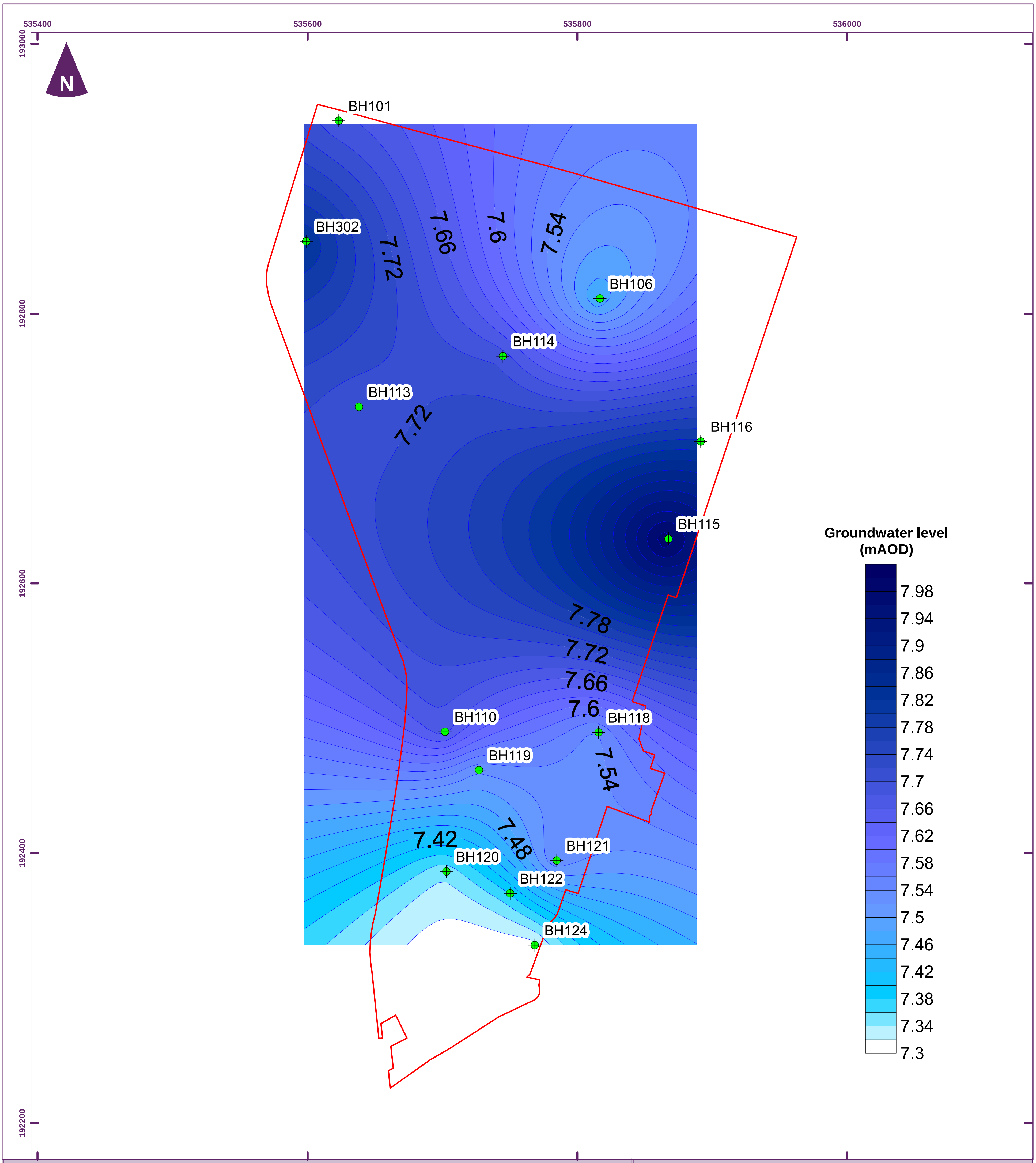

Key

🟥	Edmonton EcoPark Operational site boundary
⊕	Borehole (Note: Only boreholes used to generate contours are shown on this figure)
—	Groundwater level in Kempton Park Gravel (mAOD)

0 25 50 100 150 Metres

Scale at A4: 1:3,000

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Figure 11
Groundwater levels in Kempton Park Gravel (November 2014)

August 2015

35180-New67.mxd parkj

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● Series 06 Environmental Statement

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