

Grainne Oglesby

Subject: FW: W0156-01 - KTK Sand and Gravel
Attachments: 1350719008 L1 V1_KTK SG_Technical Amendment_24 June 2013.pdf

From: Vainio-Mattila, Thomas [mailto:TVainioMattila@golder.com]
Sent: 24 June 2013 14:48
To: Licensing Staff
Subject: W0156-01 - KTK Sand and Gravel

To Whom it May Concern,

We are acting on behalf of the licensee (KTK Sand & Gravel) currently operating the KTK Sand & Gravel Inert Waste Facility at Kimmeens, Ballymore Eustace West and Coghlanstown East, Co. Kildare under Waste Licence Register number W0156-01.

KTK Sand & Gravel wish to apply for Technical Amendment to Waste Licence Register number W0156-01 to change the ownership and waste licence boundary to reflect the lands currently in ownership and control of Kildare County Council.

Please find attached a copy of a Technical Amendment request in relation to Waste Licence Register number W0156-01.

Please note that this correspondence was initially submitted to EPA's Office of Environmental Enforcement section (via Alder), who advised us to submit it to the licensing department. Please find below a copy of the response received (Ref LR002209):

Dear Mr. Vainio-Mattila,

I refer to your correspondence dated 09/05/2013 (Ref. LR002209), received by the Agency via the ALDER system on 13/05/2013, in relation to your request for a Technical Amendment of Waste Licence W0156-01 KTK Sand & Gravel Limited, Ballymore Eustace, Co. Kildare to exclude a section of the facility, the ownership of which has been transferred to Kildare County Council, from the facility boundary.

The Agency notes that, the approval is sought under Condition 1.2 of the Waste Licence W0156-01, for an alteration to your facility that results in a material change in:

- the physical extent of the facility for the purposes of Waste Licence W0156-01.

This proposed change cannot be accommodated under Condition 1.2 of your licence.

A Technical Amendment (Section 42(B) (1) of the Waste Management Acts (WMA)) or a Review of your licence (Section 46(8) of the WMA) will be required to provide for the proposed changes.

To determine if the proposed change can be accommodated by Technical Amendment you should submit the following information to the Agency's Environmental Licensing Programme (ELP), EPA, P.O. Box 3000, Johnstown Castle Estate, Co. Wexford:

- Details of the requested change(s)
- Reasons for the change(s) requested
- Details of any increase or changes in emissions resulting from the change(s)
- An assessment of the likely impacts of any increase/changes in emissions

If the alteration is considered to be a significant change and cannot be accommodated by a Technical Amendment, the ELP will notify you of the process for applying for a Review.

Please quote the above reference in any future correspondence in relation to this matter.

Yours sincerely

Damien Masterson, Inspector

Office of Environmental Enforcement

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If you have any queries in relation to the attached, please do not hesitate to contact me.

Regards,
Thomas

Thomas Vainio-Mattila (MSc, PGeo, EurGeol) | Senior Consultant | Golder Associates Ireland Limited
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www.golder.com

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Directors: M. Gilligan, A. Harris (British)

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24 June 2013

Project No. 13507190008.L1.V1

Environmental Protection Agency
Office of Climate, Licensing & Resource Use
PO Box 3000
Johnstown Castle Estate
County Wexford

TECHNICAL AMENDMENT REQUEST – WASTE LICENCE REGISTER W0156-01

To Whom it May Concern,

We are acting on behalf of the licensee (KTK Sand & Gravel) currently operating the KTK Sand & Gravel Inert Waste Facility at Kimmee, Ballymore Eustace West and Coghlanstown East, Co. Kildare under Waste Licence Register number W0156-01.

On 28 August 2012 a transfer of land ownership was agreed between Kildare County Council (KCC) and KTK Sand & Gravel. The lands in question are 0.5142 ha (or 5,142 m²) in size and are situated within the currently waste licenced area. Detailed location for the KCC land acquisition is depicted on attached Drawing No 245 attached in Appendix A.

It is KCC's intention to construct a Wastewater Treatment Plant (WWTP) at the lands in question to serve the village of Ballymore Eustace's requirements for waste water treatment. It is our understanding that this proposed development has a valid Planning Permission and Discharge Licence to discharge into the River Liffey. These licences and permissions are not dealt with in this Technical Amendment request.

KTK Sand & Gravel wish to apply for Technical Amendment to Waste Licence Register number W0156-01 to change the ownership and waste licence boundary to reflect the lands currently in ownership and control of Kildare County Council.

Lands in Question

The lands in question are located north-west of the KTK Sand & Gravel Site – see attached Drawing 245 attached in Appendix A for details. Prior to 2002 these lands formed a part of a sand and gravel pit. The extracted aggregate supplied the construction industry at the time. KTK Sand & Gravel successfully applied for an EPA Waste Licence, which was granted in June 2002, in order to restore the Site back to its original landform by recovering inert materials and placing into the pit as required by the Site's planning permission.

Description of Materials Used for Recovery

The inert materials imported for recovery at the facility originated predominantly from greenfield construction sites located in and around Dublin and surrounding areas. The following Table 1 depicts details of inert materials from early 2006 to early 2008 that were deposited within the KTK Sand & Gravel facility including within the lands in question. In total approximately 140,000 tonnes or 70,000 m³ of inert soils were recovered within and around the lands in question during this time period.

The size of the land in question is 5,142 m² and the average thickness of the deposited inert materials has been estimated from existing topographical surveys at 4.9 m. This results to a volume of inert materials of 25,200 m³ (or 50,400 tonnes) within the KCC land acquisition area.

It is noted that the KTK Sand & Gravel waste licence allows 242,000 tonnes of inert Construction and Demolition wastes to be recovered at the Site annually. The total volumes recovered within the entire Site during 2006, 2007 and 2008 were 210,079 tonnes and 236,856 tonnes and 181,921 tonnes respectively.

Golder Associates Ireland Limited

Tel: Fax: www.golder.com

Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America
Registered in Ireland Registration No. 297875 Town Centre House, Dublin Road, Naas, Co. Kildare, Ireland
Directors: M. Gilligan, A. Harris (British) VAT No.: 8297875W



The inert material deposited within and around the lands in question comprised mainly soils and stone (99.35%), with some minor concrete (0.6%) and tarmac (0.05%). Chemical testing was carried out at the soils in compliance with the Waste Acceptance Criteria EC/33/2003 (WAC) requirements and the results complied with the WAC. A copy of original laboratory results is attached at Appendix B of this report.

Table 1: Details of Recovered Inert Materials deposited within and around the lands in question during 2006 to 2008.

Haulier	Origin of Inert Material	EWG Code	Material Type	Site Type	Lab Testing	Date Started	Date Completed	Volume (t)	Volume (m ³)
Mr Roy Clarke	Ballymore Eustace, Co Kildare	17 05 04	Soils & stones	Greenfield	N/A	Mar-07	Mar-07	58	29
CLM Properties	Ballymore Eustace, Co Kildare	17 05 04	Soils & stones	Greenfield	N/A	Apr-07	Apr-07	193	97
Pat Doyle Plant Hire	Foxrock, Co Dublin	17 05 04	Soils & stones	Greenfield	N/A	Jan-07	Feb-07	27	14
Flynn Site Excavations	Clonard, Co Meath	17 01 01	Concrete	Haul Road	N/A	Oct-07	Nov-07	244	122
Flynn Site Excavations	Glasnevan	17 01 01	Concrete	House demolition	N/A	Jan-07	Jan-07	20	10
Flynn Site Excavations	Dundrum, Churchtown, Co Dublin	17 01 02	Tarmac	Roads	N/A	Mar-07	Apr-07	75	38
Flynn Site Excavations	Dundrum, Churchtown, Co Dublin	17 01 01	Concrete	Demolition	N/A	Mar-07	Apr-07	671	336
Flynn Site Excavations	Eadestown, Co Kildare	17 05 04	Soils & stones	Greenfield	N/A	Jun-07	Jun-07	93	47
Flynn Site Excavations	Tallaght, Co Dublin	17 05 04	Soils & stones	Greenfield	N/A	Mar-07	Mar-08	31,819	15,910
Flynn Site Excavations	Cherrywood, Co Dublin	17 05 04	Soils & stones	Greenfield	One WAC test	Jun-06	Jun-07	44,028	22,014
Flynn Site Excavations	Greenhills Rd, Tallaght	17 05 04	Soils & stones	Greenfield	N/A	Oct-05	Oct-06	33	17
Flynn Site Excavations	Greenogue, Tallaght	17 05 04	Soils & stones	Greenfield	N/A	Sep-06	Dec-06	10,801	5,400
Flynn Site Excavations	Leopardstown, Co Dublin	17 05 04	Soils & stones	Greenfield	N/A	Feb-06	Jun-06	26,583	13,292
Flynn Site Excavations	Newcastle	17 05 04	Soils & stones	Greenfield	N/A	Feb-06	Jun-06	21,672	10,836
Flynn Site Excavations	Stepaside Village, Co Dublin	17 05 04	Soils & stones	Greenfield	N/A	Mar-07	Jun-07	5,462	2,731
								141,782	70,891

Stability of Body of Waste

A geotechnical investigation within the lands in question was carried out by Nicholas Dwyer Consulting Engineers during 2008 and 2009.

The Site investigation works comprised the following:

- Five (5No) cable percussion borings;
- One (1 No) rotary open hole drillings;
- Two (2 No) trial pits;
- Five (5 No) dynamic probes;
- Geotechnical field testing for SPT (Standard Penetration Testing), and geotechnical laboratory testing for a range of tests; and
- Analytical testing of the soil samples.

The results of the geotechnical investigation confirm that the materials within the lands in question are fit for construction purposes. It is noted that Golder has not reviewed construction plans for the proposed WWTP. A copy of the Nicholas Dwyer Consulting Engineers factual report on the findings of the site investigation is attached at Appendix C of this report.

Environmental Management during Construction

A Waste Management Plan for the proposed development has been prepared by Response Group. It includes details for the project, assignment for responsibilities, training, proposal for minimisation reuse and recycling of C&D waste, licence requirements, demolition procedures and waste auditing.

A copy of the Waste Management Plan is attached at Appendix D of this report.

It is not envisaged that any soils will be removed from the Site during the construction process of the proposed WWTP. All excavated soils will be used for Site improved works, i.e. In case soils are excavated it is proposed that these are used for constructing internal soil berms within the Site

Construction Schedule

Response Group has commenced with the on-Site construction works. It is proposed that the WWTP will be operating during 2014.

ALcontrol Laboratories Ireland

Table Of Results

Interim
 Validated

Ref Number: 08-B01809/01

Client: KTK Sand and Gravel

Date of Receipt: 26/03/2008
 (of first sample)

Sample Type: SOIL

Location: Cherrywood

Client Contact: Mervyn Ross

Client Ref: BME

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method	Method Detection Limit	CV AA	ELTRA	GC	GC	GC	GC	GC	GCMS	GCMS	GCMS	GCMS
			<0.0005mg/kg	<0.2%	<1mg/kg	<1mg/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<1ug/kg	<1ug/kg
08-B01809-S0006	Other ID	20/03/08											
	Sample Identity	RST1											
	ALcontrol Reference												
	Dissolved Mercury Low CEN 10:1 Leachate	mg/kg	<0.0005	✓									
	Total Organic Carbon	%	0.5	✓									
	Diesel Range Organics	mg/kg	<1	✓									
	Mineral Oil by GC	mg/kg	<1	✓									
	DRO Interpretation		n/a										
	Petrol Range Organics C5-C9	ug/kg	<10	✓									
	Petrol Range Organics C10-12	ug/kg	<10	✓									
	Benzene	ug/kg	<10	✓									
	Toluene	ug/kg	<10	✓									
	Ethylbenzene	ug/kg	<10	✓									
	Total Xylene	ug/kg	<10	✓									
	Naphthalene	ug/kg	<1	✓									
	Acenaphthylene	ug/kg	<1	✓									
	Acenaphthene	ug/kg	<1	✓									
	Fluorene	ug/kg	<1	✓									

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NDP = NO DETERMINATION POSSIBLE

Checked By : Cormac Lacey

Printed at 17:43 on 14/04/2008
 * SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE WESTER LABORATORY

ALcontrol Laboratories Ireland

Table Of Results

Sample Type: **SOIL**

Location: **Cherrywood**

Client Contact: **Mervyn Ross**

Client Ref: **BME**

Ref Number: **08-B01809/01**

Client: **KTK Sand and Gravel**

Date of Receipt: **26/03/2008**

(of first sample)

- Interim
- Validated

Detection Method	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
Method Detection Limit	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg
UKAS Accredited [Testing Laboratory] No. 1291	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Other ID														
Sample Identity														
ALcontrol Reference														
08-801809-S0006														
RST1														
20/03/08														
Phenanthrene	ug/kg	<1												
Anthracene	ug/kg	<1												
Fluoranthene	ug/kg	<1												
Pyrene	ug/kg	<1												
Benzo(a)anthracene	ug/kg	<1												
Chrysene	ug/kg	<1												
Benzo(b)+Benzo(k) fluoranthene	ug/kg	<1												
Benzo(a)pyrene	ug/kg	<1												
Indeno(123cd)pyrene	ug/kg	<1												
Dibenzo(ah)anthracene	ug/kg	<1												
Benzo(ghi)perylene	ug/kg	<1												
Coronene	ug/kg	<1												
Total 6 PAHs	mg/kg	<1.6												
Total 16 EPA PAHs	ug/kg	<1												
Total 17 PAHs	ug/kg	<1												

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Checked By : **Cormac Lacey**

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ALcontrol Laboratories Ireland

Table Of Results

Interim
 Validated

Ref Number: 08-B01809/01

Client: KTK Sand and Gravel

Date of Receipt: 26/03/2008

(of first sample)

Sample Type: SOIL

Location: Cherrywood

Client Contact: Mervyn Ross

Client Ref: BME

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method	Method Detection Limit														
		GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	GC/MS	HPLC	ICP MS	ICP MS				
08-B01809-50006	RST1	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<1 ug/kg	<0.1mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.004mg/kg
ALcontrol Reference	Other ID															
		PCB Congener 28	ug/kg	<1												
		PCB Congener 52	ug/kg	<1												
		PCB Congener 101	ug/kg	<1												
		PCB Congener 148	ug/kg	<1												
		PCB Congener 153	ug/kg	<1												
		PCB Congener 138	ug/kg	<1												
		PCB Congener 180	ug/kg	<1												
		PCB Total of 7 Congeners	ug/kg	<1												
		Natural Moisture Content	%	6.9												
		Total Dissolved Solids in CEN 10:1 Leachate	mg/kg	1420												
		Total Phenols in CEN 10:1 Leachate	mg/kg	<0.1												
		Dissolved Antimony Low CEN 10:1 Leach	mg/kg	<0.01												
		Dissolved Arsenic Low CEN 10:1 Leach	mg/kg	<0.01												
		Dissolved Barium Low CEN 10:1 Leach	mg/kg	0.99												
		Dissolved Cadmium Low CEN 10:1 Leach	mg/kg	<0.004												

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Table Of Results

- Interim
 Validated

Sample Type: SOIL
 Location: Cherrywood
 Client Contact: Mervyn Ross
 Client Ref: BME

Ref Number: 08-B01809/01
 Client: KTK Sand and Gravel
 Date of Receipt: 26/03/2008
 (of first sample)

Detection Method	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	ICP MS	IR	KONE	KONE	KONE
Method Detection Limit	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<0.01mg/kg	<20mg/kg	<10mg/kg	<1mg/kg	<30mg/kg
Other ID											
Sample Identity											
ALcontrol Reference											
	Dissolved Chromium Low CEN 10:1 Leach	mg/kg	<0.01	✓							
	Dissolved Copper Low CEN 10:1 Leach	mg/kg	0.04	✓							
	Dissolved Lead Low CEN 10:1 Leach	mg/kg	<0.01	✓							
	Dissolved Molybdenum Low CEN 10:1 Leach	mg/kg	0.11	✓							
	Dissolved Nickel Low CEN 10:1 Leach	mg/kg	<0.01	✓							
	Dissolved Selenium Low CEN 10:1 Leach	mg/kg	0.07	✓							
	Dissolved Zinc Low CEN 10:1 Leach	mg/kg	0.07	✓							
	Dissolved Organic Carbon in CEN 10:1 Leachate	mg/kg	<20	✓							
	Chloride in CEN 10:1 Leachate	mg/kg	24	✓							
	Fluoride in CEN 10:1 Leachate	mg/kg	4	✓							
	Sulphate in CEN 10:1 Leachate	mg/kg	454	✓							

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Proposed Way Forward

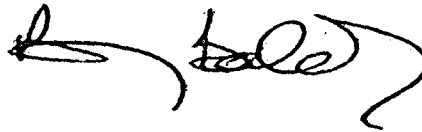
We request the EPA's decision on this Technical Amendment application as soon as possible in order to regulate the legal land ownership position.

Yours sincerely,

GOLDER ASSOCIATES IRELAND LIMITED



Thomas Vainio-Mattila
Senior Consultant



Barry Balding
Associate

TVM/BB/aw

CC: Mr Mervyn Ross, KTK Sand & Gravel, Ballymore Eustace

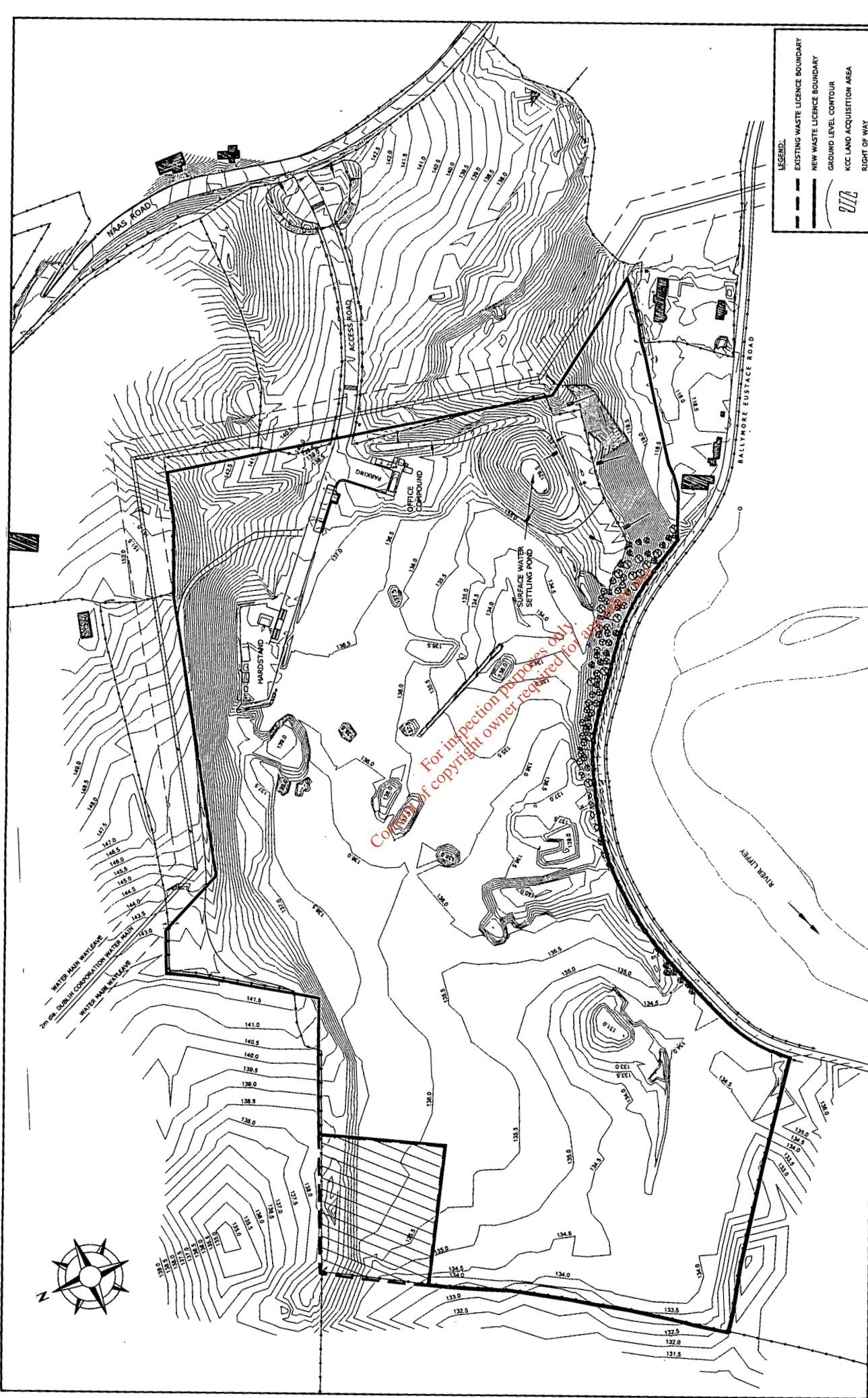
Attachments: Appendix A – Drawing 245
Appendix B – Laboratory Results for Soils Testing
Appendix C – Copy of Geotechnical Assessment by Nicholas Dwyer Consulting Engineers
Appendix D – Waste Management Plan for Construction Period

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APPENDIX A

Drawing 245

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LEGEND:

- EXISTING WASTE LICENCE BOUNDARY
- NEW WASTE LICENCE BOUNDARY
- GROUND LEVEL CONTOUR
- ▨ KCC LAND ACQUISITION AREA
- RIGHT OF WAY

<p>Golden Associates TOWN CENTRE HOUSE, DUBLIN ROAD, WAAS, CO. KILDARE TEL: 045 874411 - FAX: 045 874549 - www.golden.com</p>		<p>Client: KTK SAND & GRAVEL Ltd. Location: BALLYMORE EUSTACE, Co. KILDARE Project: LAND ACQUISITION</p>	<p>Project number: 13.5071.9.0008 File Location: Graphics\Waste\A\ubca\KTK_S&G_Ballymore\2013 - Landis...13 - Ok...1345 ORDNANCE SURVEY IRELAND LICENCE NUMBER: AR0056013</p>	<p>Created by: POB Engineer: CC Reviewed by: TYM</p>	<p>Issue to: ISSUE TO EPA</p>	<p>DATE: Apr. 13</p>	<p>Revision: A</p>	<p>Title: Existing Site Conditions (28/05/10) with Kildare County Council Land Acquisition Area Scale: 1:1,000 A1 1:2,000 A3</p>	<p>Drawing: 245</p>
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APPENDIX B

Laboratory Results for Soil Testing

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Geotech Specialists Limited

**Carewswood,
Castlemartyr, County Cork, Ireland
Tel: +353 (0) 21 466 7164 Fax: +353 (0) 21 466 7630
email: cork@geotech.ie**

**BALLYMORE EUSTACE SEWERAGE
SCHEME**

VOLUME I

**FACTUAL REPORT ON SITE INVESTIGATION
PROPOSED WASTEWATER TREATMENT PLANT**

Report No. KC8089/I

Engineer: Nicholas O'Dwyer

Client: Kildare County Council

September 2009

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**Client:
Kildare County Council
Aras Chill Dara
Devoy Park
Naas
County Kildare**

**Engineer:
Nicholas O'Dwyer
Consulting Engineers
Nutgrove Office Park
Nutgrove Avenue
Dublin 14**

APPENDIX C

Copy of Geotechnical Assessment by Nicholas Dwyer Consulting Engineers

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VOLUME II - PROPOSED SEWERAGE NETWORK

Part 1 - Factual Report

Part 2 - Interpretative Report



1 INTRODUCTION

During July 2008 Geotech Specialists Limited (GSL) were commissioned by Nicholas O'Dwyer (NOD), on behalf of Kildare County Council (KCC), to carry out a site investigation at Ballymore Eustace, County Kildare. The investigation was required to obtain geotechnical and geoenvironmental information for the proposed construction of extensions and upgrades to the existing sewerage infrastructure.

The scope of the investigation, which was specified by NOD, comprised cable percussion and rotary drilled boreholes, trial pits, slit trenches, in situ testing and laboratory testing. The investigation was carried out in accordance with the contract specification and relevant standards (see References). The main fieldwork was carried out between 5 August and 6 October 2008. Additional works were carried out on the sewer route comprising slit trenches (ST12-14) on 15 January 2009, additional boreholes (PB15, 16, 16A and 17) between 17 and 26 February 2009, a dynamic probe CBR test (DCP01) on 08 April 2009 and data logging of the water levels in the standpipes installed in PB04 and PBP06 between 24 February and 15 March 2009.

This volume of the report, Volume I, presents the factual records of the fieldwork and laboratory testing for the Wastewater Treatment Plant. Volume II covers the investigation for the proposed sewerage network.

2 THE SITE AND GEOLOGY

2.1 The Site

The scheme under investigation extends from the sand and gravel quarry approximately 2 km northwest of Ballymore Eustace town and runs parallel to the River Liffey as far as the existing wastewater treatment plant, located approximately 0.25 km southwest of the town, see Site Plan in Enclosure F. The sewerage route is from approximately National Grid reference N 919 105 to N 925 098.

The western section of the sand and gravel quarry was investigated. The area is bounded to the west and south west by vegetation and to south and the north by bunds. The area under investigation continues along the Naas Road and extends to two adjacent agricultural fields which stretch from the bank of the River Liffey to the Naas Road. This area is approximately 1.75 km wide and 5 km in length and is bounded by trees and vegetation on the River Liffey side and a



stone wall on the road side. A 1.60m concrete water main pipe runs through this area. The investigation continued along the pedestrian Liffey Walk pathway along the bank of the River Liffey. The existing wastewater treatment plant site comprises a gravel access road, a control building, disused portable cabins, a primary settlement tank and a sludge pit located at the back of the site. The site is bounded by a fence and trees, with the Liffey Walk pedestrian pathway running immediately along the south, west and northwest boundary respectively.

The wastewater treatment plant is to be constructed at the northwest corner of the sand and gravel quarry.

2.2 Published Geology

The published geological map covering the site, GSI Sheet 16 (1968) shows the route is underlain by greywacke and shale of Tipperkevin formation from the Cambrian Age. GSI Datasets show Glaciofluvial sands and gravels beneath the route with Alluvium adjacent to the river in part. Glacial Till is noted to the south of the river and to the west of the sand and gravel quarry area.

3 FIELDWORK

3.1 General

The fieldwork was carried out in general accordance with BS 5930 (1999) and Part 9 of BS 1377 (1990).

The exploratory hole and in situ test locations were selected by NOD and set out from local features. The co-ordinates and reduced levels were surveyed by Geotech Specialists Ltd. to National Grid and Ordnance Datum. The exploratory hole and in situ test locations are shown on the Site Plan in Enclosure F.



3.2 Exploratory Holes

The exploratory holes are listed in the following table.

SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	MAXIMUM DEPTH (m)	REMARKS
Cable Percussion Boring	5	8.50	PB01, PB02, PB03, PB13, PB14, PBP01
Rotary Open Hole Drilling	1	15.24	PB3R
Trial Pits	2	4.20	TP01, TP02, TP03, TP04, TP05
Dynamic Probes	5	4.42	DP01, DP02, DP03, DP04, DPSP01

The exploratory hole records are presented in Enclosure A and should be read in conjunction with the Key included therein. The records provide descriptions, in accordance with BS 5930 (1999), of the materials encountered and details of the samples taken, together with observations made during boring, drilling and pitting. The dynamic probes were carried out in accordance with BS1377 and are included in Enclosure A as blow count against depth plots. Photographs of the trial pits are presented on CD in Enclosure E.

On completion of the fieldwork all geotechnical samples were transported to the Cork laboratory of Geotech Specialists Ltd for temporary retention and testing. Geoenvironmental samples were transported to the Dublin laboratory of ALcontrol.

3.3 Instrumentation and Monitoring

The instrument installed in the exploratory hole PB03 is shown on the log and detailed in Enclosure B. Records of groundwater monitoring are presented in Enclosure B.

3.4 In Situ Testing

In situ testing was carried in accordance with BS 5930 (1999) and Part 9 of BS 1377 (1990) and is summarised below. The results of the standard penetration tests are presented on the logs in Enclosure A.

SUMMARY OF IN SITU TESTING

TYPE	QUANTITY	REMARKS
Standard Penetration Tests	49	Boreholes PB01, PB02, PB03, PB13, PB14, PBP01, PB3R



4 LABORATORY TESTING

4.1 Geotechnical Testing

The testing was scheduled by GSL, approved by NOD and carried out in accordance with BS 1377 (1990) unless otherwise stated. The testing is summarised below and the results are presented in Enclosure C.

SUMMARY OF GEOTECHNICAL LABORATORY TESTING

TYPE	REMARKS
Moisture Content Determination	
Atterberg Limit Determination	
Particle Size Distribution Analysis	
Unconsolidated Undrained Triaxial Compression	
California Bearing Ratio	
Dry Density / Moisture Content Relationship	
pH and Water Soluble Sulphate Content of Soils	Carried out at ALcontrol. Results included with geo-environmental tests in Enclosure D.

4.2 Geoenvironmental Testing

The testing was scheduled by GSL, approved by NOD and carried out by ALcontrol. The results are included in Enclosure D

Prepared By	C Mc Grath BSc (Hons) <i>C. Mc Grath</i>
Reviewed By	A C Suckling BSc (Hons) C Eng MICE
Approved for Issue By	A C Suckling BSc (Hons) C Eng MICE <i>A. C. Suckling</i>



REFERENCES

- BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.
- BS 5930 : 1999 : Code of practice for site investigations. British Standards Institution.
- GSI Geology of Kildare – Wicklow Sheet 16: 1995. 1:100,000 geological map (solid).

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ENCLOSURE A
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records
Borehole Logs
Trial Pit Logs
Dynamic Probes

Key
PB01 to 03, 13, 14, PBP01, PB3R
TP01 to TP05
DP01 to DP04, DPSP01

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Key to Exploratory Hole Records

SAMPLES

Undisturbed	
U	Driven tube sample
TW	Pushed thin wall tube sample
P	Pushed piston sample
L	Liner sample (from Windowless or similar sampler), full recovery unless otherwise stated
CBR	CBR mould sample
BLK	Block sample
CS	Core sample (from rotary core) taken for laboratory testing
AMAL	Amalgamated sample

} nominally 100 mm diameter and full recovery unless otherwise stated

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample

Environmental chemistry samples (in more than one container where appropriate)

ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that attempt was made to take a tube sample, however, there was no recovery.

Monitoring samples taken after completion of hole construction are not shown on the exploratory hole logs.

TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS 1377 : Part 9 (1990). The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 (either in total or for a single increment) the total blow count beyond the seating drive is given (without the N = prefix).

IV *In situ* Vane shear strength, peak (p) and remoulded (r)

HV Hand vane shear strength, peak (p) and remoulded (r)

PP Pocket penetrometer test, converted to shear strength

KFH, KRH, KPI Variable head permeability tests (KFH = falling head test, KRH = rising head test, KPI = packer test), permeability value

Test results provided in Field Records column

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930 (1999)

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacings are presented. The term non-intact (NI) is used where the core is fragmented.

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss
NR	Not recovered

GROUNDWATER



Groundwater strike



Groundwater level after standing period

Notes:

Project: Ballymore Eulace Sewerage Scheme
Project No.: KD8059
Carried out for Kildare County Council

Key

Sheet 1 of 2

Key to Exploratory Hole Records

INSTALLATION

Standpipe/ piezometer

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

SP
SPIE
PPIE
EPIE



The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:
Standpipe
Standpipe piezometer
Pneumatic piezometer
Electronic piezometer

Inclinometer or Slip Indicator

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

ICE
ICM
SLIP



The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:
Biaxial Inclinometer
Inclinometer tubing for use with probe
Slip Indicator

Settlement Points or Pressure Cells

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

ESET
ETM
EPCE
PPCE



The type of instrument installed is indicated by a code in the Legend column:
Electronic settlement cell/gauge
Magnetic extensometer settlement point
Electronic embedment pressure cell
Electronic push in pressure cell

INSTALLATION LEGENDS

A legend describing the installation is shown in the rightmost column. Legends additional to BS5930 are used to describe the backfill materials as indicated below.

Arisings



Concrete



Grout



Bentonite



Sand



Gravel



Tarmac



NOTES

- 1 Strata legends are in accordance with BS 5930 (1999).
- 2 Water level observations of discernible entries during the advancing of the exploratory hole are given at the foot of the log and in the Legend column. The term "none observed" is used where no discrete entries are identified although this does not necessarily indicate that the hole has not been advanced below groundwater level. Under certain conditions groundwater cannot be observed, for instance, drilling with water flush or overwater, or boring at a rate much faster than water can make its way into the borehole (ref BS5930 : 1999, Clause 47.2.7). In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs, however, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.
- 4 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.
- 5 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.
- 6 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures

REFERENCES

BS 1377 : 1990 : British Standard Methods of test for soils for civil engineering purposes. British Standards Institution
BS 5930 : 1999 : Code of Practice for site investigations. British Standards Institution

Updated February 2007

Notes:

Project: Ballymore Eustace Sewerage Scheme
Project No.: KD0099
Carried out for Kildare County Council

Key

Sheet 2 of 2



Borehole Log

Drilled DA Logged CMG Checked ACS		Start 06/08/2008 End 09/08/2008		Equipment, Methods and Remarks Dando 2000 Cable Percussion 200mm diameter from 0.00m to 8.05m. Backfilled with grout.		Depth from 0.00m to 8.05m Diameter 200mm Casing Depth 8.00m		Ground Level Coordinates National Grid Chainage		+135.65 mOD E 291935.63 N 210649.47		
Samples and Tests						Strata		Depth, Level (Thickness)		Legend		
Depth	Type & No	Records	Date Casing	Time Water	Description							
0.00-0.50	B 1				<p>MADE GROUND: Firm to stiff dark grey mottled orange brown slightly sandy to sandy slightly gravelly to gravelly CLAY. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies including limestone. Driller notes cobbles.</p> <p>Medium dense to dense brown slightly clayey to clayey SAND and GRAVEL with clay pockets (up to 100mm) and occasional to many cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of various lithologies. Cobbles are angular to subrounded of strong to very strong limestone.</p>							
0.50-0.95 0.50 0.50-1.00	SPT C D 2 B 3	N=14 (2,2,3,3,4,4)										
1.50-1.95 1.50 1.50-2.00	SPT C D 4 B 5	N=15 (2,2,3,3,4,3)	1.50	dry					(3.80)			
2.50-2.95 2.50 2.50-3.00	SPT C D 6 B 7	N=14 (1,3,3,2,4,5)	2.50	dry								
3.50-3.95 3.50 3.80	SPT C D 8 O 9	N=15 (11,9,3,3,4,9)	3.50	dry					3.80 +137.85			
4.30-4.75 4.30-4.80	SPT C B 10	N=19 (2,4,4,5,5,5)	4.30	dry								
5.00	D 11											
5.30-5.75 5.30-5.80	SPT C B 12	N=36 (2,7,14,8,6,6)	5.30	3.10					(4.25)			
6.00	D 13											
6.80-7.25 6.80-7.30 7.00	SPT C B 14 O 15	N=30 (2,4,6,6,6,10)	6.80	4.10					7.00 m grey gravel			
7.50-8.00 7.60-8.05	B 15 SPT C	N=22 (2,4,4,6,6,6)	7.60	5.30			8.05 +127.60					
						06/08/2008 8.00						
								EXPLORATORY HOLE ENDS AT 8.05 m				
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)		Depth sealed (m)		Depth Related Remarks * From to (m) 4.50 8.00 Water added to assist drilling.		Chiselling Depths (m) 3.60-3.90 60 mins 5.80-5.90 30 mins 7.30-7.40 30 mins		Tools used		Borehole PB01 Sheet 1 of 1		
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Ballymore Eustace Sewerage Scheme Project No. KD8089 Carried out for Kildare County Council		Scale 1:50				

Borehole Log



Drilled DA Logged CMG Checked ACS		Start 05/08/2008 End 05/08/2008		Equipment, Methods and Remarks Danda 2000 Cable Percussion 200m diameter from 0.00m to 8.45m. Backfilled with gravel.		Depth from 0.00m to 8.45m		Diameter 200mm		Casing Depth 8.00m		Ground Level Coordinates National Grid Chainsage		+138.43 mOD E 291988.73 N 210650.86							
Samples and Tests						Strata						Depth, Level (Thickness)		Legend		Backfill Instruments					
Depth		Type & No		Records		Date Casing		Time Water		Description											
0.00 0.10 0.10-0.50		D 1 D 2 B 3								MADE GROUND: Brown slightly sandy gravelly CLAY. Sand is fine to medium. Gravel is angular to subangular to fine to medium of various lithologies.						0.10 +138.33					
0.50-0.95 0.50-1.00		SPT C B 4		N=18 (2,3/4, 4, 5, 5)				dry													
1.50-1.95 1.50 1.50-2.00		SPT C D 5 B 6		N=14 (2,2/3, 4, 4, 3)		1.50		dry		MADE GROUND: Firm to stiff dark brown mottled orange brown slightly sandy to sandy slightly gravelly to gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies. Cobbles are subangular of strong to very strong limestone.						(4.00)					
2.50-2.95 2.50 2.60-3.00		SPT C D 7 B 8		N=19 (2,2/4, 5, 5, 5)		2.50		dry													
3.50-3.84 3.50		SPT C D 9		50 (2,5/8, 20, 22 for 40mm)		3.50		dry		Medium dense brown slightly clayey to clayey SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies.						4.10 +132.33					
4.10		D 10																			
4.40-4.85 4.40-4.85 4.40-4.90		SPT S D 11 B 12		N=28 (5,6/7, 6, 6, 7)		4.40		dry		4.10-4.40 m sandy gravelly CLAY.											
5.40-5.85 5.40 5.40-5.90		SPT C D 13 B 14		N=22 (2,3/5, 5, 5, 7)		5.40		2.10													
6.50		D 15								6.90 m clayey very sandy GRAVEL											
6.90-7.35 6.90-7.50		SPT S B 16		N=20 (2,4/4, 5, 5, 6)		6.90		3.40													
7.50		D 17								7.50 m slightly gravelly CLAY											
8.00-8.45 8.00-8.45		SPT S D 18		N=21 (2,3/4, 5, 6, 6)		8.00		5.90													
										8.00-8.45 m SAND with clay pockets (up to 30mm)											
												EXPLORATORY HOLE ENDS AT 8.45 m		8.45 +127.98							
Groundwater Entries No. Struck Post strike behaviour (m)		None observed (see Key Sheet)		Depth sealed (m)				Depth Related Remarks * From to (m) 5.00 8.00 Water added to assist drilling.		Chiselling Depths (m) 3.70-4.10 6.20-6.30		Time 150 mins 30 mins		Tools used							
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.						Project Ballymore Eustace Sewerage Scheme Project No. KD8089 Carried out for Kildare County Council						Borehole PB02 Sheet 1 of 1									
Scale 1:50 (c) ESGL www.esgl.co.uk 08.24.07/09/2008 13:34:18																					

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Borehole Log

Drilled DA Logged CMG Checked ACS		Start 06/08/2008 End 07/08/2008	Equipment, Methods and Remarks Cable 2000 Cable Percussion 200mm diameter from 0.00m - 8.45m, 50mm diameter standpipe installed.		Depth from 0.00m	to 8.45m	Diameter 200mm	Casing Depth 8.00m	Ground Level Coordinates National Grid Chainage	+138.01 mOD E 291968.35 N 210624.40	
Samples and Tests				Strata		Description		Depth, Level (Thickness)	Legend	Backfill/ Instruments	
Depth	Type & No	Records	Date Casing	Time Water							
0.00-0.50	B 1				<p>MADE GROUND: Firm to stiff multicoloured slightly sandy to sandy slightly gravelly to gravelly CLAY with occasional cobbles. Sand is fine to coarse. Gravel is angular to subangular fine to coarse of various lithologies. Cobbles are subangular to subrounded of strong to very strong limestone.</p>						
0.50-0.95 0.50 0.50-1.00	SPT C D 2 B 3	N=18 (2,57,3,4,4)									
1.50-1.95 1.50 1.50-2.00	SPT C D 4 B 5	N=15 (2,43,4,4,4)	1.50	dry							
2.50-2.95	SPT C	N=18 (3,34,7,3,4)	2.50	dry							
3.50-3.95 3.50 3.50-4.00	SPT C D 8 B 9	N=15 (2,24,4,3,4)	3.50	dry							
4.50-4.95 4.50 4.50-5.00	SPT C D 10 B 11	N=14 (2,23,4,3,4)	4.50	dry							
5.50-5.95 5.50 5.50-6.00	SPT C D 12 B 13	N=11 (2,23,4,2,2)	5.50	dry							
7.00-7.45 7.00 7.00-7.50	SPT C D 14 B 15	N=13 (2,23,3,4,3)	7.00	dry							
7.50-8.00	B 16										
8.00-8.45	SPT C	N=18 (2,34,4,3,4)	8.00	dry							
				07/08/2008	1800	EXPLORATORY HOLE ENDS AT 8.45 m					
				08/08/2008	1800	7.00-8.00 m pockets of grey CLAY (up to 50mm).					
						(8.45)					
						8.45 +127.56					
Groundwater Entries No. Struck Post strike behaviour None observed (see Key Sheet)		Depth sealed (m)		Depth Related Remarks * From to (m)		Chiselling Depths (m)		Time		Tools used	
Project Ballymore Eustace Sewerage Scheme		Project No. K08089		Carried out for Kildare County Council		Borehole PB03		Sheet 1 of 1			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.				(c) ESCL www.escl.co.uk 404 24 8109/009 18 34 20		Scale 1:50					

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Borehole Log



Drilled MG Logged COK Checked ACS		Start 27/08/2008 End 28/08/2008		Equipment, Methods and Remarks Dando 2000 Cable Percussion 200m diameter from 0.00m to 10.00m. Backfilled with arisings.		Depth from 0.00m to 10.00m Diameter 200mm Casing Depth 10.00m		Ground Level Coordinates National Grid Chairnage		+136.09 mOD E 291954.51 N 210864.95		
Samples and Tests						Strata						
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments				
0.30-1.00	B 1				<p>MADE GROUND: Stiff dark grey dark brown slightly sandy slightly gravelly to gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of various lithologies.</p> <p>Medium dense brown slightly clayey to clayey slightly gravelly SAND with very sandy gravel bands. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of various lithologies. Driller notes SAND and GRAVEL.</p> <p>3.30-4.00m Clayey very sandy GRAVEL.</p> <p>Compact brown slightly sandy SILT. Sand is fine to coarse.</p>							
1.00-1.45 1.00-1.45	SPTS D 2	N=18 (2,4,4,5,4,5)	1.00	dry								
1.50-2.00	B 3						(3.60)					
2.00-2.45 2.00-2.45	SPTS O 4	N=22 (4,4,5,6,6,5)	2.00	dry								
2.50-3.00	B 5											
3.00-3.45 3.00-3.45	SPTS D 6	N=13 (2,3,3,3,4,3)	3.00	dry								
3.50-4.00	B 7											
4.00-4.45 4.00-4.45	SPTS D 8	N=16 (2,3,4,4,4,4)	4.00	dry			3.60 +132.59					
4.50-5.00	B 9											
5.00-5.45 5.00	SPT C D 10	N=23 (2,3,4,6,6,7)	5.00	dry								
6.00-6.50	B 11						(4.70)					
6.50-6.95 6.50	SPT C D 12	N=28 (4,6,7,6,7,6)	6.50	dry								
7.50-8.00	B 13		27/08/2008 7.50	1800								
8.00-8.45 8.00 8.20-8.50	SPT C D 14 B 15	N=18 (2,4,6,6,4,3)	8.00	dry								
8.50	D 16					8.20 +127.89						
9.00-9.50	B 17					(1.70)						
9.50-9.95 9.50-9.95 9.50-9.90	SPTS D 18 B 19	N=15 (2,3,4,4,3,4)	9.50	dry								
			28/08/2008 10.00	1800								
Depth	Type & No	Records	Date Casing	Time Water		9.90 +126.19						
Groundwater Entries No. Struck Post strike behaviour (m)					Depth sealed (m)		Depth Related Remarks * From to (m)		Chiselling Depths (m) Time Tools used			
None observed (see Key Sheet)												
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Ballymore Eustace Sewerage Scheme		Borehole PB13		Sheet 1 of 2			
Scale 1:50 (c) ESOL www.esol.co.uk 020319109209115434					Project No. K08089		Carried out for Kildare County Council					



Borehole Log

Drilled MG Logged COX Checked ACS	Start 27/08/2008 End 28/08/2008	Equipment, Methods and Remarks Dando 2000 Cable Percussion 200m diameter from 0.00m to 10.00m. Backfilled with arisings.	Depth from 0.00m to 10.00m Diameter 200mm Casing Depth 10.00m	Ground Level Coordinates National Grid Chainage	+138.09 mOD E 291854.51 N 210684.06			
Samples and Tests			Strata		Depth, Level (Thickness)	Legend	Backfill Instruments	
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	10.00	+124.09	
10.00	D 20				Brown slightly silty sandy GRAVEL. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies. EXPLORATORY HOLE ENDS AT 10.00 m			
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks * From to (m)	Chiselling Depths (m)	Time	Tools used.
Groundwater Entries No. Struck Post strike behaviour (m) None observed (see Key Sheet)					Depth sealed (m)			
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50 (c) ESCL www.escl.co.uk 6216107292009183427			Project Carried out for	Ballymore Eustace Sewerage Scheme K08089 Kildare County Council	Borehole PB13 Sheet 2 of 2			

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Borehole Log



Drilled MG Logged COK Checked ACS	Start 26/08/2008 End 26/08/2008	Equipment, Methods and Remarks Dando 2000 Cable Perussion diameter 200mm from 0.00m to 7.50m. Backfilled with arisings.	Depth from 0.00m to 7.50m	Diameter 200mm	Casing Depth 7.50m	Ground Level Coordinates National Grid Chainsage	+135.60 mOD E 291939.12 N 210828.68		
Samples and Tests						Strata			
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level/ (Thickness)	Legend	Backfill/ Instruments	
0.00-1.00	B 1				<p>MADE GROUND: Very stiff becoming stiff below 2.50m, dark brown dark grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium of limestone. Driller notes boulders.</p> <p>4.00-4.50 m mottled dark grey</p> <p>Black GRAVEL. Gravel is subangular to subrounded fine to coarse of various lithologies predominantly limestone. Driller notes boulders.</p> <p>EXPLORATORY HOLE ENDS AT 7.50 m</p>				
1.00-1.45	SPTS O 2	N=39 (4,8,6,14,12,7)		dry					
1.50-2.00	B 3								
2.00-2.45	SPTS O 4	N=47 (4,7,8,12,18,9)		dry					
2.50-3.00	B 5								
3.00-3.45	SPTS O 6	N=35 (4,7,8,12,8,7)		dry					
3.50-4.00	B 7								
4.00-4.23	SPTS O 8	50 (16,9 for 20mm/ 21,29 for 60mm)		dry					
4.50-5.00	B 9								
5.00-5.45	SPTS O 10	N=23 (2,3,8,8,4,5)		dry					
5.00-5.45									
6.00-6.50	B 11								
6.50-6.95	SPTS O 12	N=30 (2,7,8,12,8,4)		dry					
7.00-7.30	B 13								
			26/08/2008	1800		7.00 +128.60			
			7.30	dry		(0.50)			
						7.50 +128.10			
Depth	Type & No	Records	Date Casing	Time Water	Depth Related Remarks	Chiselling Depths (m)	Time	Tools used	
Groundwater Entries					From	4.10 -4.40	60 mins		
No. Struck Post strike behaviour					to (m)	5.70 -5.90	30 mins		
None observed (see Key Sheet)						7.10 -7.50	60 mins		
Depth sealed (m)									
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project	Ballymore Bustace Sewerage Scheme			
Scale 1:50					Project No.	K03088			
(c) ESOL www.esol.co.uk 020 2167020/208 15 84 31					Carried out for	Kildare County Council			
					Borehole	PB14			
						Sheet 1 of 1			

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Borehole Log

Drilled DA Legged CMG Checked ACS		Start 07/08/2008 End 07/08/2008		Equipment, Methods and Remarks Gande 2000 Cable Percussion 200mm diameter from 0.00m to 8.00m. 50mm diameter standpipe installed.		Depth from 0.00m to 8.00m Diameter 200mm Casing Depth 8.00m		Ground Level Coordinates National Grid +135.44 mOD E 291927.73 N 210628.89	
Samples and Tests				Strata		Description		Depth, Level/ (Thickness) Legend Backfill/ Instruments	
Depth	Type & No	Records	Date Casing	Time Water					
0.00-0.50	B 1				MADE GROUND: Firm to stiff multicoloured slightly sandy to sandy gravelly CLAY with occasional to many cobbles. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of various lithologies. Cobbles are subangular to subrounded of muddy limestone. Driller notes concrete fill.				
0.30	D 2			dry					
0.50-0.65	U 3	85 blows 400 mm rec							
0.95	D 4			0.00					
1.50-1.95	SPT C D 5 B 6	N=22 (2,4,4,6,6)	1.50	dry					
2.50-2.95	U 7	85 blows	2.50						
2.95	D 8								
3.50-3.95	SPT C B 10 D 9	N=38 (5,8,9,10,10,8)	3.50	dry					
4.50-5.00	B 11 U NR	100 blows No recovery	4.50						
5.00-5.45	SPT C B 12 D 13	N=9 (2,2,3,2,2,2)	5.00	dry					
6.00-6.50	B 14 U NR	100 blows No recovery	6.00		3.50 m clayey GRAVEL		(8.00)		
6.50-6.95	SPT C B 15 D 16	N=17 (2,2,3,4,3,3)	6.50	dry	5.00 m slight organic odour.				
7.30	D 17								
7.50-7.95	SPT C B 18	N=12 (1,3,2,3,3,4)	7.50	dry					
7.50-8.00			07/08/2008	1800			8.00	+127.44	SP
					EXPLORATORY HOLE ENDS AT 8.00 m				
Groundwater Entries No. Struck Post strike behaviour None observed (see Key Sheet)		Depth sealed (m)		Depth Related Remarks * From to (m)		Chiselling Depths (m) 3.60-3.70 4.10-4.20		Time Tools used 30 mins 30 mins	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50				Project Ballymore Eustace Sewerage Scheme		Project No. K08089		Carried out for Kildare County Council	
						Borehole PBP01		Sheet 1 of 1	

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Borehole Log



Drilled Logged Checked	MV ACS	Start 02/10/2008 End 02/10/2008	Equipment, Methods and Remarks Casagrande C6 Rotary Open Hole 175mm diameter from 0.00m - 15.245m. Backfilled with grout.		Depth from 0.00m to 15.25m	Diameter 175mm	Casing Depth 15.00m	Ground Level Coordinates National Grid Chainage	+135.82 mOD E 291951.74 N 210828.13
Samples and Tests					Strata				
Depth	Type & No	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend	Backfill Instruments	
					Driller Reports: Fill.	(6.20)			
					Driller Reports: SAND and GRAVEL with clay stone.	6.20 +129.62 (4.00)			
Depth	Type & No	Records	Date Casing	Time Water	Stratum continues to 10.20 m				
Groundwater Entries No. Struck Post strike behaviour (m)			Depth sealed (m)	Depth Related Remarks * From to (m) Flush Type: Air / Mast.		Chiselling Depths (m) Time Tools used			
None observed (see Key Sheet)									
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.					Project Ballymore Eustace Sewerage Scheme	Borehole PB3R			Sheet 1 of 2
Scale 1:50 (c) ESGL www.esgl.co.uk 08 24 07 08 2008 15 25 41					Project No. KD8089	Carried out for Kildare County Council			

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Borehole Log

Drilled MN Logged Checked ACS	Start 02/10/2008 End 02/10/2008	Equipment, Methods and Remarks Casing: 175mm diameter from 0.00m - 15.245m. Rotary Open Hole 175mm diameter from 0.00m - 15.245m. Backfilled with grout.	Depth from 0.00m to 15.25m Diameter 175mm Casing Depth 15.00m	Ground Level Coordinates National Grid Chainage +135.82 mOD E 291851.74 N 210628.13				
Samples and Tests			Strata					
Depth	Type & No	Records	Date Casing	Time Water	Description (Continued from Sheet 1)	Depth, Level (Thickness)	Legend	Backfill Instruments
10.00-10.45	SPTS	N-37 (7,7/18,8,7,4)	10.00	dry	Driller Reports: SAND and GRAVEL with clay stone.	10.20 +125.62		
11.50-11.74	SPTS	80 (9,9/24,26 for 10mm)	11.50	dry	Driller Reports: Stiff clay stone (Boulder CLAY).	(5.05)		
13.00-13.36	SPTS	50 (7,12/18,19,15 for 60mm)	13.00	dry				
15.00-15.25	SPTS	50 (3,20/23,27 for 20mm)	15.00	damp 1600	EXPLORATORY HOLE ENDS AT 15.25 m	14.90-15.00 m Damp 15.25 +120.57		
Groundwater Entries No. Struck Post strike behaviour None observed (see Key Sheet)					Depth sealed (m) From to (m)		Chiselling Depths (m) Time Tools used	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:50					Project Ballymore Eustace Sewerage Scheme Project No. K08089 Carried out for Kildare County Council		Borehole PB3R Sheet 2 of 2	

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Trial Pit Log



Logged CMG Checked ACS	Start 20/08/2008 End 20/08/2008	Equipment, Methods and Remarks Excavated using a JCB 3CX Backfilled with arisings.	Dimensions and Orientation Width 1.00 m Length 4.00 m 195 (Deg)	Ground Level Coordinates National Grid Chainage +135.36 mOD E 201916.82 N 210655.82
---------------------------	--	---	--	---

Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.70-0.80 0.70-0.80	B 1 D 2		1 MADE GROUND: Firm to stiff dark grey becoming brown at 0.5m and black at 1.75m slightly sandy to sandy gravelly CLAY with cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of argillaceous limestone. Cobbles and boulders are subangular to subrounded of argillaceous limestone.	(2.10)		
1.40-1.50 1.40-1.50	B 3 D 4					
2.40-2.60 2.40-2.60	B 5 D 6		2 MADE GROUND: Brown silty SAND and GRAVEL. Sand is fine to coarse. Gravel is angular to subrounded fine to coarse of argillaceous limestone.	2.10 +133.26		
3.10-3.20 3.10-3.20	B 7 D 8		1.90 m plastic sheet 2.40-2.50 m Slightly sandy slightly gravelly CLAY. 3.10-3.20 m Sandy gravelly CLAY.	(1.90)		
			EXPLORATORY HOLE ENDS AT 4.00 m	4.00 +131.39		

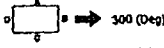




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Groundwater Entries No. Struck Post Strike Behaviour (m) 2.10 Slight seep from pocket in made ground	Depth Related Remarks * From to (m) 2.10 4.00 Water seepage. Pit terminated due to partial collapse.	Stability Moderate Shoring None Weather Overcast
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project Ballymore Eustace Sewerage Scheme Project No. KD8889 Carried out for Kildare County Council	Trial Pit TP01 Sheet 1 of 1

Scale 1:25
(c) ESOL www.esol.co.uk
0214 07092208 18 0154

Trial Pit Log



Logged COK Checked ACS	Start 03/09/2008 End 03/09/2008	Equipment, Methods and Remarks Excavated using a JCB 3CX. Backfilled with arisings.	Dimensions and Orientation Width 1.00 m Length 3.00 m 	Ground Level Coordinates National Grid Chalnage	+138.19 mOD E 201968.11 N 210643.18	
Samples and Tests			Strata			
Depth	Type & No.	Date Records	Description	Depth, Level (Thickness)	Legend	Backfill/ Instruments
0.80-0.90 0.80-0.90	B1 D2		1 MADE GROUND: Firm to stiff brown slightly sandy slightly gravelly to gravelly CLAY with many cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies predominantly limestone. Cobbles and boulders are subangular to subrounded of limestone.	(1.20)		
			2 MADE GROUND: Grey stiff slightly sandy gravelly CLAY with many cobbles and boulders. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse of various lithologies. Cobbles and boulders are subangular to subrounded of limestone.	1.20 +134.99 (1.70)		
2.60-2.70 2.60-2.70	B3 D4			2.90 +133.29		
			EXPLORATORY HOLE ENDS AT 2.90 m			
Depth	Type & No.	Records Date				
Groundwater Entries No. Struck Post Strike Behaviour (m) None observed (see Key Sheet)			Depth Related Remarks* From to (m) 2.90 PA terminated due to possible boulder obstruction.		Stability Good Shoring None Weather	
Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 (c) ESCL www.escl.co.uk 408 24 01022008 18 0154			Project Ballymore Eustace Sewerage Scheme Project No. KD088 Carried out for Kildare County Council		Trial Pit TP02 Sheet 1 of 1	

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Dynamic Probe Log



Operator: JR / GM Probe Type: DPH
 Logged by: JR / GM Rod Diameter (mm): 35 Cone Diameter (mm): 43.7
 Checked by: ACS Rod Mass (kg/m): 6 Hammer Mass (kg): 50.00 Cone tip abandoned at (mBGL): -
 Ground Level: +134.57 mOD
 Coordinates: E 291895.83 N 210622.98
 Fall Height (mm): 500 Date of Test: 28/08/2008 Chainage:

Level	Depth (m)	Blows per 100mm	Blow Count					Torque (Nm)	Description	Legend	Backfill Instruments
			5	10	15	20	25				
+134.57	0.00	4									
		2									
		1									
+134.07	0.50	3									
		1									
		4									
		6									
+133.57	1.00	4									
		6									
		3									
		2									
+133.07	1.50	4									
		4									
		4									
+132.57	2.00	8									
		9									
		7									
		11									
+132.07	2.50	18									
		12									
		11									
		8									
		7									
+131.57	3.00	8									
		7									
		7									
		8									
+131.07	3.50	6									
		2									
		3									
		3									
+130.57	4.00	4									
		2									
		3									
		6									
		15									
		26									

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End of Probehole at 4.42 m

Remarks
 Tested in accordance with BS 1377

Equipment, Methods and Comments
 At 4.40m: 25 blows for 15mm. Refusal.

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres.
 Scale: 1:25
 (c) ESOL www.esol.co.uk
 42 24 0709 1008 113 725

Project Ballymore Eustace Sewerage Scheme
Project No. KD8089
Carried out for Kildare County Council

Exploratory Hole
DP01
 Sheet 1 of 1



ENCLOSURE B
INSTRUMENTATION AND MONITORING

Installation Details
Groundwater Monitoring

B1
B2

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Groundwater Installation Details



Hole No	Instrument ID	Installation Type	Date of Installation	Reference depth (mBGL)	Piezometer Diameter (mm)	Top of response zone (mBGL)	Base of response zone (mBGL)	Tubing Completion Details	Headworks	Remarks
PB03		SP	7 Aug 2008	0.00	50	1.00	8.00		Lockable top cover	

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Notes: Type: SP - Standpipe, SPIE - Standpipe
 Piezometer, HPIE - Hydraulic Piezometer, PPIE -
 Pneumatic Piezometer, EPIE - Electronic
 Piezometer Prepared: 28/10/2008 15:04



Project Ballymore Eustace Sewerage Scheme
 Project No. KD8089
 Carried out for Kildare County Council

Table
B1

Groundwater Monitoring



Hole ID	Instrument ID	Instrument Type	Base of Instrument (mBGL)	Reference Depth (mBGL)	Reading				
					Date	Time (hhmmss)	Water Level (mBGL) * calculated	Head (m above Tip) * calculated	Comments
PB03		SP	8	0.00	26 Aug 2008		7.00		

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Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



Project: **Ballymore Eustace Sewerage Scheme**
 Project No.: **KDS009**
 Carried out for: **Kildare County Council**

Sheet **B2**



ENCLOSURE C
GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX
Particle Size Distribution Analyses	PSD
Unconsolidated Undrained Triaxial Compression Summary of Results	UUSUM
Unconsolidated Undrained Triaxial Compression Tests	UTXL
Compaction Tests	COMPH
California Bearing Ratio Tests	CBR
California Bearing Ratio / Moisture Content Relationship Plots	CBREL

INDEX PROPERTIES - SUMMARY OF RESULTS

Project No		Project Name												
KD8089		Ballymore Eustace Sewage Scheme												
Hole No.	Sample				Soil Description	ρ	ρ_d	W	<425 μ m sieve	W _L	W _p	I _p	P_s	Remarks
	No.	Depth (m)		type		Mg/m ³	%	%	%	%	%	kg/m ³		
		from	to											
PB01	4	1.50		O	Grey gravelly CLAY			14	47 a	24 a	15	9		
PB01	7	2.50	3.00	B	Brown slightly sandy slightly gravelly CLAY with many cobbles			16	28 a	28 a	19	10		
PB02	8	1.50	2.00	B	Brown slightly sandy slightly gravelly CLAY			14	81 a	28 a	17	9		
PB03	5	1.50	2.00	B	Grey mottled brown sandy gravelly CLAY			13	54 a	25 a	18	9		
PB03	9	3.50	4.00	B	Brown dark grey slightly sandy slightly gravelly CLAY			13	52 a	27 a	17	10		
PB03	13	5.50	6.00	B	Grey slightly sandy slightly gravelly CLAY			12	53 a	26 a	17	9		
PB03	16	7.50	8.00	B	Brown slightly sandy slightly gravelly CLAY			13	57 a	22 a	15	7		
PB13	1	0.30	1.00	B	Dark brown slightly sandy gravelly CLAY			12	50 a	23 a	16	10		
PB13	5	2.50	3.00	B	Grey slightly sandy slightly gravelly CLAY			14	55 a	30 a	19	11		
PB14	2	1.00	1.45	O	Dark brown slightly sandy slightly gravelly CLAY			11						
PB14	6	3.00	3.45	O	Brown sandy slightly gravelly CLAY			18	52 a	29 b	17	12		
PB14	10	5.00	5.45	O	Brown slightly sandy slightly gravelly CLAY			11						
PBP01	3	0.80	0.95	U	Stiff dark brown slightly sandy gravelly CLAY with two cobbles			72	33 a	29 b	19	10		
PBP01	7	2.50	2.95	U	Brown slightly sandy gravelly CLAY			11	55 a	27 a	18	9		
PBP01	10	3.50	4.00	B	Brown slightly sandy gravelly CLAY			14	50 a	31 a	18	12		
PBP01	14	6.00	6.50	B	Brown grey slightly sandy gravelly CLAY with many cobbles			18	24 a	29 a	19	10		
PBP01	18	7.50	8.00	B	Brown grey slightly sandy gravelly CLAY			15	34 a	25 a	14	11		
TP01	1	0.70	0.80	B	Dark grey sandy gravelly CLAY with occasional cobbles			15	37 a	27 a	16	9		
TP02	1	0.80	0.90	B	Brown slightly sandy slightly gravelly CLAY			14	69 a	28 a	18	10		
TP02	3	2.60	2.70	B	Brown grey slightly sandy gravelly CLAY			15	53 a	29 a	21	8		

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General notes: All above tests carried out to BS1377 : 1990 definitive method in all cases unless annotated otherwise. See individual test reports for further details.

Key:

ρ bulk density, linear	W _L liquid limit	W _p Plastic limit	<425 μ m preparation	ρ_s particle density
ρ_d dry density	a 4 point cone test	NP non - plastic	n from natural soil	-g = gas jar
w moisture content	b 1 point cone test	I _p Plasticity Index	s sieved specimen	-p = small pycnometer

QA Ref
SLR 1
Rev 82
Jul 07

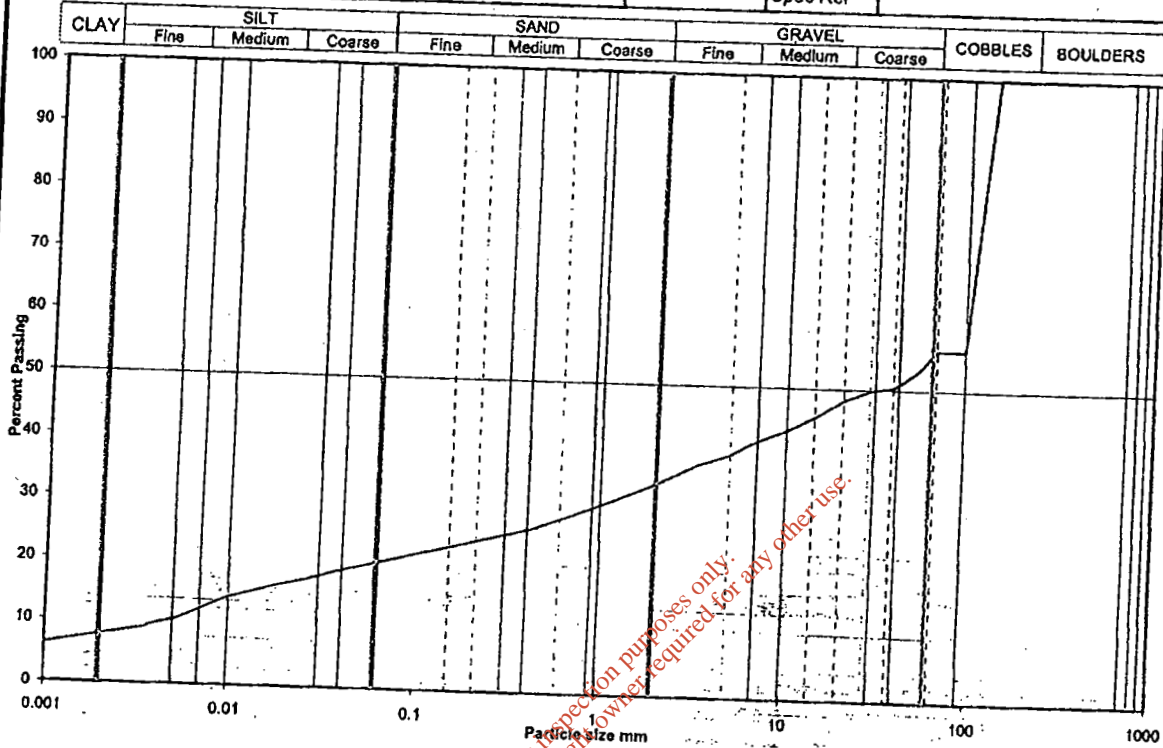


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Table
INDX

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	2.50
			Samp No	7
			Type	B
			ID	ESGKD808920080826000000007
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	20
90	56	0.0501	19
75	56	0.0360	19
63	56	0.0259	17
50	53	0.0186	16
37.5	50	0.0099	14
28	50	0.0052	10
20	48	0.0037	9
14	45	0.0035	9
10	43	0.0009	6
6.3	41		
5.0	39		
3.35	37		
2.00	34		
1.18	31		
0.600	28		
0.425	26		
0.300	25		
0.212	24		
0.150	23		
0.063	20		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
5.8

Soil description	Brown slightly sandy slightly gravelly CLAY with many cobbles		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		44	0
		22	39
		14	25
		12	21
		8	14

*<60mm values to aid description only

Uniformity Coefficient	D_{60} / D_{10}	20119
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2.9
Rev 78
Jan 08

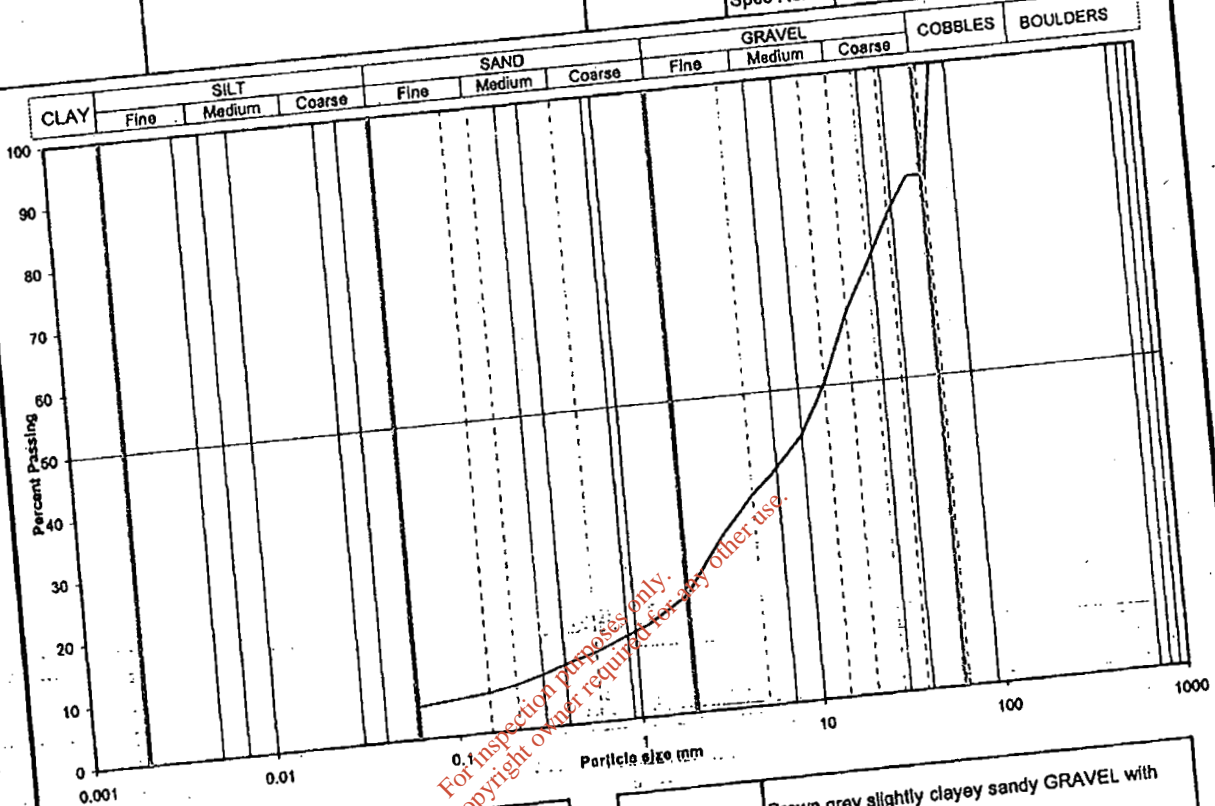


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB01	
Project Name	Ballymore Eustace Sewage Scheme	Depth (m BGL)	4.30		
		Samp No	10	Type	B
		ID	ESGKD8089200808260000000010		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	82		
50	82		
37.5	77		
28	69		
20	61		
14	50		
10	43		
6.3	38		
5.0	34		
3.35	28		
2.00	19		
1.18	15		
0.600	11		
0.425	10		
0.300	8		
0.212	7		
0.150	6		
0.083	5		

Dry mass of sample, kg
3.3

Soil description	Brown grey slightly clayey sandy GRAVEL with occasional cobbles		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<80mm
		18	0
		63	77
		14	17
		silt+clay =	
		5	6

Uniformity Coefficient D_{60} / D_{10} **44**

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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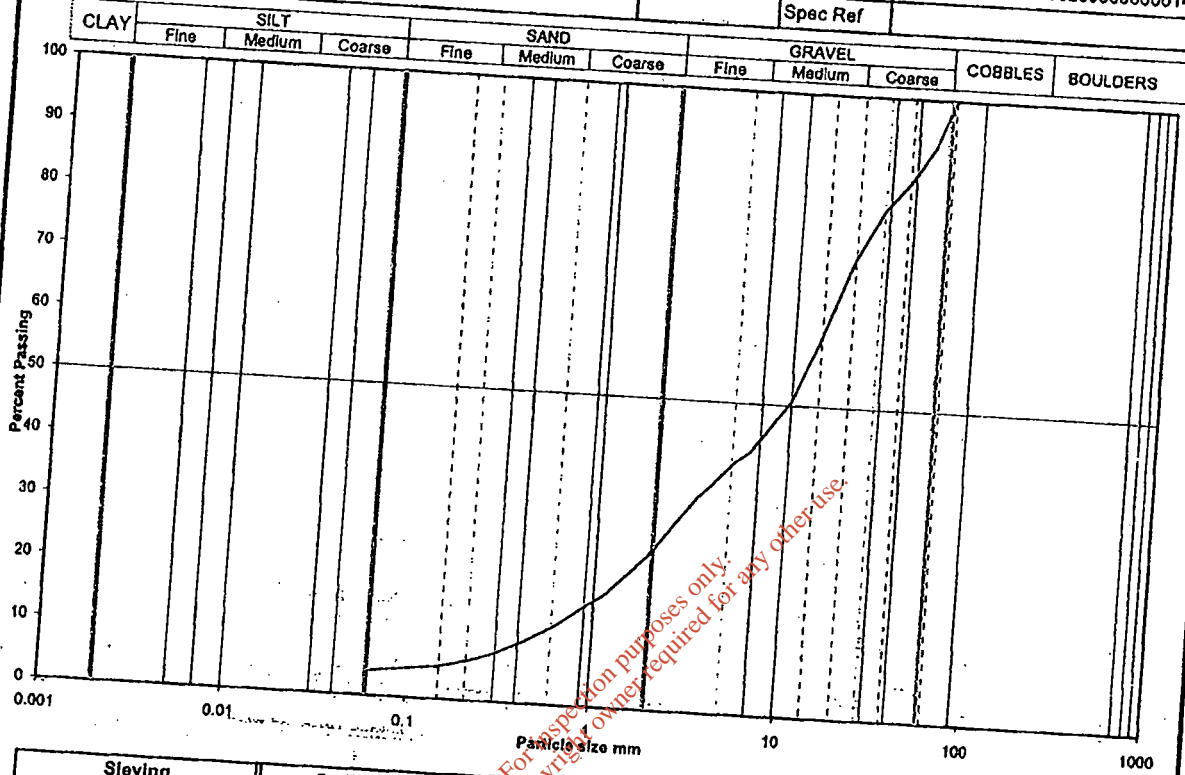
Figure
PSD

QA Ref
SLR 2.9
Rev 78
Jan 08



Particle Size Distribution Analysis

Project No	KD8089	Sample Details:		Hole No	PB01
Project Name	Ballymore Eustace Sewage Scheme			Depth (m BGL)	6.80
		Samp No	14	Type	B
		ID	ESGKD8089200808280000000014		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	92		
37.5	86		
28	82		
20	74		
14	61		
10	51		
6.3	42		
5.0	40		
3.35	34		
2.00	26		
1.18	18		
0.600	12		
0.425	10		
0.300	8		
0.212	6		
0.150	5		
0.063	4		
		Dry mass of sample, kg	
		3.6	

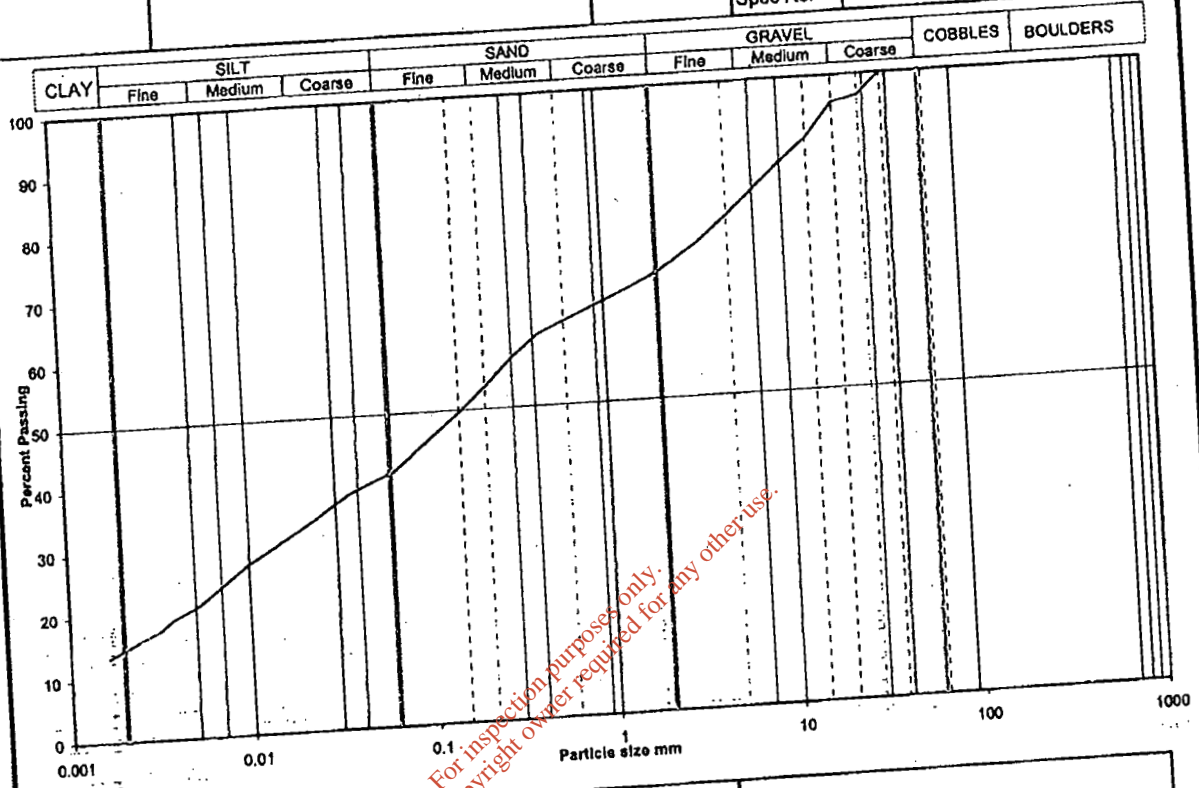
Soil description	Brown slightly clayey very sandy GRAVEL with cobbles		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>* <60mm values to aid description only</small>	Cobbles / boulders	Whole	* <60mm
	Gravel	2	0
	Sand	72	73
	Silt	22	22
	Clay	4	4
Uniformity Coefficient	D_{60} / D_{10}	31	
Test Method	BS 1377 : Part 2 : 1990		
	Sieving	9.2 wet sieve	
	Sedimentation	none	

QA Ref
SLR 2.9
Rev 78
Jan 08



Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	1.50
			Samp No	6
			Type	B
			ID	ESGKD8089200808260000000058
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	41
90	100	0.0494	39
75	100	0.0355	38
63	100	0.0257	35
50	100	0.0186	32
37.5	100	0.0099	27
28	97	0.0052	21
20	98	0.0037	19
14	90	0.0032	17
10	87	0.0016	13
6.3	81		
5.0	79		
3.35	74		
2.00	70		
1.18	67		
0.600	63		
0.425	61		
0.300	58		
0.212	54		
0.150	50		
0.083	41		

Soil description	Brown slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	30	30
	Silt	30	30
	Clay	28	28
		14	14

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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BS 1377 : Part 2 : 1990	
Test Method	9.2 wet sieve
	9.5 hydrometer

QA Ref
SLR 2.9
Rev 78
Jan 08

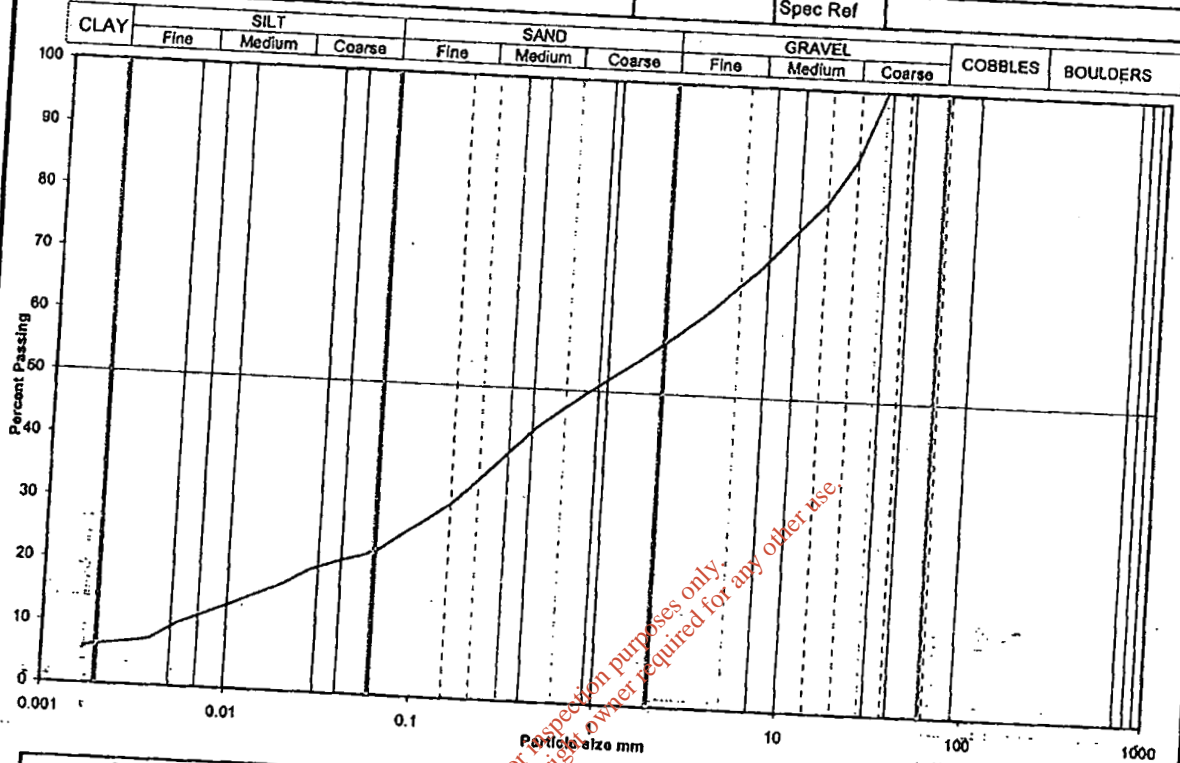


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	4.40
			Samp No	11
			Type	D
			ID	ESGKD808920080826000000063
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	23
90	100	0.0536	22
75	100	0.0383	21
63	100	0.0275	20
50	100	0.0198	17
37.5	100	0.0106	14
28	100	0.0054	10
20	89	0.0039	8
14	82	0.0035	7
10	77	0.0017	6
6.3	71		
5.0	68		
3.35	63		
2.00	58		
1.18	53		
0.600	47		
0.425	44		
0.300	40		
0.212	35		
0.150	31		
0.063	23		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
0.4

Soil description	Brown sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		42	42
		35	35
		17	17
		6	6

Uniformity Coefficient	D_{60} / D_{10}	460
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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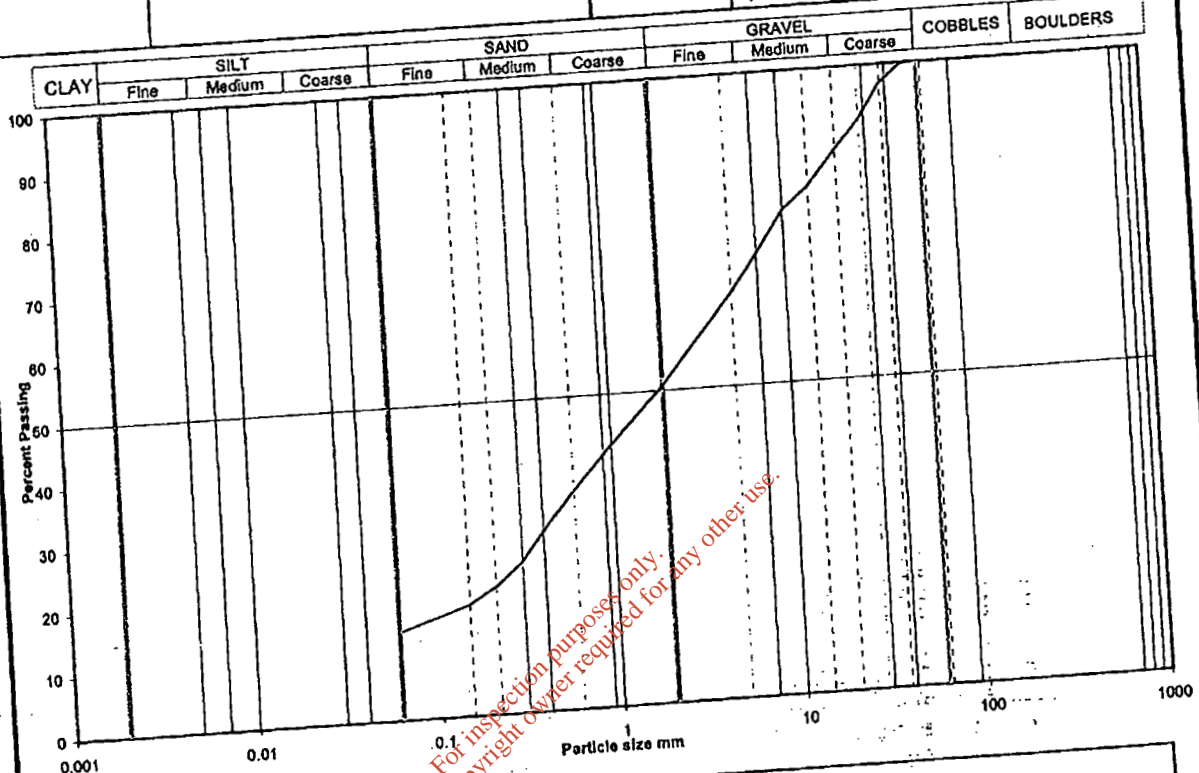
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Figure

PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	6.90
			Samp No	16
			Type	B
			ID	ESGKD8089200808260000000068
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	97		
28	91		
20	87		
14	81		
10	78		
6.3	69		
5.0	65		
3.35	59		
2.00	51		
1.18	44		
0.600	35		
0.425	30		
0.300	24		
0.212	20		
0.150	18		
0.083	14		

Dry mass of sample, kg
4.9

Soil description	Brown clayey very sandy GRAVEL		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to add description only</small>	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	49	49
	Silt	37	37
	Clay	silt+clay =	14

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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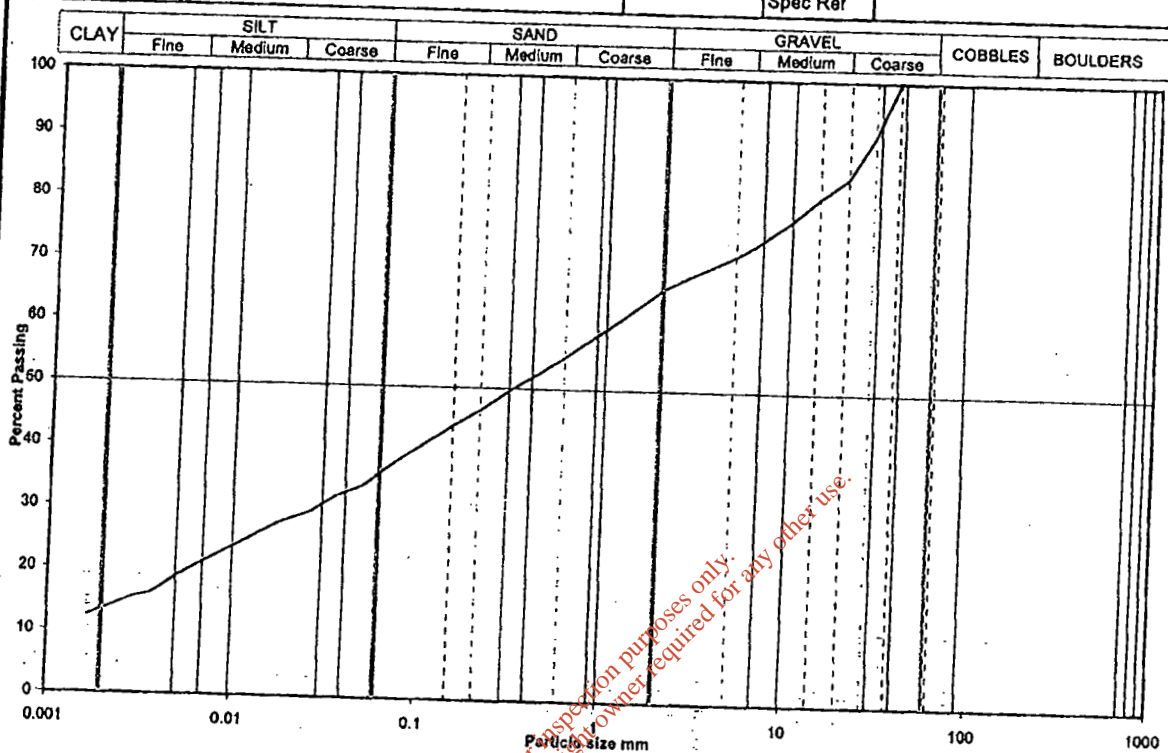


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB03
Project Name	Ballymore Eustace Sewage Scheme		Depth (m.BGL)	3.50
			Samp No	9
			Type	B
			ID	ESGKD8089200808280000000182
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	38
90	100	0.0489	34
75	100	0.0352	32
63	100	0.0255	29
50	100	0.0183	28
37.5	100	0.0098	24
28	92	0.0051	19
20	85	0.0037	16
14	81	0.0030	15
10	78	0.0017	12
6.3	73		
5.0	72		
3.35	69		
2.00	66		
1.18	61		
0.600	55		
0.425	52		
0.300	50		
0.212	46		
0.150	44		
0.063	38		

Soil description	Brown dark grey slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <60mm
		0	0
		34	34
		30	30
		23	23
		13	13

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
2.2

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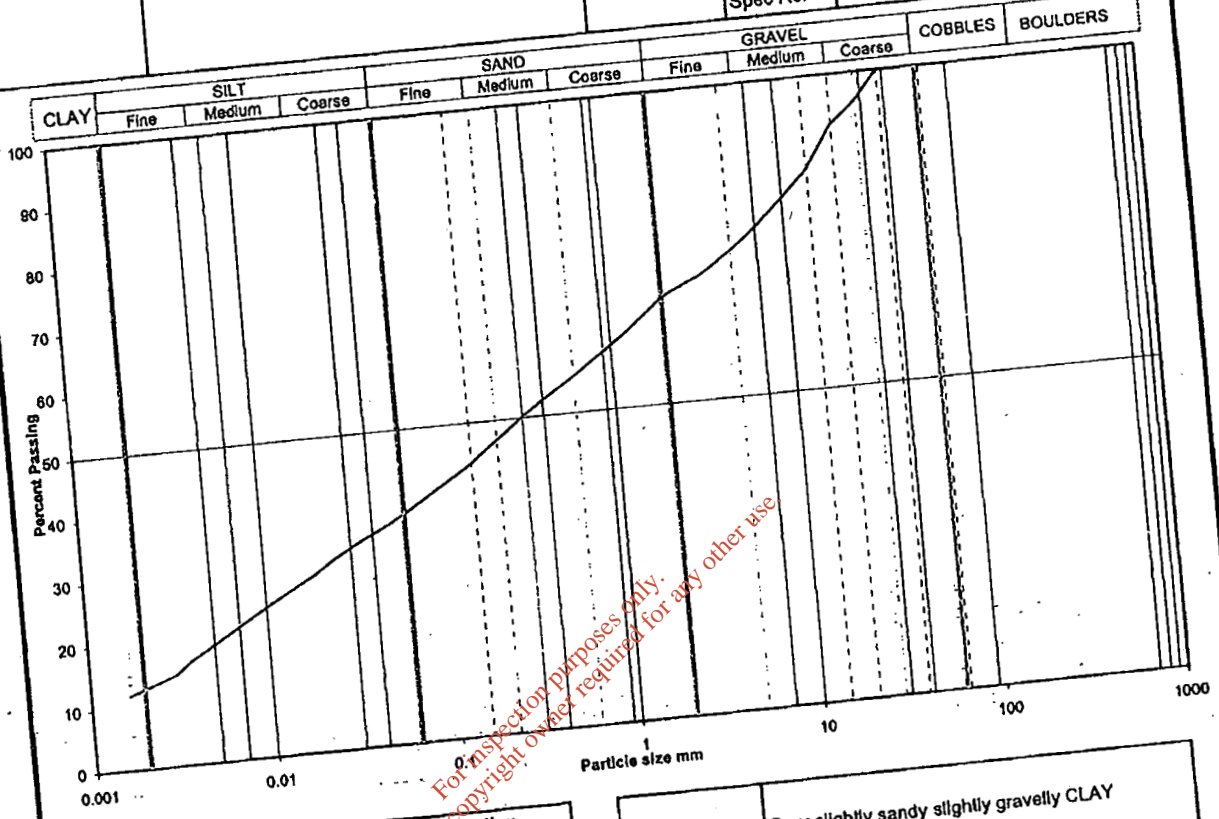


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB03
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	5.50
			Samp No	13
			Type	B
			ID	ESGKD8089200808280000000186
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	37
90	100	0.0484	35
75	100	0.0350	33
63	100	0.0253	31
50	100	0.0183	28
37.5	100	0.0098	24
28	96	0.0051	19
20	92	0.0037	17
14	85	0.0030	15
10	81	0.0016	12
6.3	78		
5.0	74		
3.35	70		
2.00	67		
1.18	62		
0.600	56		
0.425	53		
0.300	50		
0.212	47		
0.150	44		
0.083	37		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
3.0

Soil description	Grey slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	33	33
	Silt	31	31
	Clay	24	24
		12	12

Uniformity Coefficient D₆₀ / D₁₀ #N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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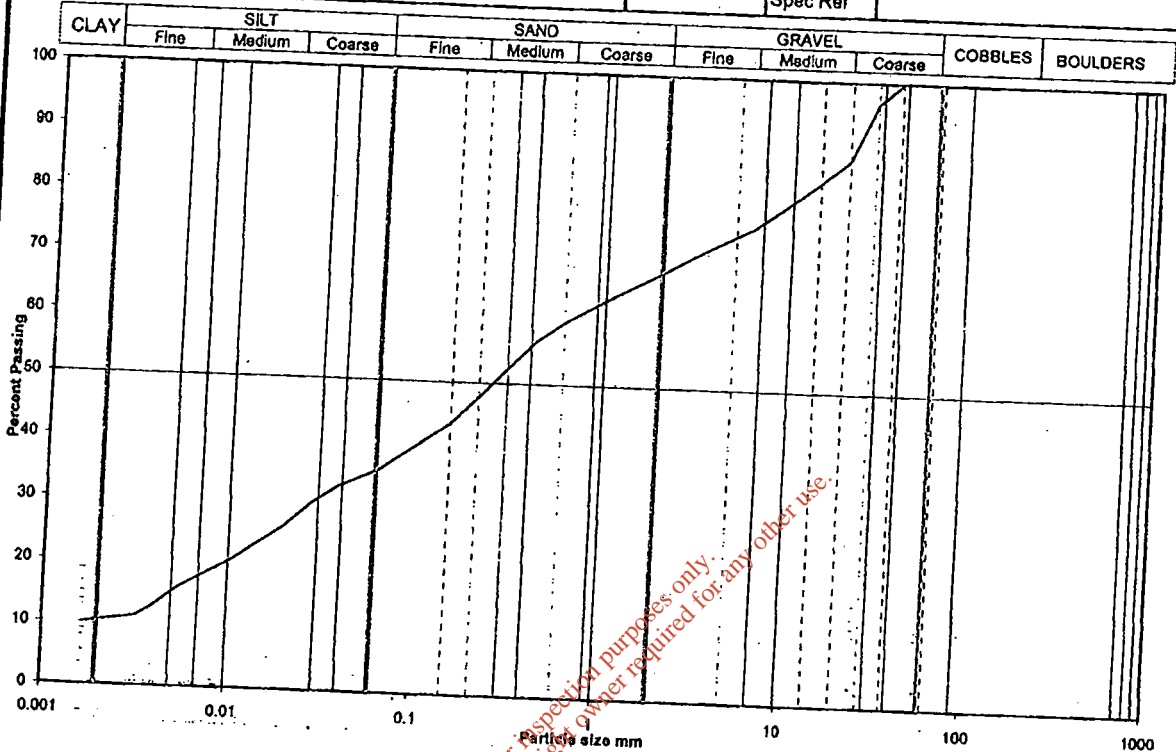


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB03
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	7.50
			Samp No	18
			Type	B
			ID	ESGKD8089200808280000000189
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	36
90	100	0.0536	35
75	100	0.0383	33
63	100	0.0276	30
50	100	0.0199	28
37.5	100	0.0106	21
28	97	0.0054	18
20	87	0.0039	13
14	84	0.0032	11
10	81	0.0018	10
6.3	78		
5.0	75		
3.35	72		
2.00	68		
1.18	65		
0.600	60		
0.425	57		
0.300	52		
0.212	48		
0.150	43		
0.083	36		

Particle density, Mg/m ³	2.65 assumed
Dry mass of sample, kg	3.6

Soil description	Brown slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	* < 60mm
	Gravel	0	0
	Sand	32	32
	Silt	33	33
	Clay	25	25
		10	10

* < 60mm values to aid description only

Uniformity Coefficient	D_{60} / D_{10}	353
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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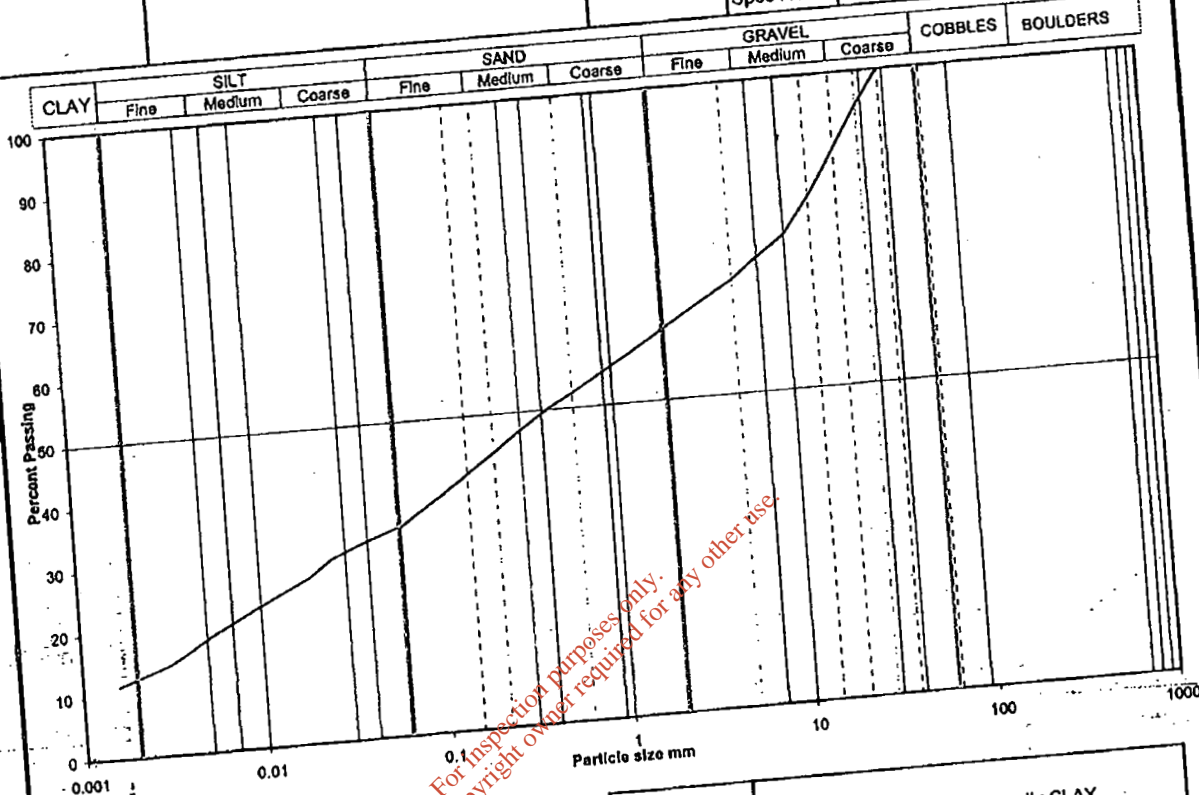
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Figure

PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB13
Project Name	Ballymore Eustace Sewage Scheme	Depth (m BGL)	0.30	
		Samp No	1	Type
		ID	ESGKD808920080903000000325	
		Spec Ref		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	34
90	100	0.0494	32
75	100	0.0355	31
63	100	0.0255	29
50	100	0.0186	26
37.5	100	0.0099	22
28	95	0.0051	18
20	88	0.0037	16
14	80	0.0031	14
10	75	0.0018	11
6.3	71		
5.0	68		
3.35	65		
2.00	61		
1.18	57		
0.600	52		
0.425	50		
0.300	47		
0.212	44		
0.150	41		
0.083	34		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
3.5

Soil description	Dark brown slightly sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	<60mm
	Gravel	0	0
	Sand	39	39
	Silt	28	28
	Clay	21	21
		12	12

Uniformity Coefficient	D ₆₀ / D ₁₀	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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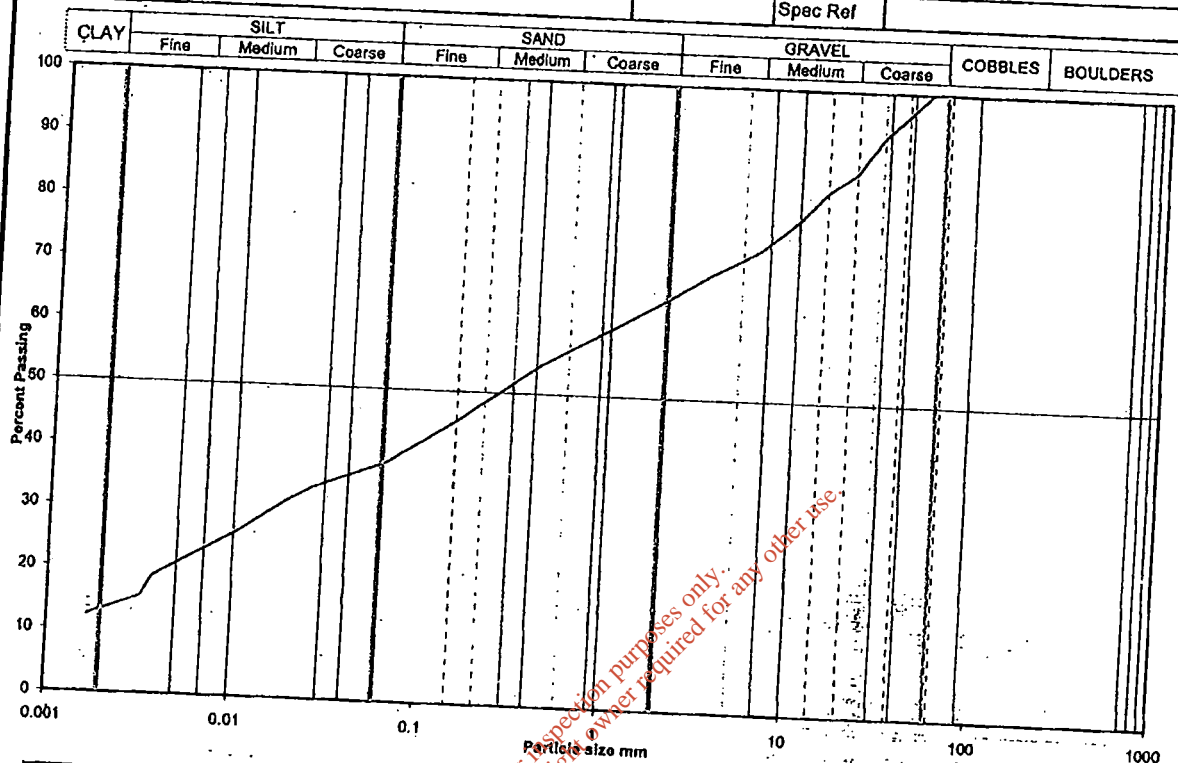


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PB13
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	2.50
			Samp No	5
			Type	B
			ID	ESGKD8089200809030000000329
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	38
90	100	0.0506	37
75	100	0.0362	35
63	100	0.0259	34
50	100	0.0187	31
37.5	96	0.0100	26
28	93	0.0052	21
20	87	0.0037	19
14	84	0.0032	18
10	79	0.0017	12
6.3	74		
5.0	73		
3.35	70		
2.00	66		
1.18	62		
0.600	57		
0.425	55		
0.300	52		
0.212	48		
0.150	45		
0.063	38		

Particle density, Mg/m ³	2.65 assumed
Dry mass of sample, kg	3.9

Soil description	Grey slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	34	34
	Silt	28	28
	Clay	25	25
		13	13

Uniformity Coefficient	D_{60} / D_{10}	#N/A
Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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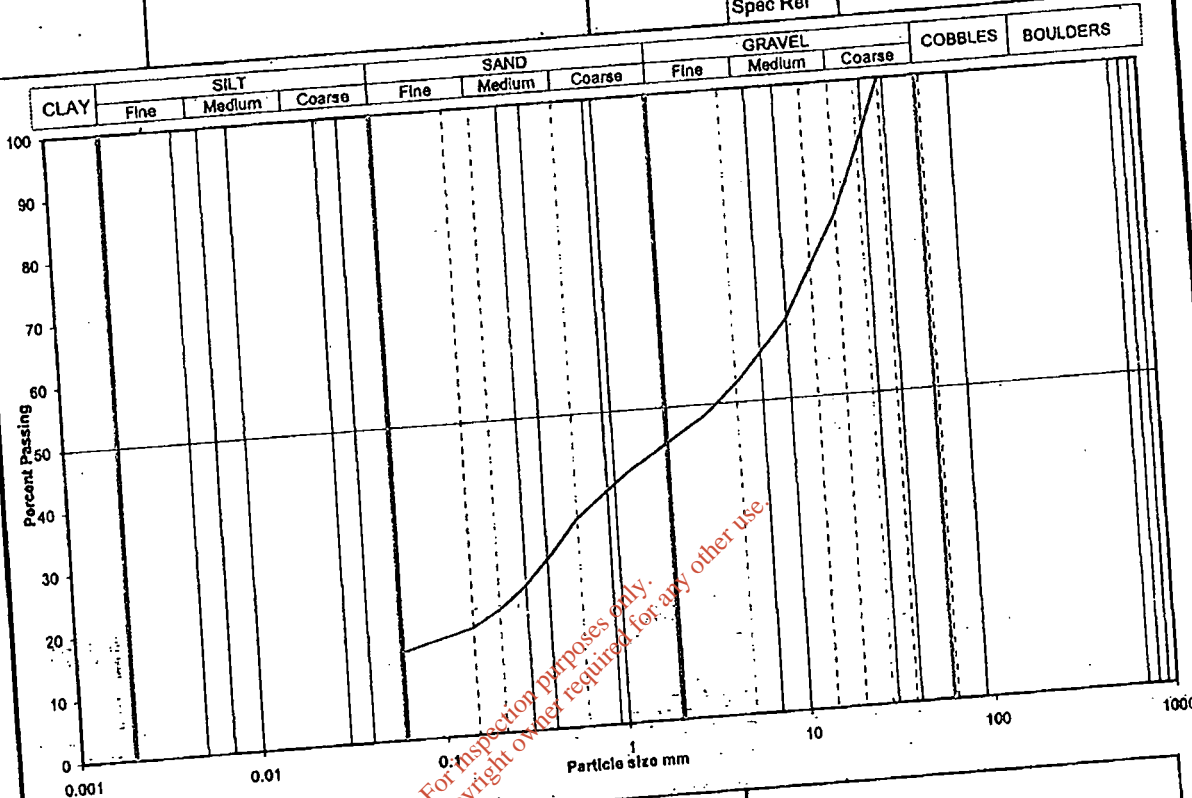


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Figure
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Particle Size Distribution Analysis

Project No	KD8089	Sample Details: Hole No		PB13	
		Depth (m BGL)		3.50	
Project Name	Ballymore Eustace Sewage Scheme	Samp No	7	Type	B
		ID	ESGKD8089200809030000000331		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	89		
20	79		
14	71		
10	63		
6.3	56		
5.0	53		
3.35	48		
2.00	44		
1.18	40		
0.600	33		
0.425	28		
0.300	23		
0.212	20		
0.150	17		
0.063	14		

Soil description	Brown clayey very sandy GRAVEL		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>* < 80mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* < 60mm
		0	0
		56	56
		30	30
		silt+clay = 14	14

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

Dry mass of sample, kg
3.4

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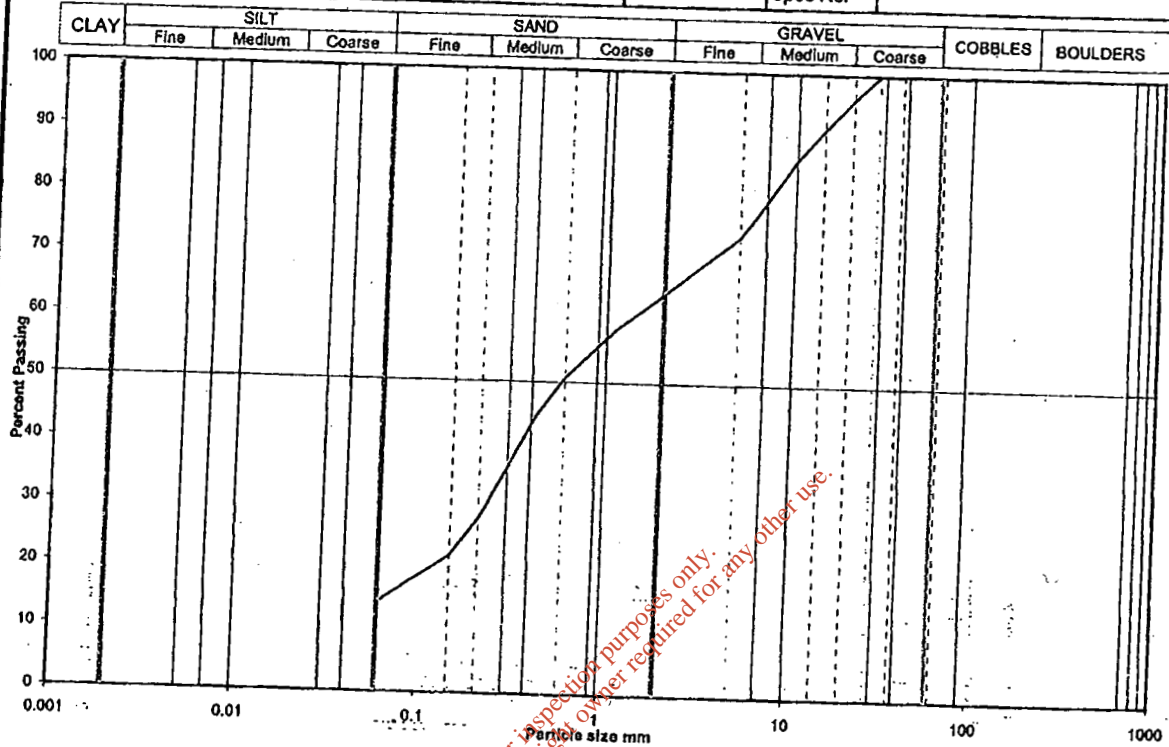


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:		Hole No	PB13
Project Name	Ballymore Eustace Sewage Scheme			Depth (m BGL)	6.00
		Samp No	11	Type	B
		ID	ESGKD8089200809030000000335		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	96		
14	91		
10	86		
6.3	77		
5.0	74		
3.35	69		
2.00	64		
1.18	59		
0.600	51		
0.425	45		
0.300	36		
0.212	28		
0.150	22		
0.083	15		

Dry mass of sample, kg
2.1

Soil description	Brown clayey very gravelly SAND		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>* < 60mm values to add description only</small>	Cobbles / boulders	Whole	< 60mm
	Gravel	0	0
	Sand	36	36
	Silt	50	50
	Clay	silt+clay = 14	14

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	nones

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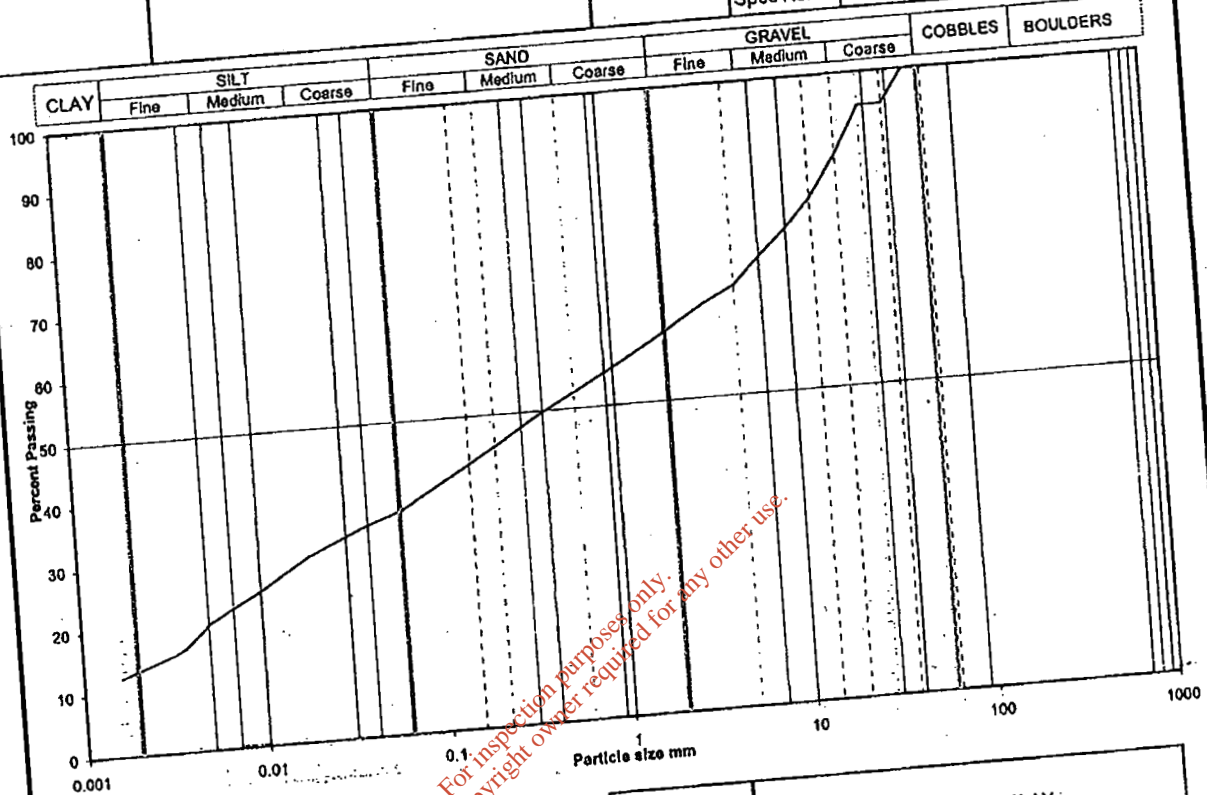


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Figure
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Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	PBP01	
Project Name	Ballymore Eustace Sewage Scheme	Depth (m BGL)	3.50		
		Samp No	10	Type	B
		ID	ESGKD808920080828000000121		
		Spec Ref			



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Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	36
90	100	0.0508	35
75	100	0.0362	33
63	100	0.0260	31
50	100	0.0187	30
37.5	95	0.0100	25
28	95	0.0052	20
20	87	0.0037	18
14	80	0.0033	18
10	76	0.0016	12
6.3	70		
5.0	68		
3.35	65		
2.00	61		
1.18	57		
0.600	52		
0.425	50		
0.300	48		
0.212	45		
0.150	42		
0.063	36		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
1.8

Soil description	Brown slightly sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole 0 39 25 22 14	<60mm 0 39 25 22 14

Uniformity Coefficient D_{60} / D_{10} #N/A

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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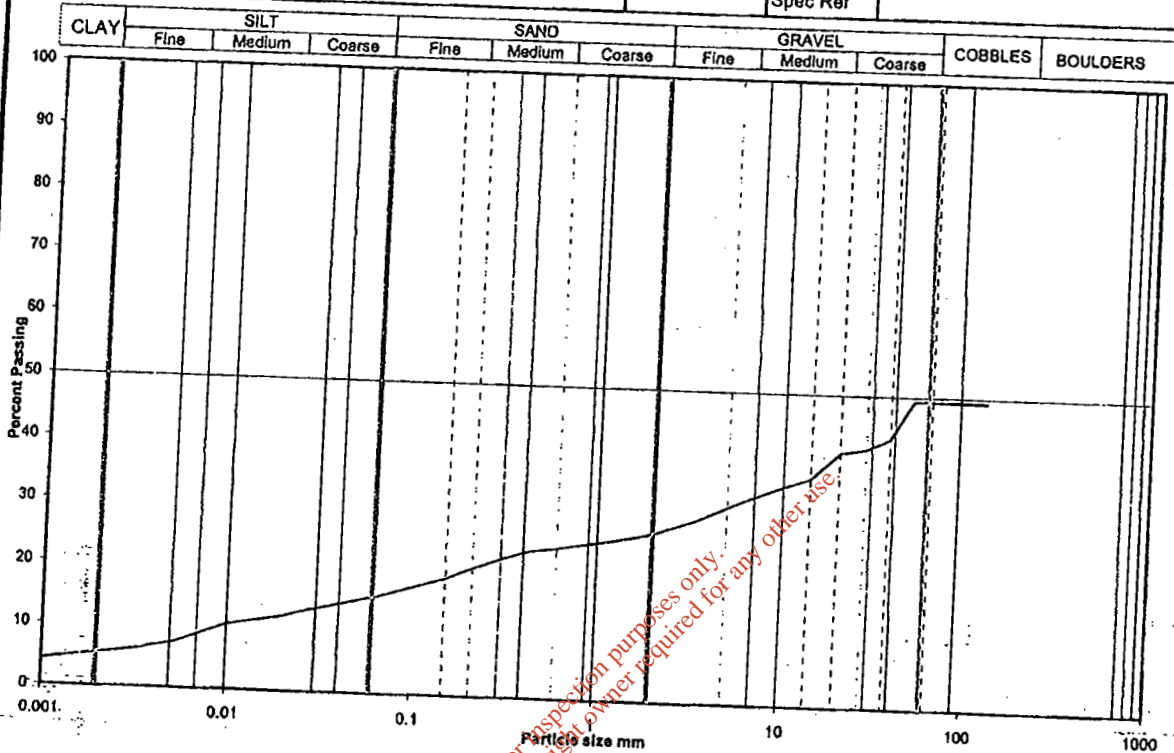


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:		Hole No	PBP01
Project Name	Ballymore Eustace Sewage Scheme			Depth (m BGL)	6.00
		Samp No	14	Type	B
		ID	ESGKD808920080828000000127		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	49	0.0630	15
90	49	0.0494	15
75	49	0.0358	14
63	49	0.0258	13
50	49	0.0187	12
37.5	43	0.0099	10
28	41	0.0052	7
20	41	0.0037	7
14	37	0.0036	6
10	35	0.0009	4
6.3	33		
5.0	31		
3.35	29		
2.00	27		
1.18	26		
0.600	24		
0.425	24		
0.300	22		
0.212	21		
0.150	19		
0.083	15		

Soil description	Brown gray slightly sandy gravelly CLAY with many cobbles		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders	Whole	*<60mm
	Gravel	51	0
	Sand	22	45
	Silt	12	24
	Clay	10	20

Uniformity Coefficient	D_{60} / D_{10}	#N/A
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
5.7

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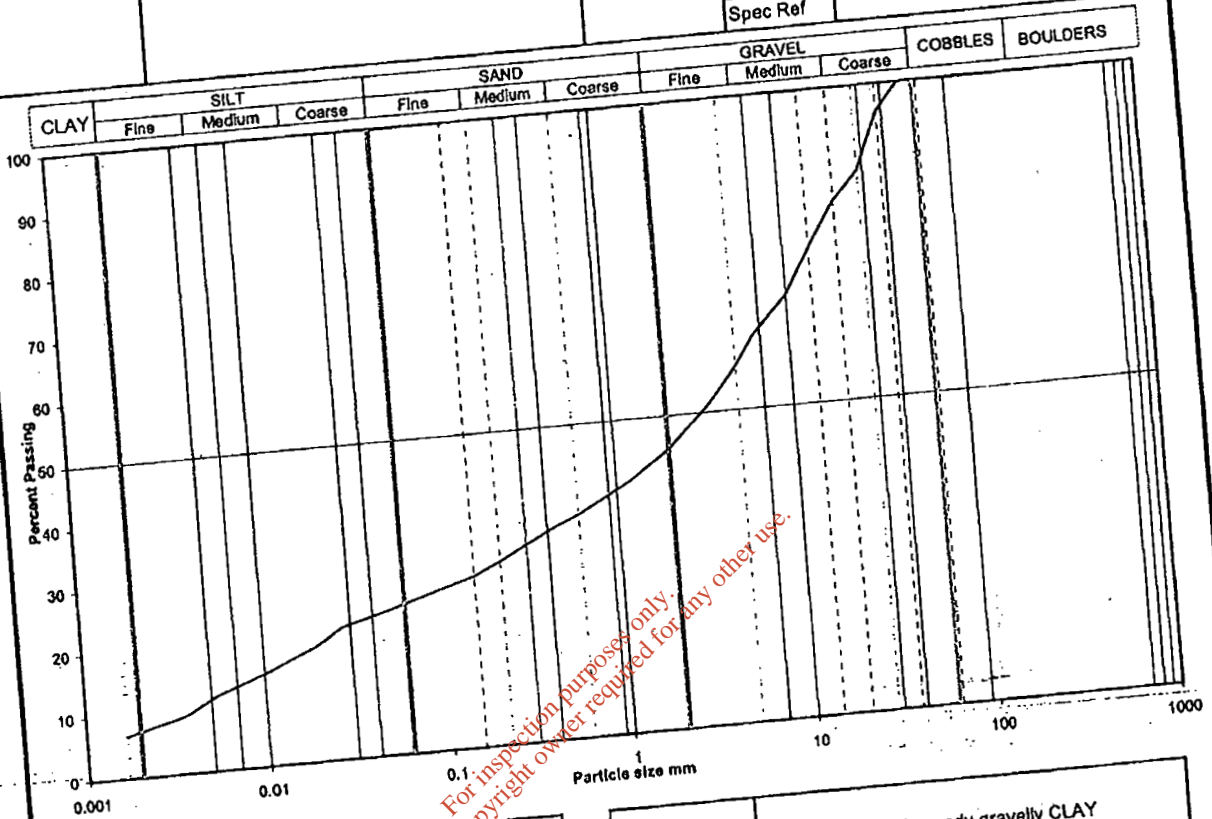


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Figure
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Particle Size Distribution Analysis

Project No KD8089		Sample Details: Hole No		PBP01			
		Project Name Ballymore Eustace Sewage Scheme		Depth (m BGL)		7.50	
		Samp No		18			
		ID		Type		B	
		Spec Ref		ESGKD808920080828000000131			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	24
90	100	0.0525	23
75	100	0.0376	22
63	100	0.0269	21
50	100	0.0195	18
37.5	96	0.0104	15
28	87	0.0053	12
20	82	0.0038	10
14	75	0.0034	9
10	68	0.0017	7
6.3	61		
5.0	57		
3.35	51		
2.00	45		
1.18	40		
0.600	36		
0.425	34		
0.300	32		
0.212	29		
0.150	27		
0.083	24		

Soil description	Brown grey slightly sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions <small>* <60mm values to aid description only</small>	Cobbles / boulders	Whole	* <60mm
	Gravel	0	0
	Sand	55	55
	Silt	21	21
	Clay	17	17

Uniformity Coefficient	D_{60} / D_{10}	1417
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
4.6

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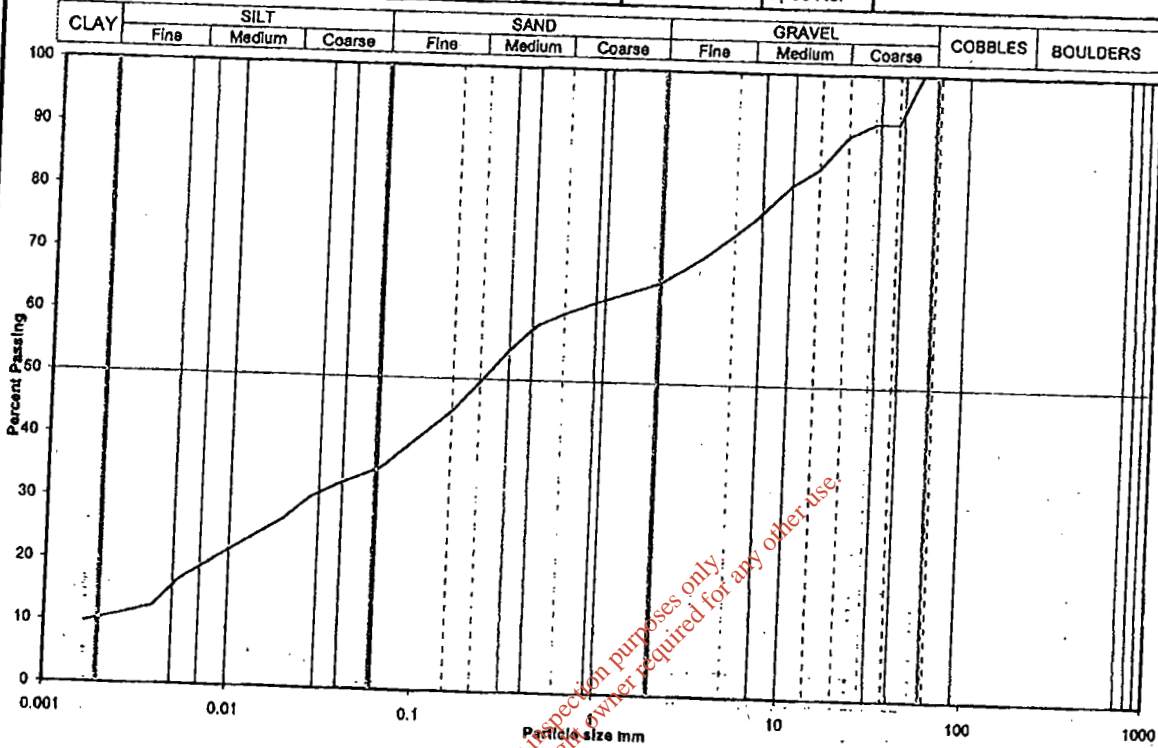
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Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	2.40
			Samp No	5
			Type	B
			ID	ESGKD8089200808290000000212
			Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	35
90	100	0.0530	34
75	100	0.0379	33
63	100	0.0272	30
50	100	0.0196	27
37.5	92	0.0104	22
28	92	0.0054	17
20	90	0.0039	12
14	85	0.0035	12
10	82	0.0017	10
6.3	78		
5.0	74		
3.35	70		
2.00	66		
1.18	64		
0.600	61		
0.425	59		
0.300	55		
0.212	50		
0.150	45		
0.063	35		

Soil description	Brown grey slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	<60mm
		0	0
		34	34
		31	31
		25	25
		10	10

Uniformity Coefficient	D_{60} / D_{10}	283
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
1.8

QA Ref
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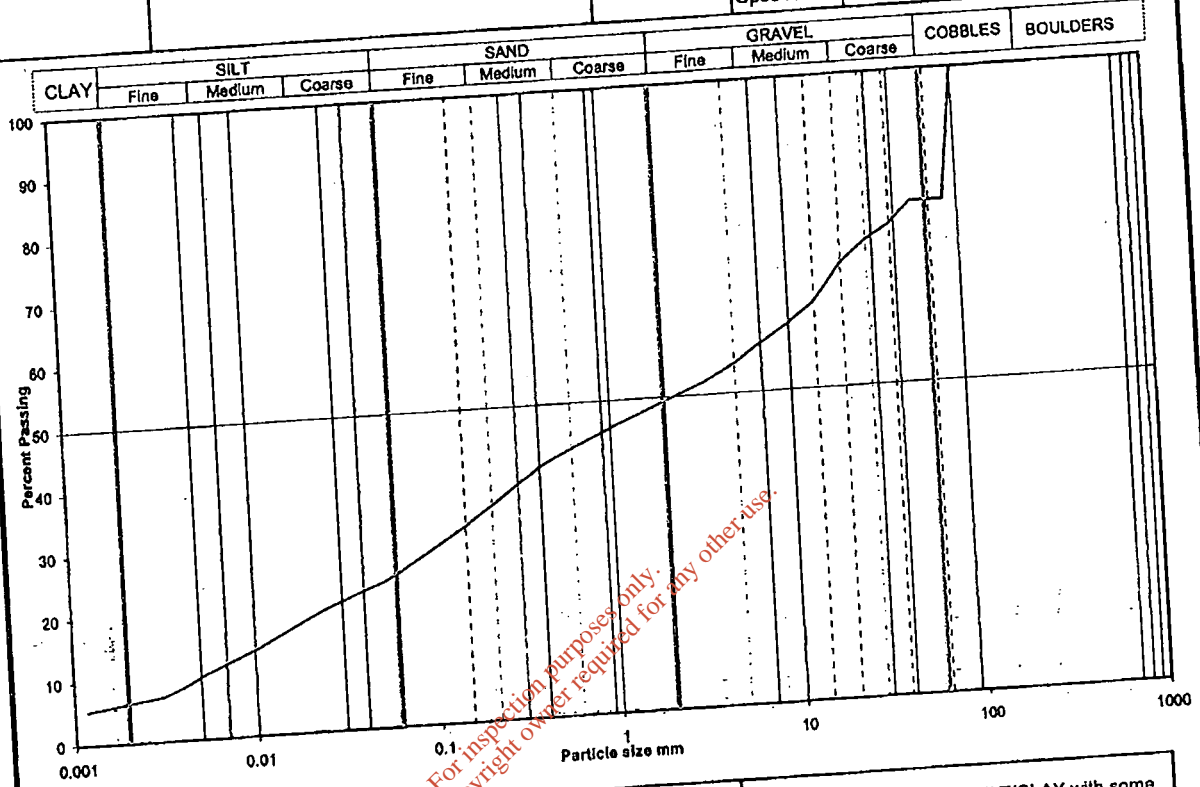


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme	Depth (m BGL)	3.10	
		Samp No	7	Type
		ID	ESGKD8089200808290000000214	
		Spec Ref		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	25
90	100	0.0519	23
75	79	0.0373	22
63	79	0.0269	20
50	79	0.0194	18
37.5	75	0.0104	14
28	73	0.0054	10
20	70	0.0039	8
14	64	0.0031	7
10	61	0.0012	5
6.3	57		
5.0	55		
3.35	52		
2.00	49		
1.18	47		
0.800	43		
0.425	41		
0.300	38		
0.212	35		
0.150	31		
0.063	25		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
5.0

Soil description	Brown grey sandy gravelly SILT/CLAY with some cobbles		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions <small>* <60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	* <60mm
		21	0
		30	38
		25	32
		18	23
		6	8

Uniformity Coefficient D_{60} / D_{10} 1824

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2.9
Rev 78
Jan 08

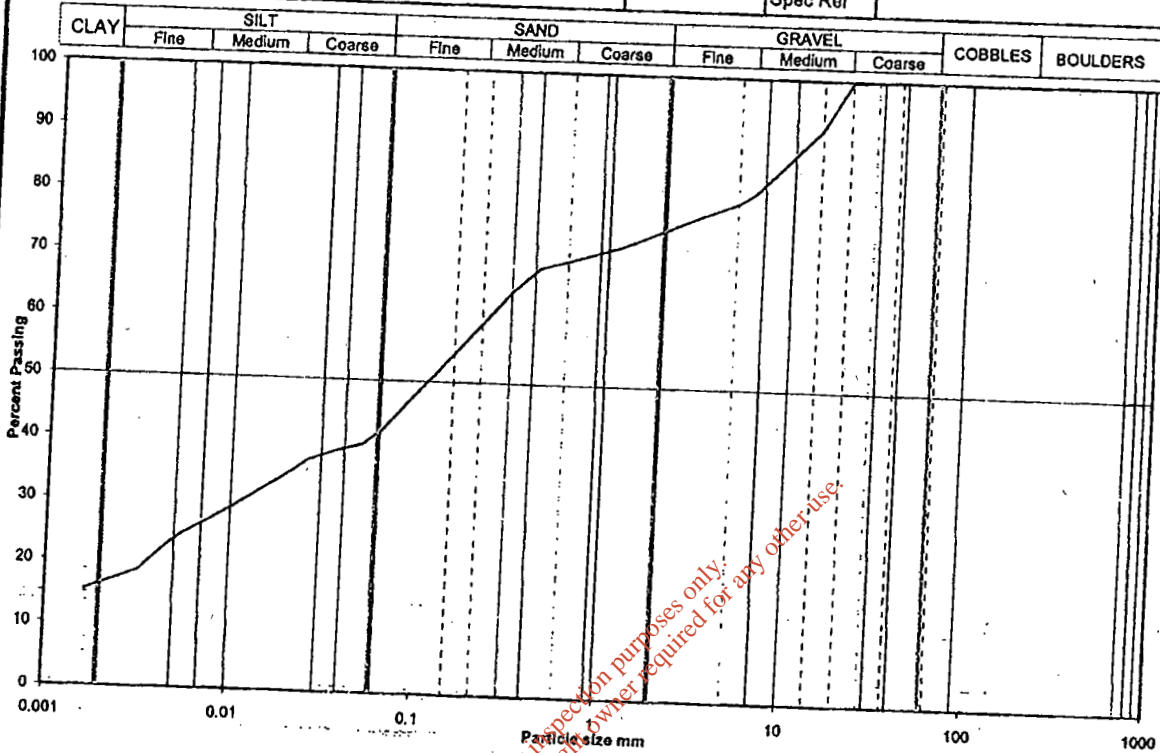


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:	
Project Name	Ballymore Eustace Sewage Scheme	Hole No	TP02
		Depth (m BGL)	0.80
		Samp No	1
		Type	B
		ID	ESGKD808920080910000000474
		Spec Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0830	42
90	100	0.0498	40
75	100	0.0355	39
63	100	0.0254	37
50	100	0.0184	34
37.5	100	0.0099	29
28	100	0.0051	24
20	100	0.0037	20
14	92	0.0032	19
10	88	0.0016	15
6.3	82		
5.0	80		
3.35	78		
2.00	75		
1.18	72		
0.600	70		
0.425	69		
0.300	65		
0.212	59		
0.150	55		
0.083	42		

Particle density, Mg/m³
2.65 assumed

Dry mass of sample, kg
9.3

Soil description	Brown slightly sandy slightly gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	<60mm
		0	0
		25	25
		34	34
		25	25
		16	16

* <60mm values to aid description only

Uniformity Coefficient	D_{60} / D_{10}	#N/A
------------------------	-------------------	------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2.9
Rev 78
Jan 08

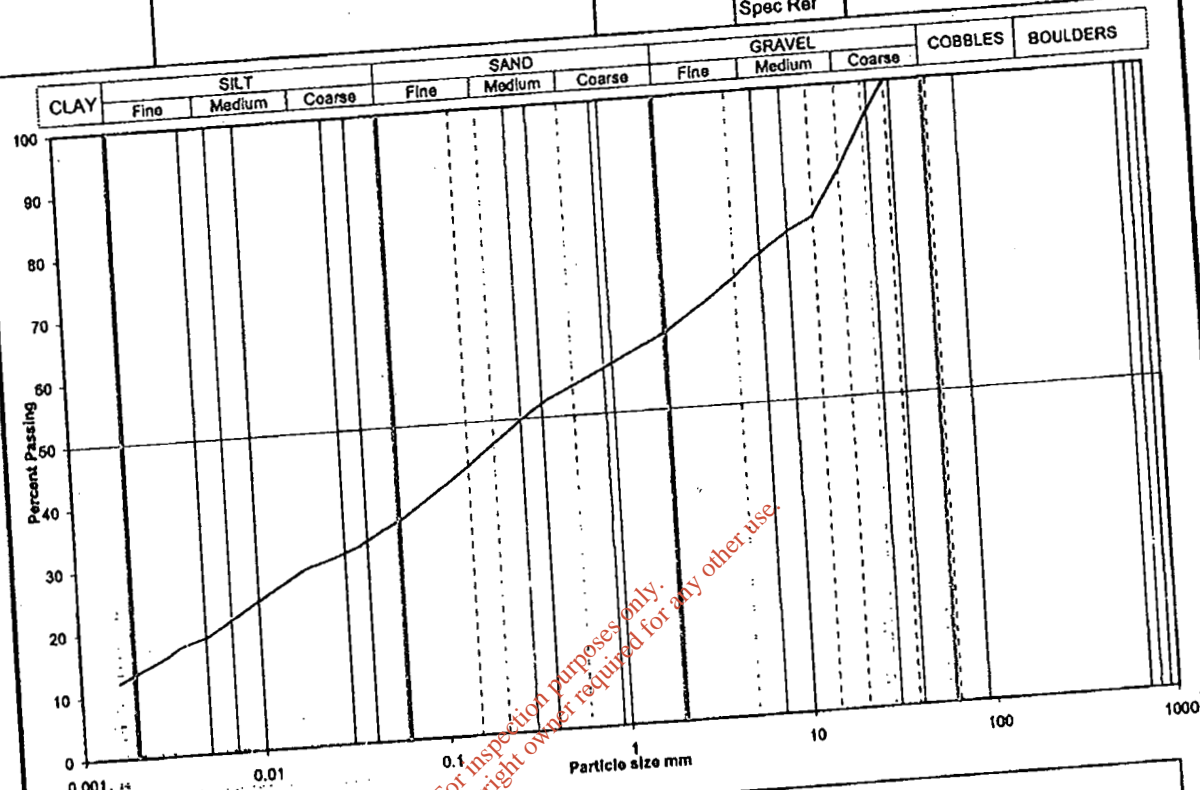


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Figure
PSD

Particle Size Distribution Analysis

Project No	KD8089	Sample Details:		Hole No	TP02
		Project Name		Depth (m BGL)	2.60
Ballymore Eustace Sewage Scheme		Samp No	3	Type	B
		ID	ESGKD8089200809100000000476		
		Spec Ref			



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	35
90	100	0.0492	34
75	100	0.0357	31
63	100	0.0266	30
50	100	0.0183	28
37.5	100	0.0099	24
28	94	0.0051	19
20	86	0.0037	17
14	79	0.0031	16
10	77	0.0016	12
6.3	73		
5.0	70		
3.35	67		
2.00	62		
1.18	59		
0.600	55		
0.425	53		
0.300	50		
0.212	46		
0.150	43		
0.083	35		

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Soil description	Brown grey slightly sandy gravelly CLAY		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	<60mm
		0	0
		38	38
		27	27
		22	22
*<60mm values to sld description only		13	13

Uniformity Coefficient	D_{60} / D_{10}	#N/A
------------------------	-------------------	------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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Figure
PSD

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TESTS WITHOUT MEASUREMENT OF PORE PRESSURE - SUMMARY OF RESULTS

Project No		Project Name												
KD8089		Ballymore Eustace Sewage Scheme												
Hole No.	Sample			Soil Description	Density		w	Test type	Dia. mm	σ_3 kPa	At failure / end of stage			Remarks
	No.	Depth (m)			type	bulk					dry	Arsl strain	$\delta_1 - \delta_3$ kPa	
		from	to		Mg/m ³	%	%			%	kPa	kPa		
PBP01	3	0.60	0.95	U										Unsuitable for OED and UUT too gravelly
PBP01	7	2.50	2.95	U										Unsuitable for OED and UUT natural breaks and no full diameter

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General notes: Tests carried out in accordance with BS1377: Part 7: 1990, clause 8 for single stage, clause 9 for multistage tests. Specimens nominally 2:1 height diameter ratio and tested at a rate of strain of 2%/minute, unless annotated otherwise. See individual test reports for further details.

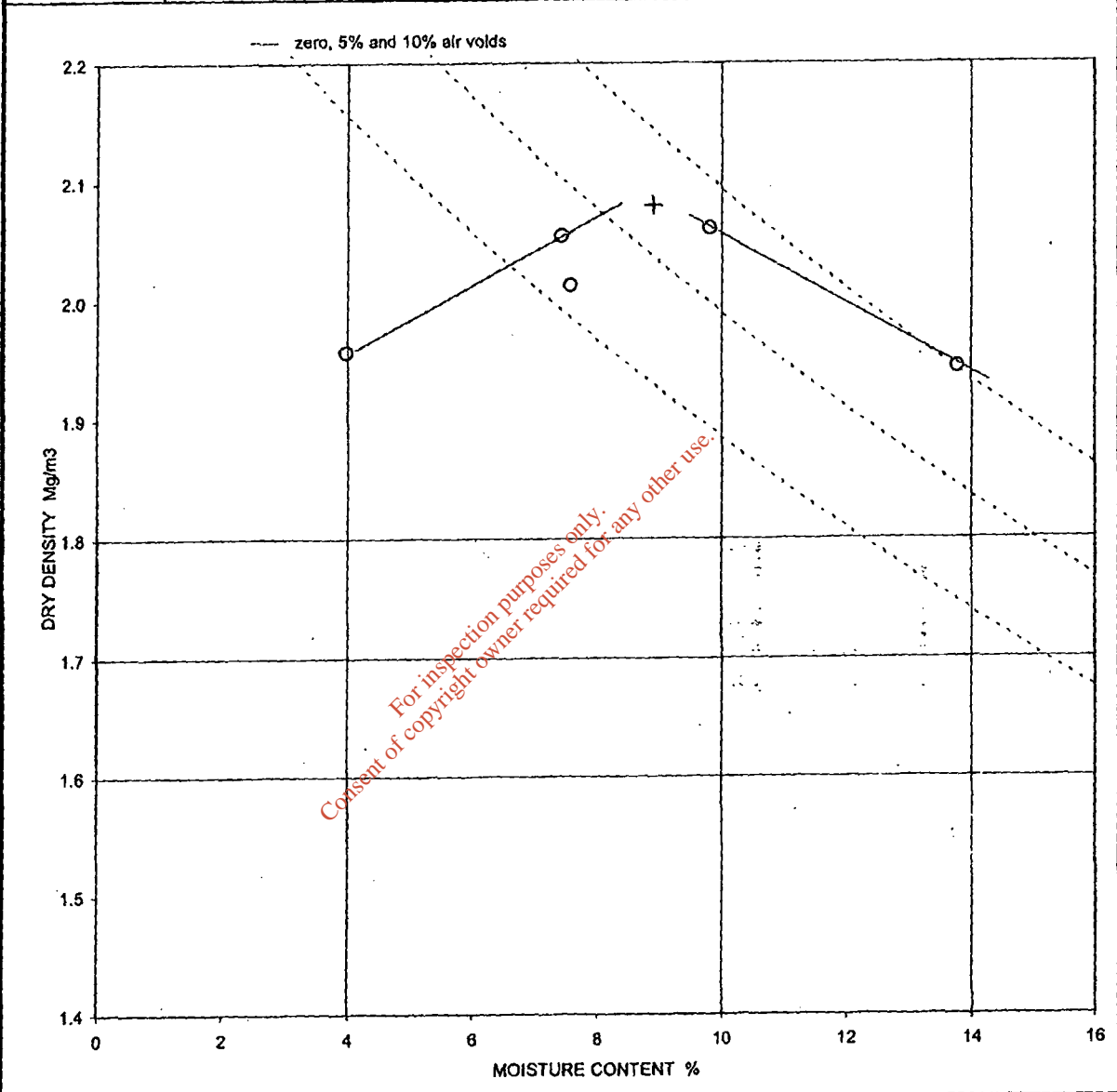
Legend

UU - single stage test (may be in sets of specimens)	σ_3	cell pressure	Mode of failure	P	plastic
UUM - multistage test on a single specimen	$\delta_1 - \delta_3$	deviator stress		B	brittle
suffix R - remoulded or recompacted	C_u	undrained shear strength		C	compound

QA Ref SLR 2 Rev 63 Jul 07		Printed: 20/05/2009 12:26	Table UUSUM
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.70
			Samp No	1
			Type	B
			ID	ESGKD8089200808290000000208
			Spec Ref	

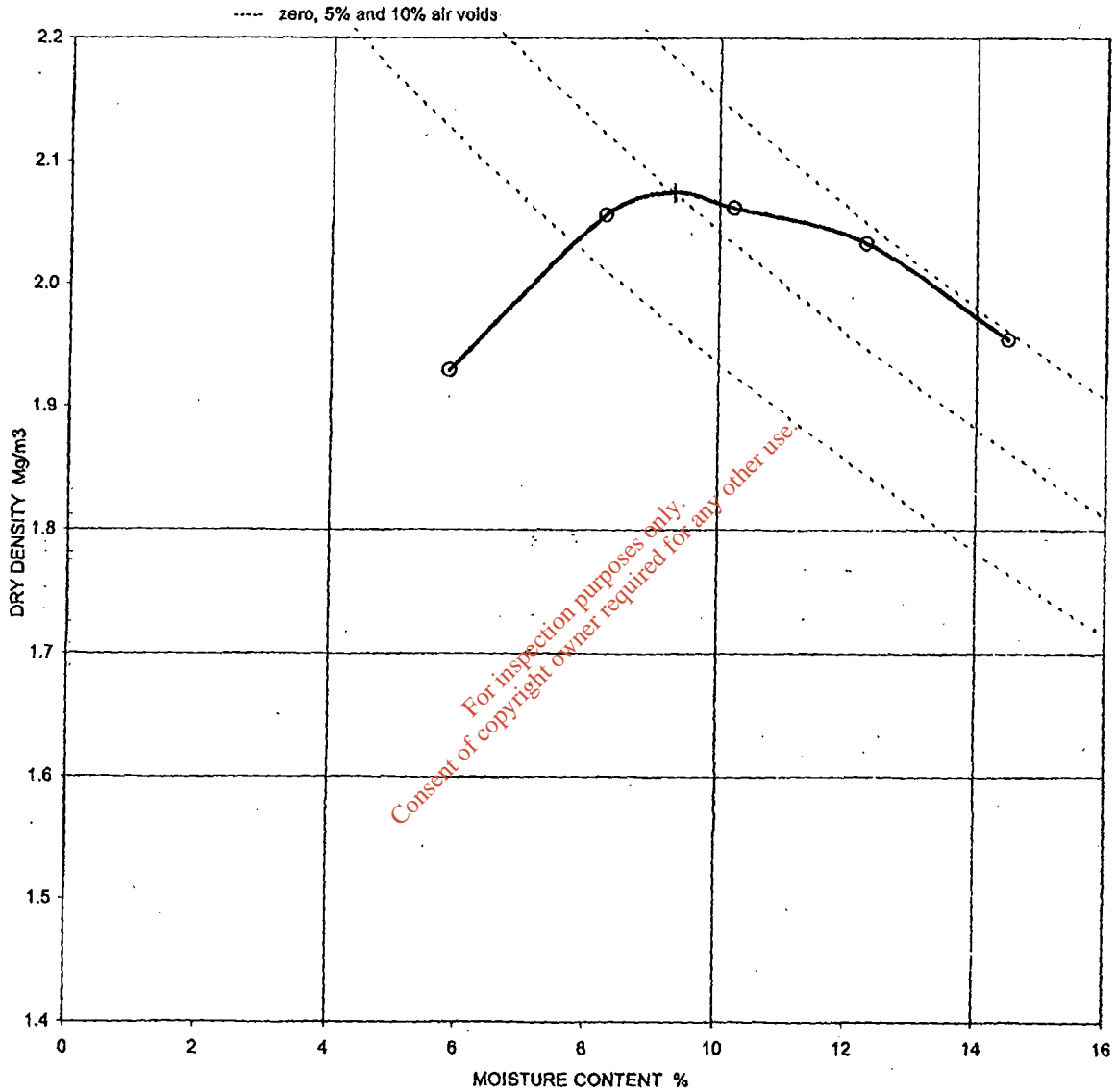


Soil description	Dark grey sandy gravelly CLAY with occasional cobbles	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.6, 4.5 kg rammer in a CBR mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, separate specimens tested	2.08
Material > 37.5mm	17 %	Optimum moisture content, %
Material < 37.5mm > 20mm	2 %	8.9
Particle density	2.65 assumed	
Remarks		

QA Ref		Printed:20/05/2009 12:08	Figure COMPH
SLD 4, 3.5/6 Rev 62 Jul 07			

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Project No	KD8089	Sample Details:	Hole No	TP02		
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80		
			Samp No	1	Type	B
			ID	ESGKD808920080910000000474		
			Spec Ref			



Soil description	Brown slightly sandy slightly gravelly CLAY	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.6, 4.5 kg rammer in a CBR mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, separate specimens tested	2.08
Material > 37.5mm	3 %	Optimum moisture content, %
Material < 37.5mm > 20mm	8 %	9.3
Particle density	2.74 assumed	
Remarks		

QA Ref
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 Rev 62
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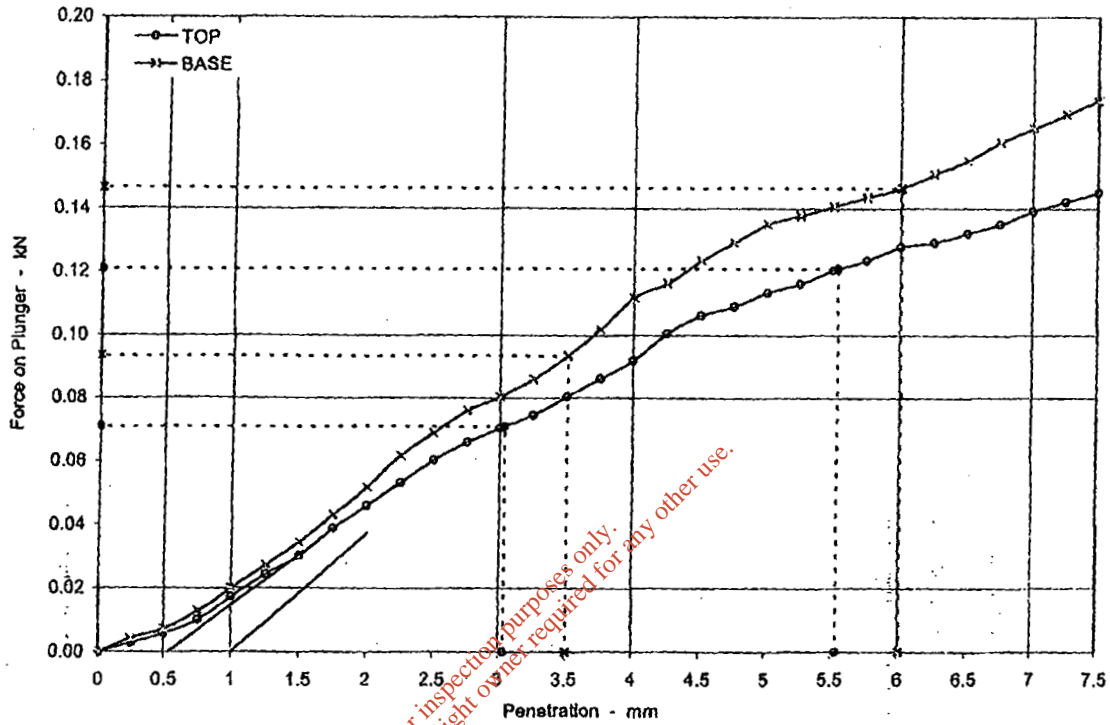


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Figure
COMPH

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.70
			Samp No	1
			Type	B
			ID	ESGK0808920080829000000208
			Spec Ref	



Soil description: Dark grey sandy gravelly CLAY with occasional cobbles

Test Conditions		
Sample Retained on 20 mm sieve	%	19

Sample Conditions		
Initial Moisture Content	%	14
Bulk Density	Mg/m ³	2.21
Dry Density	Mg/m ³	1.95
Moisture Content - TOP	%	13
Moisture Content - BASE	%	14

Method of Compaction		
Recompacted - Rammer compaction with specified effort (4.5kg)		
Preparation	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.54	0.71
5.0	0.60	0.73

Surcharge applied	kg	17
	kPa	10

Accepted CBR %	0.60	0.73
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Notes :

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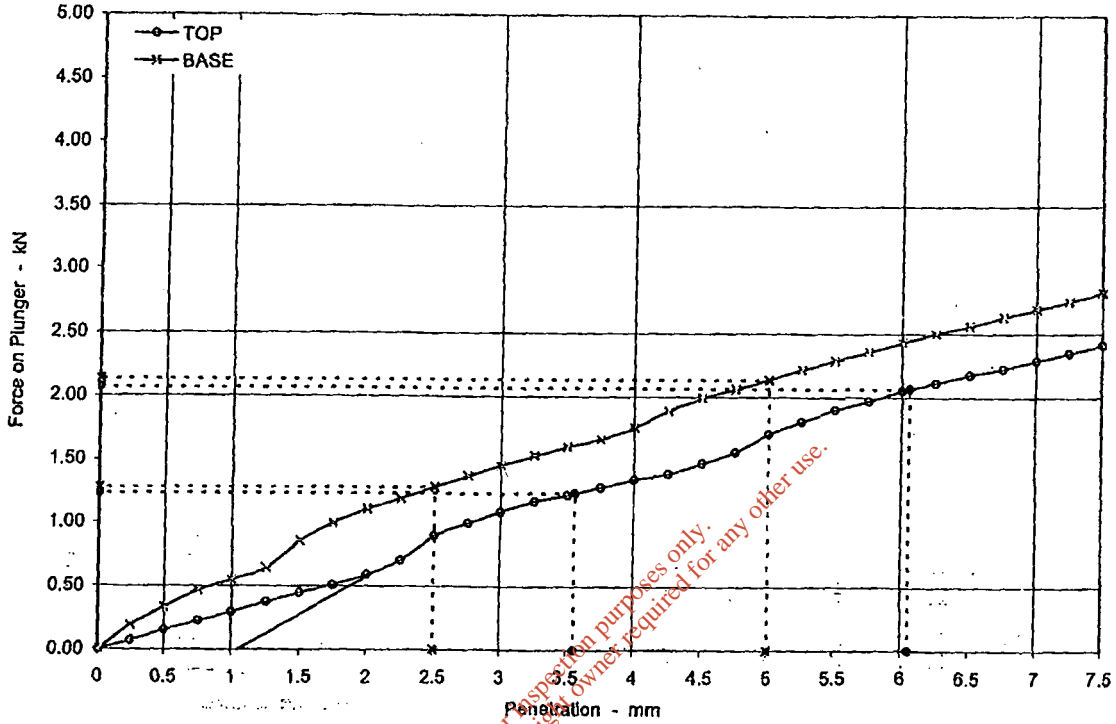


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Figure
CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.70
			Samp No	1
			Type	B
			ID	ESGKD8089200808290000000208
			Spec Ref	1



Soil description 0

Test Conditions		
Sample Retained on 20 mm sieve	%	19

Sample Conditions		
Initial Moisture Content	%	10
Bulk Density	Mg/m ³	2.28
Dry Density	Mg/m ³	2.06
Moisture Content - TOP	%	9.8
Moisture Content - BASE	%	10

Method of Compaction		
Recompacted - Rammer compaction with specified effort (4.5kg)		
Preparation	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	9.3	9.7
5.0	10	11

Surcharge applied	kg	17
	kPa	10

Notes :

Accepted CBR %	10	11
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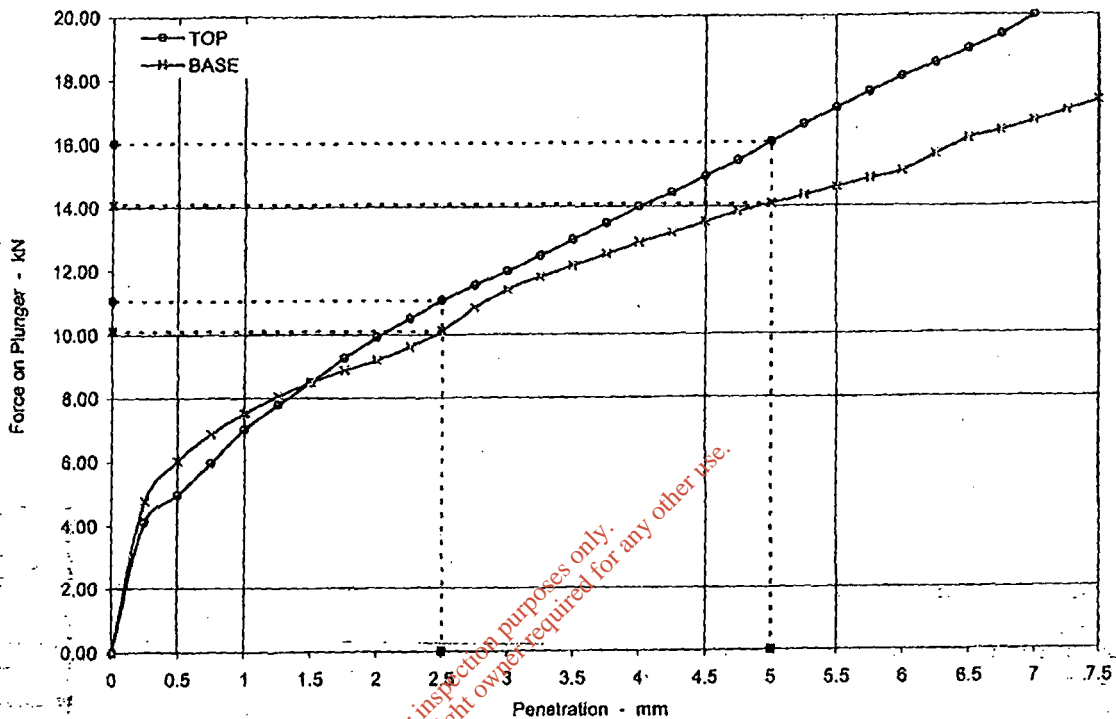
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Figure

CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.70
			Samp No	1
			Type	B
			ID	ESGKD808920080829000000208
			Spec Ref	3



Soil description 0

Test Conditions		
Sample Retained on 20 mm sieve	%	19

Sample Conditions		
Initial Moisture Content	%	7.3
Bulk Density	Mg/m ³	2.04
Dry Density	Mg/m ³	1.90
Moisture Content - TOP	%	11
Moisture Content - BASE	%	4.0

Method of Compaction		
Recompacted - Rammer compaction with specified effort (4.5kg)		
Soaked test		NO
Soaking Period	days	N/A
Amount of Swell	mm	N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	84	77
5.0	80	70

Surcharge applied	kg	17
	kPa	10

Accepted CBR %	84	77
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Notes :

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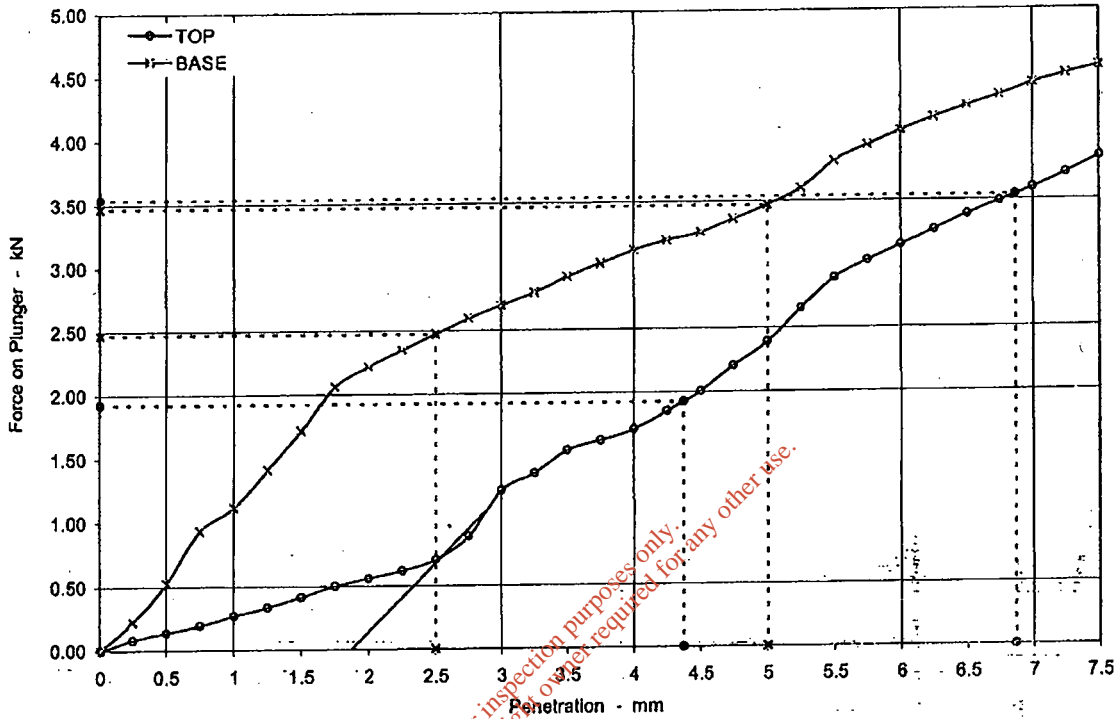
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Figure

CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.70
			Samp No	1
			Type	B
			ID	ESGKD808920080829000000208
			Spec Ref	4



Soil description **0**

Test Conditions		
Sample Retained on 20 mm sieve	%	19

Sample Conditions		
Initial Moisture Content	%	7.6
Bulk Density	Mg/m ³	2.17
Dry Density	Mg/m ³	2.01
Moisture Content - TOP	%	7.6
Moisture Content - BASE	%	7.6

Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	15	19
5.0	18	17

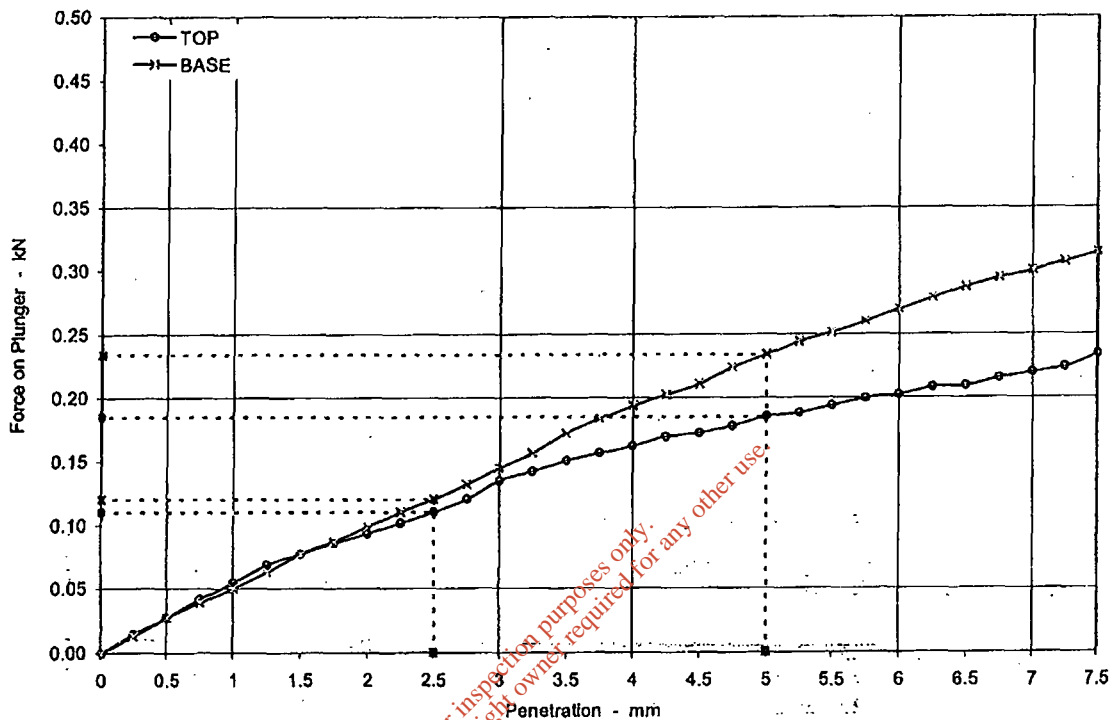
Surcharge applied	kg	17
	kPa	10

Accepted CBR %	18	19
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Notes :

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD8089200809100000000474
			Spec Ref	



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions		
Sample Retained on 20 mm sieve	%	11

Sample Conditions		
Initial Moisture Content	%	15
Bulk Density	Mg/m ³	2.23
Dry Density	Mg/m ³	1.95
Moisture Content - TOP	%	14
Moisture Content - BASE	%	14

Method of Compaction			
Recompacted - Rammer compaction with specified effort (4.5kg)			
Preparation	Soaked test	NO	
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.84	0.91
5.0	0.93	1.2

Surcharge applied	kg	17
	kPa	10

Notes :

Accepted CBR %	0.93	1.2
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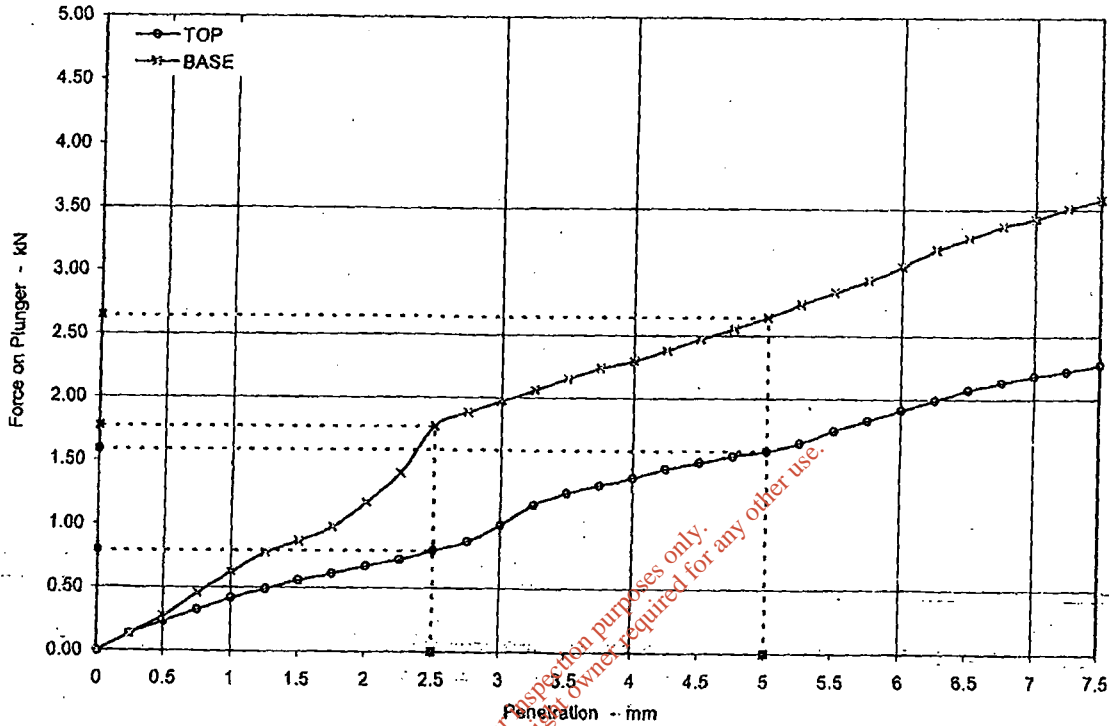


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Figure
CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8088	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD8088200809100000000474
			Spec Ref	1



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions		
Sample Retained on 20 mm sieve	%	11

Sample Conditions		
Initial Moisture Content	%	11
Bulk Density	Mg/m ³	2.27
Dry Density	Mg/m ³	2.05
Moisture Content - TOP	%	10
Moisture Content - BASE	%	11

Method of Compaction			
Recompacted - Rammer compaction with specified effort (4.5kg)			
Preparation	Soaked test	NO	
	Soaking Period	days	N/A
	Amount of Swell	mm	N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	6.0	13
5.0	7.9	13

Surcharge applied	kg	17
	kPa	10

Notes :

Accepted CBR %	7.9	13
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QA Ref

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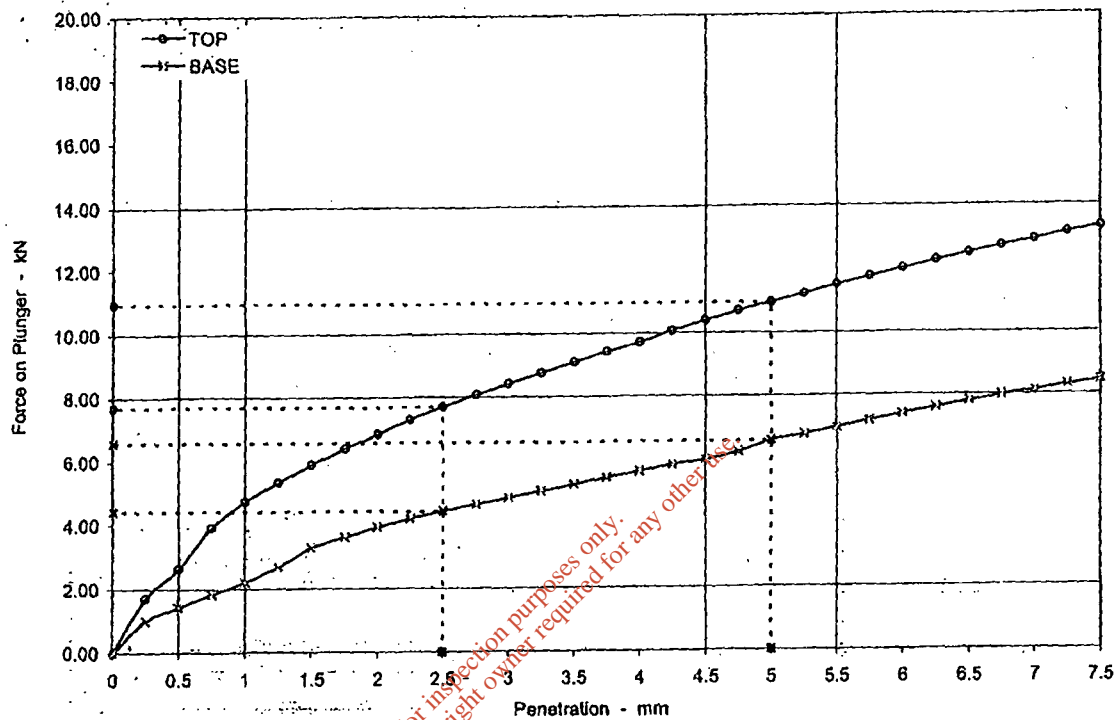
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Figure

CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD808920080910000000474
			Spec Ref	2



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions		
Sample Retained on 20 mm sieve	%	11

Sample Conditions		
Initial Moisture Content	%	9.3
Bulk Density	Mg/m ³	2.22
Dry Density	Mg/m ³	2.03
Moisture Content - TOP	%	8.3
Moisture Content - BASE	%	10

Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	58	34
5.0	55	33

Surcharge applied	kg	17
	kPa	10

Accepted CBR %	58	34
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Notes :

QA Ref
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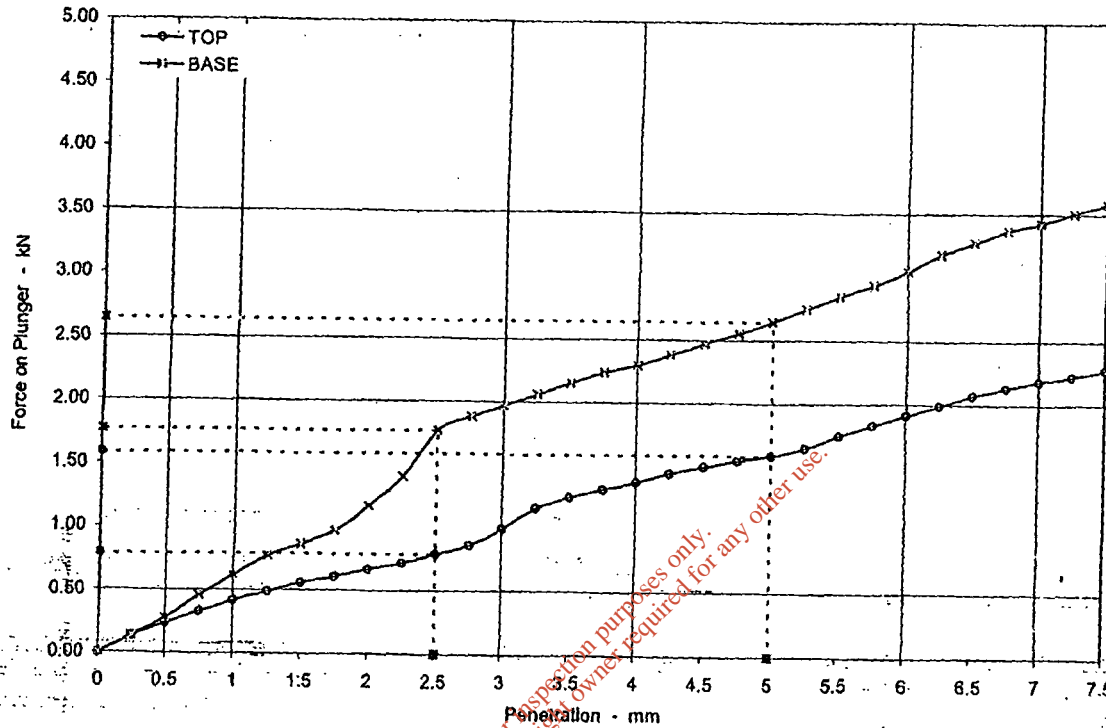


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Figure
CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD8089200809100000000474
			Spec Ref	1



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions	
Sample Retained on 20 mm sieve	11 %

Sample Conditions	
Initial Moisture Content	11 %
Bulk Density	2.27 Mg/m ³
Dry Density	2.05 Mg/m ³
Moisture Content - TOP	10 %
Moisture Content - BASE	11 %

Method of Compaction	
Recompacted - Rammer compaction with specified effort (4.5kg)	
Soaked test	NO
Soaking Period	days N/A
Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	6.0	13
5.0	7.9	13

Surcharge applied	kg	17
	kPa	10

Accepted CBR %	7.9	13
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Notes :

QA Ref
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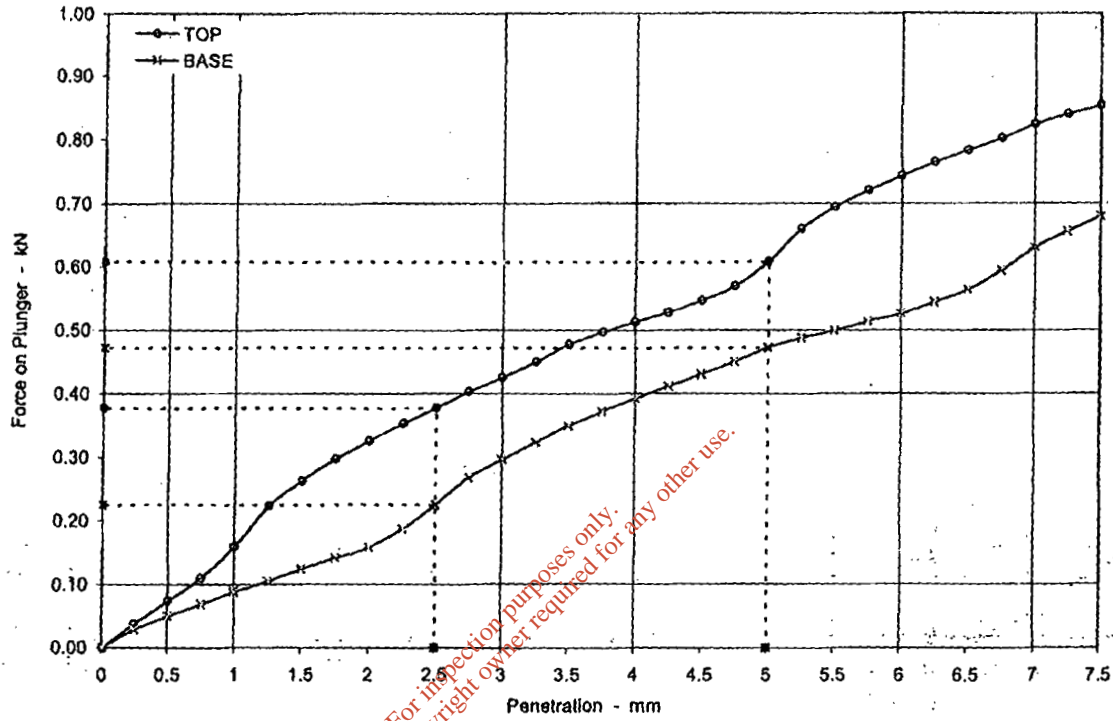


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Figure
CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD8089200809100000000474
			Spec Ref	3



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions	
Sample Retained on 20 mm sieve	11 %

Sample Conditions	
Initial Moisture Content	12 %
Bulk Density	2.28 Mg/m ³
Dry Density	2.03 Mg/m ³
Moisture Content - TOP	12 %
Moisture Content - BASE	12 %

Method of Compaction	
Recompacted - Rammer compaction with specified effort (4.5kg)	
Soaked test	NO
Soaking Period	days N/A
Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.9	1.7
5.0	3.0	2.4

Surcharge applied	kg	17
	kPa	10

Accepted CBR %	3.0	2.4
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Notes :

QA Ref
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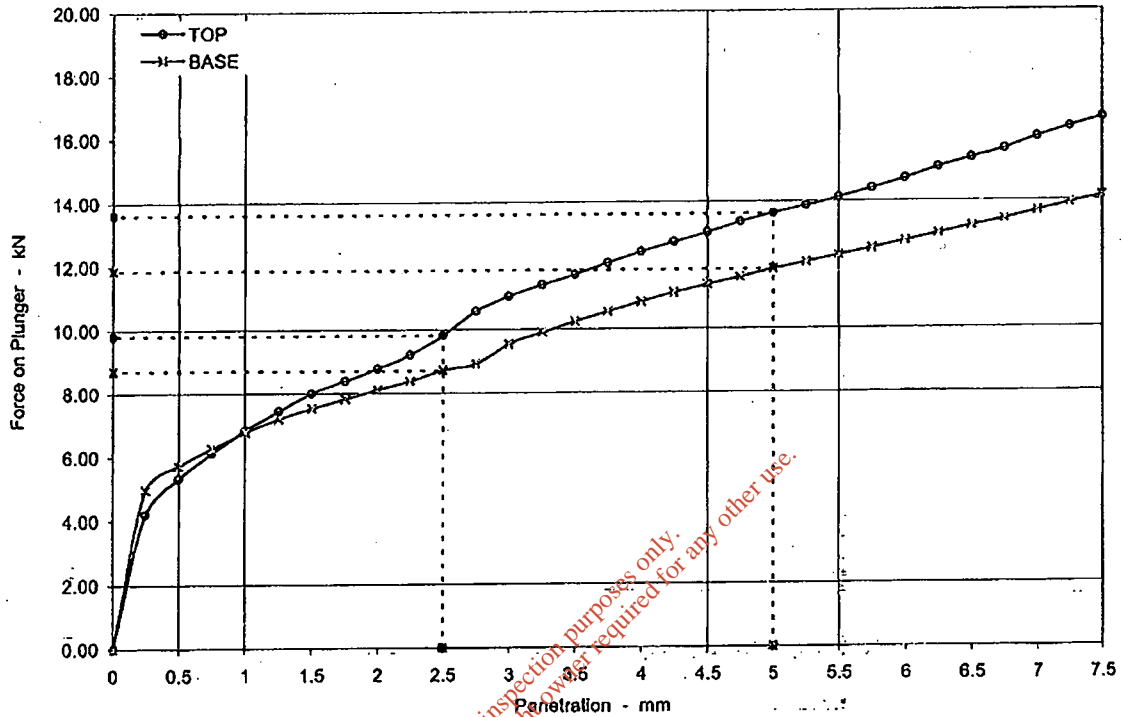


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Figure
CBR

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.80
			Samp No	1
			Type	B
			ID	ESGKD8089200809100000000474
			Spec Ref	4



Soil description: **Brown slightly sandy slightly gravelly CLAY**

Test Conditions		
Sample Retained on 20 mm sieve	%	11

Method of Compaction		
Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Surcharge applied	kg	17
	kPa	10

Notes :

Sample Conditions		
Initial Moisture Content	%	6.7
Bulk Density	Mg/m ³	2.04
Dry Density	Mg/m ³	1.91
Moisture Content - TOP	%	7.5
Moisture Content - BASE	%	5.8

Penetration mm	CBR Values %	
	TOP	BASE
2.5	74	66
5.0	68	59

Accepted CBR %	74	66
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QA Ref
SLR 4.7
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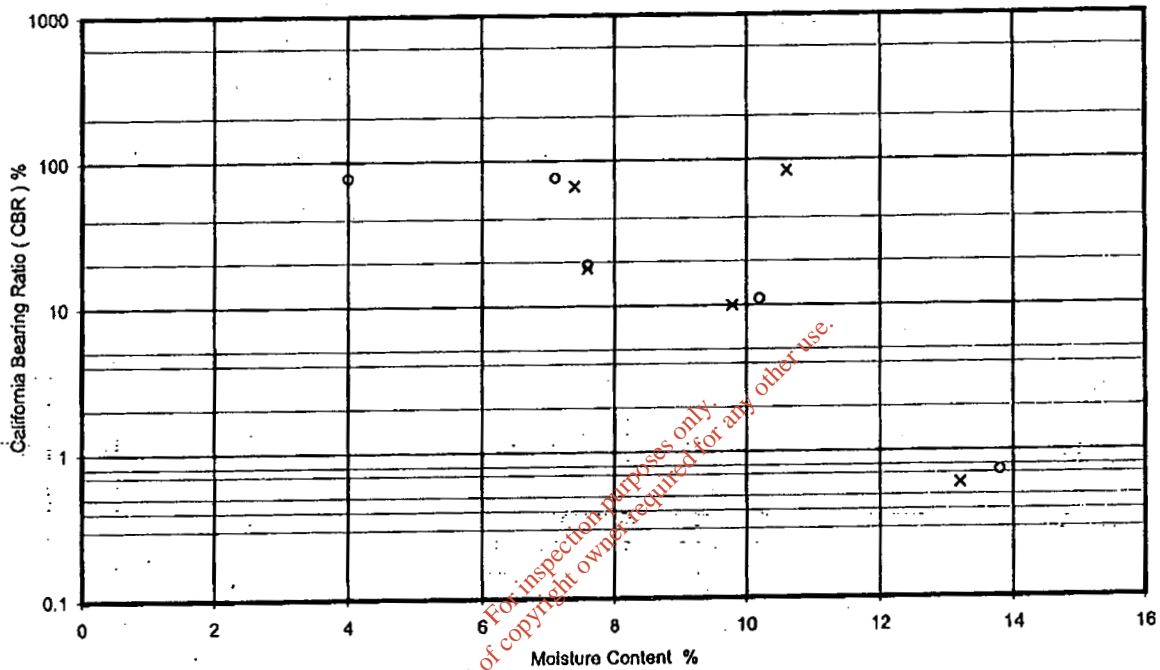
Figure
CBR

CALIFORNIA BEARING RATIO (CBR) / MOISTURE CONTENT RELATIONSHIP BS 1377 : PART 4 : 1990 : CLAUSE 7 - Multiple tests

Project No	KD8089	Sample Details:	Hole No	TP01
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.7
			Samp No	1
			Type	B
			ID	ESGKD808920080829000000208

CBR / Moisture Content Relationship Plot

X CBR Top o CBR Base



Sample Description	Dark grey sandy gravelly CLAY with occasional cobbles
Sample Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)
Material > 20mm removed	19 %

Spec Ref or TESN	Initial Conditions			Test Results				Remarks
	Moisture Content	Bulk Density Mg/m ³	Dry Density Mg/m ³	Top		Base		
				w %	CBR %	w %	CBR %	
	13.5	2.21	1.95	13.2	0.6	13.8	0.7	
1	10.0	2.26	2.06	9.8	10.0	10.2	11.0	
2	7.2	2.21	2.06	7.4	87.0	7.1	76.0	
3	7.3	2.04	1.90	10.6	84.0	4.0	77.0	
4	7.6	2.17	2.01	7.6	18.0	7.6	19.0	

* for further information and full reporting to BS1377, see individual test results.

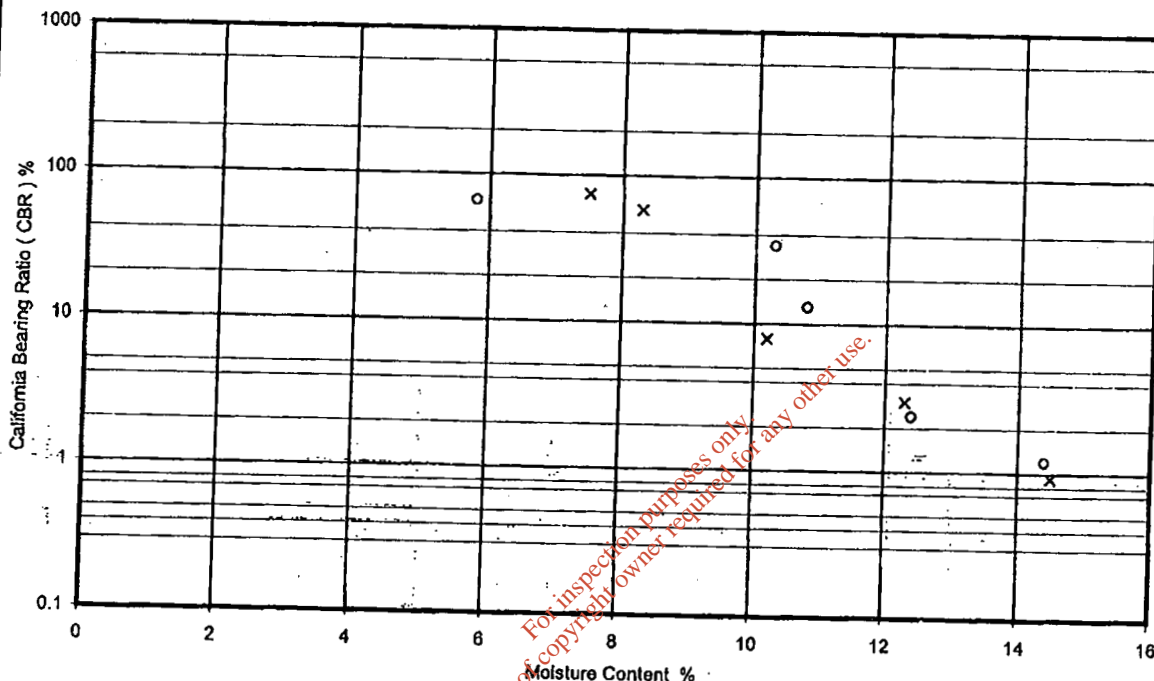
QA Ref SLR5 Rev 22 Jul 07		Printed: 19/11/2008 12:43	Table CBRREL
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CALIFORNIA BEARING RATIO (CBR) / MOISTURE CONTENT RELATIONSHIP BS 1377 : PART 4 : 1990 : CLAUSE 7 - Multiple tests

Project No	KD8089	Sample Details:	Hole No	TP02
Project Name	Ballymore Eustace Sewage Scheme		Depth (m BGL)	0.8
			Samp No	1
			Type	B
			ID	ESGKD8089200809100000000474

CBR / Moisture Content Relationship Plot


x CBR Top o CBR Base



Sample Description	Brown slightly sandy slightly gravelly CLAY
Sample Preparation	Recompacted - Rammer compaction with specified effort (4.5kg)
Material > 20mm removed	11 %

Spec Ref or TESN	Initial Conditions			Test Results				Remarks
	Moisture Content	Bulk Density Mg/m ³	Dry Density Mg/m ³	Top		Base		
				w %	CBR %	w %	CBR %	
1	14.5	2.23	1.95	14.5	0.9	14.4	1.2	
2	10.5	2.27	2.05	10.2	7.9	10.8	13.0	
3	9.3	2.22	2.03	8.3	68.0	10.3	34.0	
4	12.4	2.28	2.03	12.3	3.0	12.4	2.4	
5	6.7	2.04	1.91	7.5	74.0	5.8	66.0	

* for further information and full reporting to BS1377, see individual test results.

QA Ref SLR5 Rev 22 Jul 07		Printed: 19/11/2008 12:44	Table CBRREL
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ENCLOSURE D
GEOENVIRONMENTAL LABORATORY TEST RESULTS

ALcontrol

Report No. 08-B05985\02

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ALcontrol Laboratories (Dublin)

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CERTIFICATE OF ANALYSIS

Client: Geotech Speciallsts Ltd CORK
Carewswood
Castlemartyr
Co.Cork

Attention: Teresa OSullivan

Date: 11 November, 2008

Our Reference: 08-B05985/01

Your Reference: KD8089

Location: BALLYMORE EUSTACE SEWAGE SCHEME

A total of 33 samples was received for analysis on Monday, 20 October 2008. Accredited laboratory tests are defined in the log sheet, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Signed

Dylan Halpin

Dylan Halpin
Team Leader Project Co-ordination

Lorraine McNamara

Lorraine McNamara
General Manager

Compiled By

Caoimhe McLoughlin

Caoimhe McLoughlin



Printed at 16:41 on 19/11/2008

ALcontrol Goodchem Ireland is a trading division of ALcontrol UK Limited.

Registered Office: Templeborough House, Mill Close, Rotherham, S60 1BZ. Registered in England and Wales No. 4057291

ALcontrol Laboratories Ireland Test Schedule

Sample Type: SOIL
 Location: BALLYMORE EUSTACE SEWAGE SCHEME
 Client Contact: Teresa OSullivan
 Client Ref: KD8089

Ref Number: 08-B05985/01
 Client: Geotech Specialists Ltd CORK
 Date of Receipt: 20/10/2008

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method		Digestion	DR LANGE	ELTRA	GC FID	GC FID	GC FID	GC FID	GCMS	GRAVIMETRIC	GRAVIMETRIC	HPLC	ICP	ICP
	Sample Identity	Other ID													
08-B05985-50003-A01	PB01 B5	1.50-2.00	X	-	X	-	-	-	-	-	X	-	-	X	-
08-B05985-50003-A12	PB01 B5	1.50-2.00	-	X	-	-	-	-	-	X	-	X	-	-	-
08-B05985-50003-A18	PB01 B5	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50003-A19	PB01 B5	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50004-A01	PB03 B5	1.50-2.00	X	-	X	-	-	-	-	X	-	-	-	-	-
08-B05985-50004-A12	PB03 B5	1.50-2.00	-	X	-	-	-	-	-	-	X	-	-	-	-
08-B05985-50004-A18	PB03 B5	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50004-A19	PB03 B5	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50005-A01	PB03 B13	5.50-6.00	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50006-A01	PB07 B4	7.50-8.00	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50007-A01	PB08 D11	0.70-1.20	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50008-A01	PB11 D14	3.90	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50009-A01	PB13 B1	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50010-A01	PB14 B1	3.95	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50011-A01	PBP01 B6	0.00-1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50012-A01	PBP01 B6	1.50-2.00	X	-	X	-	-	-	-	-	-	-	-	-	-
08-B05985-50012-A13	PBP01 B6	1.50-2.00	-	X	-	-	-	-	-	X	-	X	-	-	-
08-B05985-50012-A19	PBP01 B6	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50012-A20	PBP01 B6	1.50-2.00	On Hold	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-50013-A01	PBP01 D13	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

ALcontrol Laboratories Ireland Test Schedule

Page 3 / 19

Ref Number: 08-B05985/01

Client: Geotech Specialists Ltd CORK

Date of Receipt: 20/10/2008

Sample Type: SOIL

Location: BALLYMORE EUSTACE SEWAGE SCHEME

Client Contact: Teresa OSullivan

Client Ref: KD8089

UKAS Accredited [Testing Laboratory] No. 1291		Detection Method															
ALcontrol Reference	Sample Identity	Other ID	P / V	Digestion	DR RANGE	ELTRA	GC-FID	GC FID	GC FID	GC FID	GCMS	GRAVIMETRIC	GRAVIMETRIC	HPLC	ICP	ICP	ICP
08-B05985-50014-A01	PBP03 B2	0.60-1.20	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50015-A01	ST01 D3	1.00-1.10	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50016-A01	ST03 D3	0.90-1.00	Plastic tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50017-A01	ST05 D3	0.60-0.70	Non-Absorbed Plastic Tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50018-A01	ST07 D3	0.70-0.80	Non-Absorbed Plastic Tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50019-A01	ST11 D2	0.90-1.00	Non-Absorbed Plastic Tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50020-A01	TP01 B3	1.40-1.50	Plastic tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50020-A13	TP01 B3	1.40-1.50	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50020-A19	TP01 B3	1.40-1.50	Volatile Vial	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50020-A20	TP01 B3	1.40-1.50	Volatile Vial	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50021-A01	TP02 D2	0.80-0.90	Non-Absorbed Plastic Tub	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50021-A13	TP02 D2	0.80-0.90	Non-Absorbed Plastic Tub	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50022-A01	TP02 D4	2.60-2.70	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50023-A01	TP04 D2	0.80-0.90	Non-Absorbed Plastic Tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50023-A13	TP04 D2	0.80-0.90	Plastic tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50023-A19	TP04 D2	0.80-0.90	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50023-A20	TP04 D2	0.80-0.90	Volatile Vial	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50024-A01	TP04 B5	2.80-2.90	Volatile Vial	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50024-A14	TP04 B5	2.80-2.90	Plastic tub	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
08-B05985-50024-A22	TP04 B5	2.80-2.90	Amber Jar	-	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓
			Volatile Vial	On Hold	-	-	✓	✓	✓	✓	✓	-	-	✓	✓	✓	✓

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

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* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories Ireland

Test Schedule

Sample Type: SOIL
 Location: BALLYMORE EUSTACE SEWAGE SCHEME
 Client Contact: Teresa OSullivan
 Client Ref: KD8089

Ref Number: 08-B05985/01
 Client: Geotech Specialists Ltd CORK
 Date of Receipt: 20/10/2008

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method	Digestion	DR	LANGE	ELTRA	GC FID	GC FID	GC FID	GC FID	GC FID	GCMS	GRAVIMETRIC	GRAVIMETRIC	HPLC	ICP	ICP	ICP	ICP	
																			Acid Soluble Sulphide
08-B05985-50024-A23	TP04 B5	2.80-2.90	Volatile Vial	On Hold															
08-B05985-50025-A01	TP05 B5	1.70-1.80	Plastic tub	X															
08-B05985-50025-A14	TP05 B5	1.70-1.80	Amber Jar	X															
08-B05985-50025-A22	TP05 B5	1.70-1.80	Volatile Vial	On Hold															
08-B05985-50025-A23	TP05 B5	1.70-1.80	Volatile Vial	On Hold															
08-B05985-50025-A01	TP06 D4	1.60-1.70	Amber Jar																
08-B05985-50027-A01	TP07 D4	1.70-1.80	Amber Jar																
08-B05985-50028-A01	TP08 B1	0.60-0.70	Plastic tub	X															
08-B05985-50028-A14	TP08 B1	0.60-0.70	Amber Jar																
08-B05985-50028-A22	TP08 B1	0.60-0.70	Volatile Vial	On Hold															
08-B05985-50029-A23	TP08 B1	0.60-0.70	Volatile Vial	On Hold															
08-B05985-50029-A01	TP09 B3	1.60-1.70	Amber Jar																
08-B05985-50030-A01	TP10 B3	1.30-1.40	Amber Jar																
08-B05985-50031-A01	WS-DPS04 B2	0.50-1.30	Amber Jar																
08-B05985-50032-A02	WS-DPS06	0.60-1.00	Plastic tub																
08-B05985-50033-A01	WS-DPS02 D1	0.00-0.50	Amber Jar																
08-B05985-50034-A01	WS-DPS03 B1	0.00-0.80	Amber Jar																
08-B05985-50035-A01	ST09 D2	0.80-0.90	Amber Jar																

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories Ireland Test Schedule

Ref Number: 08-B05985/01

Client: Geotech Specialists Ltd CORK
Date of Receipt: 20/10/2008

Sample Type: SOIL

Location: BALLYMORE EUSTACE SEWAGE SCHEME
Client Contact: Teresa OSullivan

Client Ref: KD8089

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method	Sample Identity	Other ID	P / V	ICP / ICP-AES / METER / SPECTRO															
					Chromium	Copper	Lead	Mercury Low Level	Nickel	Selenium Low Level	Zinc	Water Soluble Boron	Asbestos Screening	Soluble Sulphate 2:1 Extract	pH	Total Cyanide	Thiocyanate	Free Cyanide		
08-B05985-S0003-A01	1.50-2.00	PB01 B5	Plastic tub	Plastic tub	X															
08-B05985-S0003-A12	1.50-2.00	PB01 B5	Amber Jar	Amber Jar		X														
08-B05985-S0003-A18	1.50-2.00	PB01 B5	Volatle Vial	Volatle Vial	On Hold				X											
08-B05985-S0003-A19	1.50-2.00	PB01 B5	Plastic tub	Plastic tub	On Hold															
08-B05985-S0004-A01	1.50-2.00	PB03 B5	Amber Jar	Amber Jar	X															
08-B05985-S0004-A12	1.50-2.00	PB03 B5	Plastic tub	Plastic tub		X														
08-B05985-S0004-A18	1.50-2.00	PB03 B5	Amber Jar	Amber Jar	On Hold															
08-B05985-S0004-A19	1.50-2.00	PB03 B5	Volatle Vial	Volatle Vial	On Hold															
08-B05985-S0005-A01	5.50-6.00	PB03 B13	Amber Jar	Amber Jar																
08-B05985-S0006-A01	7.50-8.00	PB03 B16	Amber Jar	Amber Jar																
08-B05985-S0007-A01	0.70-1.20	PB07 B4	Amber Jar	Amber Jar																
08-B05985-S0009-A01	3.90	PB08 D11	Volatle Vial	Volatle Vial																
08-B05985-S0010-A01	3.95	PB11 D14	Volatle Vial	Volatle Vial																
08-B05985-S0011-A01	0.30	PB13 B1	Amber Jar	Amber Jar																
08-B05985-S0012-A01	0.00-1.00	PB14 B1	Amber Jar	Amber Jar																
08-B05985-S0012-A13	1.50-2.00	PBP01 B6	Plastic tub	Plastic tub																
08-B05985-S0012-A19	1.50-2.00	PBP01 B6	Amber Jar	Amber Jar				X												
08-B05985-S0012-A20	1.50-2.00	PBP01 B6	Volatle Vial	Volatle Vial	On Hold															
08-B05985-S0013-A01	5.00	PBP01 D13	Volatle Vial	Volatle Vial	On Hold															

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Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

ALcontrol Laboratories Ireland

Test Schedule

Sample Type: SOIL
 Location: BALLYMORE EUSTACE SEWAGE SCHEME
 Client Contact: Teresa OSullivan
 Client Ref: KD8089

Ref Number: 08-B05985/01
 Client: Geotech Specialists Ltd CORK
 Date of Receipt: 20/10/2008

UKAS Accredited [Testing Laboratory] No. 1291		Detection Method																					
ALcontrol Reference	Sample Identity	Other ID	P / V	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	METER	SPECTRO	SPECTRO	SPECTRO	SPECTRO	
08-B05985-50014-A01	PBP03 B2	0.60-1.20	Amber Jar															X					
08-B05985-50015-A01	ST01 D3	1.00-1.10	Amber Jar															X					
08-B05985-50016-A01	ST03 D3	0.90-1.00	Plastic tub															X					
08-B05985-50017-A01	ST05 D3	0.60-0.70	Non-Absorbent Plastic Tub															X					
08-B05985-50018-A01	ST07 D3	0.70-0.80	Non-Absorbent Plastic Tub															X					
08-B05985-50019-A01	ST11 D2	0.90-1.00	Non-Absorbent Plastic Tub															X					
08-B05985-50020-A01	TP01 B3	1.40-1.50	Plastic tub															X					
08-B05985-50020-A13	TP01 B3	1.40-1.50	Amber Jar															X					
08-B05985-50020-A19	TP01 B3	1.40-1.50	Volatile Vial	On Hold														X					
08-B05985-50020-A20	TP01 B3	1.40-1.50	Volatile Vial	On Hold														X					
08-B05985-50021-A01	TP02 D2	0.80-0.90	Non-Absorbent Plastic Tub															X					
08-B05985-50021-A13	TP02 D2	0.80-0.90	Amber Jar															X					
08-B05985-50022-A01	TP02 D4	2.60-2.70	Non-Absorbent Plastic Tub															X					
08-B05985-50023-A01	TP04 D2	0.80-0.90	Plastic tub															X					
08-B05985-50023-A13	TP04 D2	0.80-0.90	Amber Jar															X					
08-B05985-50023-A19	TP04 D2	0.80-0.90	Volatile Vial	On Hold														X					
08-B05985-50023-A20	TP04 D2	0.80-0.90	Volatile Vial	On Hold														X					
08-B05985-50024-A01	TP04 B5	2.80-2.90	Plastic tub															X					
08-B05985-50024-A14	TP04 B5	2.80-2.90	Amber Jar															X					
08-B05985-50024-A22	TP04 B5	2.80-2.90	Volatile Vial	On Hold														X					

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Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

• SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

ALcontrol Laboratories Ireland Test Schedule

Ref Number: 08-B05985/01

Sample Type: SOIL

Client: Geotech Specialists Ltd CORK

Location: BALLYMORE EUSTACE SEWAGE SCHEME

Date of Receipt: 20/10/2008

Client Contact: Teresa OSullivan

Client Ref: KD8089

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP OES	Inspection	KONE	METER	[SPECTRO]	[SPECTRO]	[SPECTRO]
	Sample Identity	Other ID	P / V													
08-B05985-50024-A23	TP04 B5	2.80-2.90	Volatile Vial	On Hold												
08-B05985-50025-A01	TP05 B5	1.70-1.80	Plastic tub	X				X			X	X	X	X	X	X
08-B05985-50025-A14	TP05 B5	1.70-1.80	Amber Jar													
08-B05985-50025-A22	TP05 B5	1.70-1.80	Volatile Vial	On Hold												
08-B05985-50025-A23	TP05 B5	1.70-1.80	Volatile Vial	On Hold												
08-B05985-50026-A01	TP06 D4	1.60-1.70	Amber Jar													
08-B05985-50027-A01	TP07 D4	1.70-1.80	Amber Jar Plastic Tub													
08-B05985-50028-A01	TP08 B1	0.60-0.70	Plastic tub	X				X								
08-B05985-50028-A14	TP08 B1	0.60-0.70	Amber Jar													
08-B05985-50028-A22	TP08 B1	0.60-0.70	Volatile Vial	On Hold												
08-B05985-50028-A23	TP08 B1	0.60-0.70	Volatile Vial	On Hold												
08-B05985-50029-A01	TP09 B3	1.60-1.70	Amber Jar													
08-B05985-50030-A01	TP10 B3	1.30-1.40	Amber Jar													
08-B05985-50031-A01	WS-DPS04 B2	0.50-1.30	Amber Jar													
08-B05985-50032-A01	WS-DPS06	0.60-1.00	Plastic tub													
08-B05985-50033-A01	WS-DPS02 D1	0.00-0.50	Amber Jar													
08-B05985-50034-A01	WS-DPS03 B1	0.00-0.80	Amber Jar													
08-B05985-50035-A01	ST09 D2	0.80-0.90	Amber Jar													

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Notes: NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: **08-B05985/01**
 Client: Geotech Specialists Ltd CORK
 Date of Receipt: 20/10/2008

Sample Type: **SOIL**
 Location: BALLYMORE EUSTACE SEWAGE SCHEME
 Client Contact: Teresa OSullivan
 Client Ref: KD8089

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

SCHEDULE	METHOD	TEST NAME	TOTAL
X	Digestion	Acid Soluble Sulphide	10
X	DR LANGE	Chromium VI	10
X	ELTRA	Total Sulphur	10
X	GCMS	PAH Total EPA (16) GCMS <1.6mg/kg (Solid)	10
X	GRAVIMETRIC	Natural Moisture Content	33
X	GRAVIMETRIC	Solvent Extractable Matter	10
X	HPLC	Total Phenols by HPLC	10
X	ICP	Total Sulphate (Acid Soluble)**	10
X	ICP	Metals 9 (As Cd Hg Se Low)	10
X	ICP OES	Water Soluble Boron	10
X	Inspection	Asbestos Screening	8
X	KONE	Soluble Sulphate 2:1 Extract	33
X	METER	pH (Solid)	33
X	SPECTRO	Free Cyanide	10
X	SPECTRO	Thiocyanate	10
X	SPECTRO	Total Cyanide	10
2	GC FID	TPH C6-C40 Banded C6-10,>C10-20,>C20-40	3
2	Inspection	Asbestos Screening	2

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ALcontrol Laboratories Ireland

Table Of Results

Interim
 Validated

Ref Number: 08-B05985/01

Sample Type: SOIL

Client: Geotech Specialists Ltd CORK

Location: BALLYMORE EUSTACE SEWAGE SCHEME

Date of Receipt: 20/10/2008
 (of first sample)

Client Contact: Teresa OSullivan

Client Ref: KD8089

ALcontrol Reference	Sample Identity	Other ID	Detection Method														
			Digestion	DR LANGE	ELTRA	GC FID	GC FID	GC FID	GC FID	GC FID	GOMS	GRAVIMETRIC	HPLC	ICP	ICP	ICP	
UKAS Accredited [Testing Laboratory] No. 1291			<5mg/kg	<0.1mg/kg	<0.2%	<1mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<1.6mg/kg	<0.1%	<10mg/kg	<0.01mg/kg	<100mg/kg	<0.5mg/kg	<1mg/kg
08-B05985-S0003	PB01 B5	1.50-2.00	<5	<0.1	<0.2	-	-	-	-	-	<1.6	55	0.03	310	-	-	-
08-B05985-S0004	PB03 B5	1.50-2.00	13	<0.1	<0.2	-	-	-	-	<1.6	27	0.02	810	-	-	-	-
08-B05985-S0005	PB03 B13	5.50-6.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0006	PB03 B16	7.50-8.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0007	PB07 B4	0.70-1.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0008	PB08 D11	3.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0009	PB11 D14	3.95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0010	PB13 B1	0.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0011	PB14 B1	0.00-1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0012	PBP01 B6	1.50-2.00	18	<0.1	<0.2	-	-	-	-	<1.6	29	0.03	630	-	-	-	-
08-B05985-S0013	PBP01 D13	5.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0014	PBP03 B2	0.60-1.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0015	ST01 D3	1.00-1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0016	ST03 D3	0.90-1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0017	ST05 D3	0.60-0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0018	ST07 D3	0.70-0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0019	ST11 D2	0.90-1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0020	TP01 B3	1.40-1.50	16	<0.1	0.3	-	-	-	-	<1.6	19	0.04	1300	-	-	-	-
08-B05985-S0021	TP02 D2	0.80-0.90	11	<0.1	<0.2	-	-	-	-	<1.6	28	0.03	500	-	-	-	-
08-B05985-S0022	TP02 D4	2.60-2.70	<5	<0.1	<0.2	-	-	-	-	<1.6	146	<0.01	1700	-	-	-	-

Notes: METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. NDP = NO DETERMINATION POSSIBLE.

Checked By: Caoimhe McLoughlin

ALcontrol Laboratories Ireland

Table Of Results

Interim
 Validated

Sample Type: SOIL
 Location: BALLYMORE EUSTACE SEWAGE SCHEME
 Client: Geotech Specialists Ltd CORK
 Client Contact: Teresa OSullivan
 Ref Number: 08-B05985/01
 Date of Receipt: 20/10/2008
 (of first sample)
 Client Ref: KD8089

UKAS Accredited [Testing Laboratory] No. 1291	ALcontrol Reference	Sample Identity	Other ID	Digestion	DR LANGE	ELTRA	GC FID	GC FID	GC FID	GC FID	GC FID	GCMS	GRAVIMETRIC	GRAVIMETRIC	HPLC	ICP	ICP	ICP
				<5mg/kg	<0.1mg/kg	<0.2%	<1mg/kg	<1mg/kg	<1mg/kg	<1.5mg/kg	<0.1%	<10mg/kg	<0.01mg/kg	<100mg/kg	<0.5mg/kg	<1mg/kg	<0.5mg/kg	<1mg/kg
08-B05985-S0023		TP04 D2	0.80-0.90	<5	<0.1	<0.2	-	<1.6	<1.6	<1.6	<1.6	38	0.03	290	See Attached	See Attached	See Attached	See Attached
08-B05985-S0024		TP04 B5	2.80-2.90	<5	<0.1	<0.2	<1	<1	<1	<1	<1	63	0.06	640	See Attached	See Attached	See Attached	See Attached
08-B05985-S0025		TP05 B5	1.70-1.80	<5	<0.1	<0.2	<1	<1	<1	<1	<1	55	0.03	130	See Attached	See Attached	See Attached	See Attached
08-B05985-S0026		TP06 D4	1.60-1.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0027		TP07 D4	1.70-1.80	<5	0.1	<0.2	<1	<1	<1	<1	<1	88	0.03	470	See Attached	See Attached	See Attached	See Attached
08-B05985-S0028		TP08 B1	0.60-0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0029		TP09 B3	1.60-1.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0030		TP10 B3	1.30-1.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0031		WS-DPS04 B2	0.50-1.30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0032		WS-DPS06	0.60-1.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0033		WS-DPS02 D1	0.00-0.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0034		WS-DPS03 B1	0.00-0.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
08-B05985-S0035		ST09 D2	0.80-0.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL. NDP = NO DETERMINATION POSSIBLE

Checked By : Caoimhe McLoughlin

* SUBCONTRACTED TO OTHER LABORATORY / ** SAMPLES ANALYSED AT THE CHESTER LABORATORY

Interim
 Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 08-B05985/01

Sample Type: SOIL

Client: Geotech Specialists Ltd, CORK

Location: BALLYMORE EUSTACE SEWAGE SCHEME

Date of Receipt: 20/10/2008
 (of first sample)

Client Contact: Teresa OSullivan

Client Ref: KD8089

UKAS Accredited [Testing Laboratory] No. 1291	Detection Method	ICP		ICP		ICP		ICP OES		Inspection		KONE		METER		SPECTRO		SPECTRO		
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
08-B05985-50003	Other ID	1.50-2.00																		
08-B05985-50004	Other ID	1.50-2.00																		
08-B05985-50005	Other ID	5.50-6.00																		
08-B05985-50006	Other ID	7.50-8.00																		
08-B05985-50007	Other ID	0.70-1.20																		
08-B05985-50008	Other ID	3.90																		
08-B05985-50009	Other ID	3.95																		
08-B05985-50010	Other ID	0.30																		
08-B05985-50011	Other ID	0.00-1.00																		
08-B05985-50012	Other ID	1.50-2.00																		
08-B05985-50013	Other ID	5.00																		
08-B05985-50014	Other ID	0.60-1.20																		
08-B05985-50015	Other ID	1.00-1.10																		
08-B05985-50016	Other ID	0.90-1.00																		
08-B05985-50017	Other ID	0.60-0.70																		
08-B05985-50018	Other ID	0.70-0.80																		
08-B05985-50019	Other ID	0.90-1.00																		
08-B05985-50020	Other ID	1.40-1.50																		
08-B05985-50021	Other ID	0.80-0.90																		
08-B05985-50022	Other ID	2.60-2.70																		
	Sample Identity																			
	ALcontrol Reference																			
	Copper	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Lead	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Nickel	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Selenium Low Level	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Zinc	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Mercury Low Level	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Water Soluble Boron	mg/kg	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Asbestos Screening		See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached	See Attached
	Soluble Sulphate 2:1 Extract	g/l	0.040	0.212	0.504	0.087	8.20	8.01	8.37	8.09	8.03	8.32	8.13	8.13	7.98	8.13	8.13	8.13	8.21	8.21
	pH	pH Units	8.78	8.62	8.03	8.03	8.01	8.37	8.09	8.03	8.32	8.13	8.13	7.98	8.13	8.13	8.13	8.21	8.21	8.21
	Free Cyanide	mg/kg	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Thiocyanate	mg/kg	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Cyanide	mg/kg	<2.5	<2.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

NDP = NO DETERMINATION POSSIBLE

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL

Checked By: Caoimhe McLoughlin

ALcontrol Laboratories Analytical Services Sample Descriptions

Job Number: 08/17894/01/01
 Client: ALcontrol Geochem Ireland
 Client Ref: VARIOUS

Grain sizes
 <0.063mm Very Fine
 0.1mm - 0.063mm Fine
 0.1mm - 2mm Medium
 2mm - 10mm Coarse
 >10mm Very Coarse

Sample Identity	Depth (m)	Colour	Grain Size	Description	Batch
5985-3		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-4		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-12		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-20		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-21		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-22		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-23		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-24		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-25		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1
5985-28		Brown	0.1mm - 0.063mm	Silty Clay with some Stones	1

* These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials-whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

¹ Sample Description supplied by client

Validated
 Preliminary

ALcontrol Laboratories Analytical Services Table Of Results

- * ISO 17025 accredited
- M MCERTS accredited
- Subcontracted test
- » Shown on prev. report

Job Number: 08/17894/01/01 Matrix: SOLID
 Client: ALcontrol Geochem Ireland Location: IRELAND
 Client Ref. No.: VARIOUS Client Contact: Ireland Co-ordinators

Sample Identity	5985-3	5985-4	5985-12	5985-20	5985-21	5985-22	5985-23	5985-24	5985-25	Method Code	LoD/Units
Depth (m)											
Sample Type	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID		
Sampled Date											
Sample Received Date	25.10.08	25.10.08	25.10.08	25.10.08	25.10.08	25.10.08	25.10.08	25.10.08	25.10.08		
Batch	1	1	1	1	1	1	1	1	1		
Sample Number(s)	42	43	44	45	46	47	48	49	50		
Arsenic	8	7	7	8	8	10	11	8	5	TM129 ^M	<3.0 mg/kg
Cadmium	2.5	1.5	1.7	2.7	1.9	1.7	1.1	1.5	2.3	TM129 ^M	<0.2 mg/kg
Chromium	16	13	11	12	16	13	12	15	15	TM129 ^M	<4.5 mg/kg
Copper	25	20	17	20	22	20	13	19	14	TM129 ^M	<6 mg/kg
Lead	19	16	14	15	17	25	12	33	11	TM129 ^M	<2 mg/kg
Mercury	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	TM129 ^M	<0.4 mg/kg
Nickel	44	29	29	32	35	33	29	28	25	TM129 ^M	<0.9 mg/kg
Selenium	<3	<3	<3	<3	<3	<3	<3	<3	<3	TM129 ^M	<3 mg/kg
Zinc	110	110	78	160	94	100	80	110	94	TM129 ^M	<2.5 mg/kg

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All results expressed on a dry weight basis.

Date 03.11.2008

Validated
 Preliminary

ALcontrol Laboratories Analytical Services

Table Of Results

- ISO 17025 accredited
- MCERTS accredited
- * Subcontracted test
- » Shown on prev. report

Job Number: 08/17894/01/01
 Client: ALcontrol Geochem Ireland
 Client Ref. No.: VARIOUS

Matrix: SOLID
 Location: IRELAND
 Client Contact: Ireland Co-ordinators

Sample Identity	5985-28												Method Code	LoD/Units
Depth (m)														
Sample Type	SOLID													
Sampled Date														
Sample Received Date	25.10.08													
Batch	1													
Sample Number(s)	51													
Arsenic	8												TM129 ^M	<3.0 mg/kg
Cadmium	1.4												TM129	<0.2 mg/kg
Chromium	19												TM129 ^M	<4.5 mg/kg
Copper	23												TM129 ^M	<6 mg/kg
Lead	32												TM129 ^M	<2 mg/kg
Mercury	<0.4												TM129 ^M	<0.4 mg/kg
Nickel	27												TM129 ^M	<0.9 mg/kg
Selenium	<3												TM129 ^M	<3 mg/kg
Zinc	130												TM129 ^M	<2.5 mg/kg

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All results expressed on a dry weight basis.

Date 03.11.2008

ALcontrol Laboratories Analytical Services

Table Of Results - Appendix

Job Number:
Client:
Client Ref. No.:

08/17894/01/01
 ALcontrol Geochem Ireland
 VARIOUS

Report Key :

NDP No Determination Possible
 NFD No Fibres Detected
 # ISO 17025 accredited
 PFD Possible Fibres Detected

* Subcontracted test
 » Result previously reported (Incremental reports only)
 M MCERTS Accredited
 EC Equivalent Carbon (Aromatics C8-C35)

Results expressed as (e.g.) 1.03E-07 is equivalent to 1.03x10⁻⁷

Note: Method detection limits are not always achievable due to various circumstances beyond our control.

Summary of Method Codes contained within report :

Method No.	Reference	Description	ISO 17025 Accredited	MCERTS Accredited	Wet/Dry Sample ¹	Surrogate Corrected
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer			DRY	
TM129	Method 3120B, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 3050B	Determination of Metal Cations by IRIS Emission Spectrometer	✓	✓	DRY	

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¹ Applies to Solid samples only. DRY indicates samples have been dried at 35°C. NA = not applicable.

**ALcontrol Laboratories Analytical Services
Table Of Results - Appendix**

Job Number: 08/17894/01/01
Client: ALcontrol Geochem Ireland
Client Ref. No.: VARIOUS

Summary of Coolbox temperatures

Batch No.	Coolbox Temperature (°C)
1	14.6

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APPENDIX

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APPENDIX

1. Results are expressed as mg/kg dry weight (dried at 30°C) on all soil analyses except for the following: NRA Leach tests, flash point, and ammoniacal N₂ by the BRE method, VOC, PRO, Cyanide, Acid Soluble Sulphide, TPH by IR, OFGs and SEM.
2. Samples will be run in duplicate upon request, but an additional charge may be incurred.
3. A sub sample of all samples received will be retained free of charge for one month for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.
4. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
5. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.
6. When requested, an asbestos screen is done in-house on soils and if no fibres are found will be reported as NFD – no fibres detected. If fibres are detected, then identification and quantification is carried out by ALcontrol Technichem or Alcontrol Shutlers in the UK. If a sample is suspected of containing asbestos, then drying and crushing will be suspended on that sample until the asbestos results are known. If asbestos is present, then no analysis requiring dry sample are undertaken.
7. If no separate volatile sample is supplied by the client, the integrity of the data may be compromised if the laboratory is required to create a sub-sample from the bulk sample – similarly, if a headspace is present in the volatile sample.
8. NDP – No Determination Possible due to Insufficient/unsuitable sample.
9. Metals in water are performed on a filtered sample, and therefore represent dissolved metals – total metals must be requested separately.
10. A table containing the date of analysis for each parameter is not routinely included with the report, but is available upon request.

Last updated February 2005



**ENCLOSURE E
PHOTOGRAPHS**

Trial Pits
Window Sample

CD1
CD1

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**ENCLOSURE F
DRAWINGS**

Site Location Plan
Site Plan

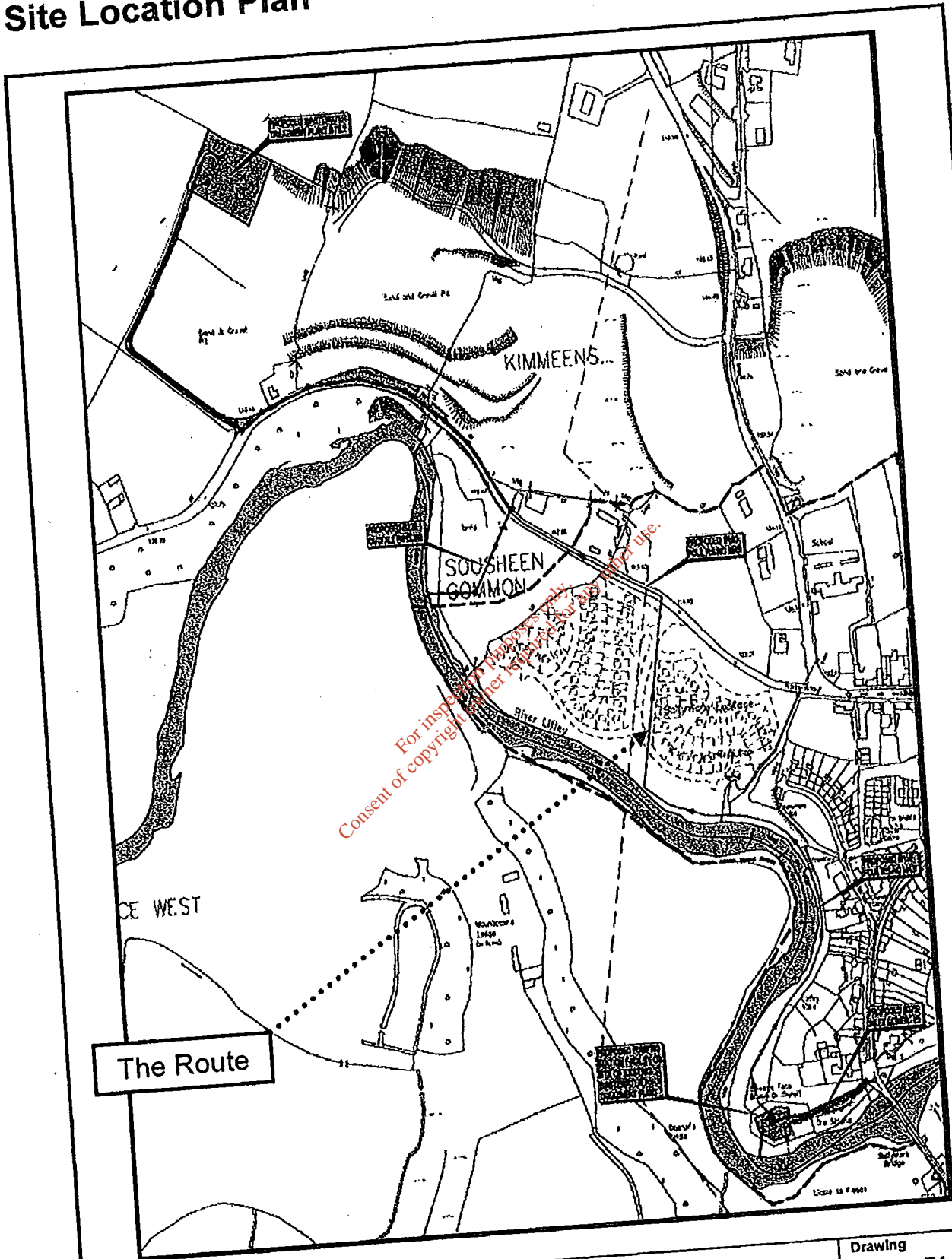
F1
O1

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November 2008
Issue 1

Report No KD8089/1
Enclosure F

Site Location Plan



Notes:

Project Ballymore Eustace Sewerage Scheme
 Project No. KD8089
 Carried out for Nicholas O Dwyer

Drawing F1

GENERAL NOTES

1. Reproduced from Government of Ireland Ordnance Survey.
2. Reproduced from Drawing No. Interpretative Drawing.
3. Hole Locations to National Grid Co-ordinate Reference System.
4. All dimensions are in metres unless indicated otherwise.
5. All levels are in metres and related to Ordnance Datum (Mean Head) unless indicated otherwise.

LEGEND TO SYMBOLS

- ⊕ Dynamic Probe Location
- ⊙ Borehole Location
- ▣ Silt Trench Location
- ▣ Trial Pit Location
- ⊙ Window Sample Location
- ⊙ DCP CBR Location


Rev	Drawn	Date	Apprv.	Date	Notification Details
1	AC	OCT 2008			ISSUED FOR 'AS BUILT' CASE

AMENDMENTS

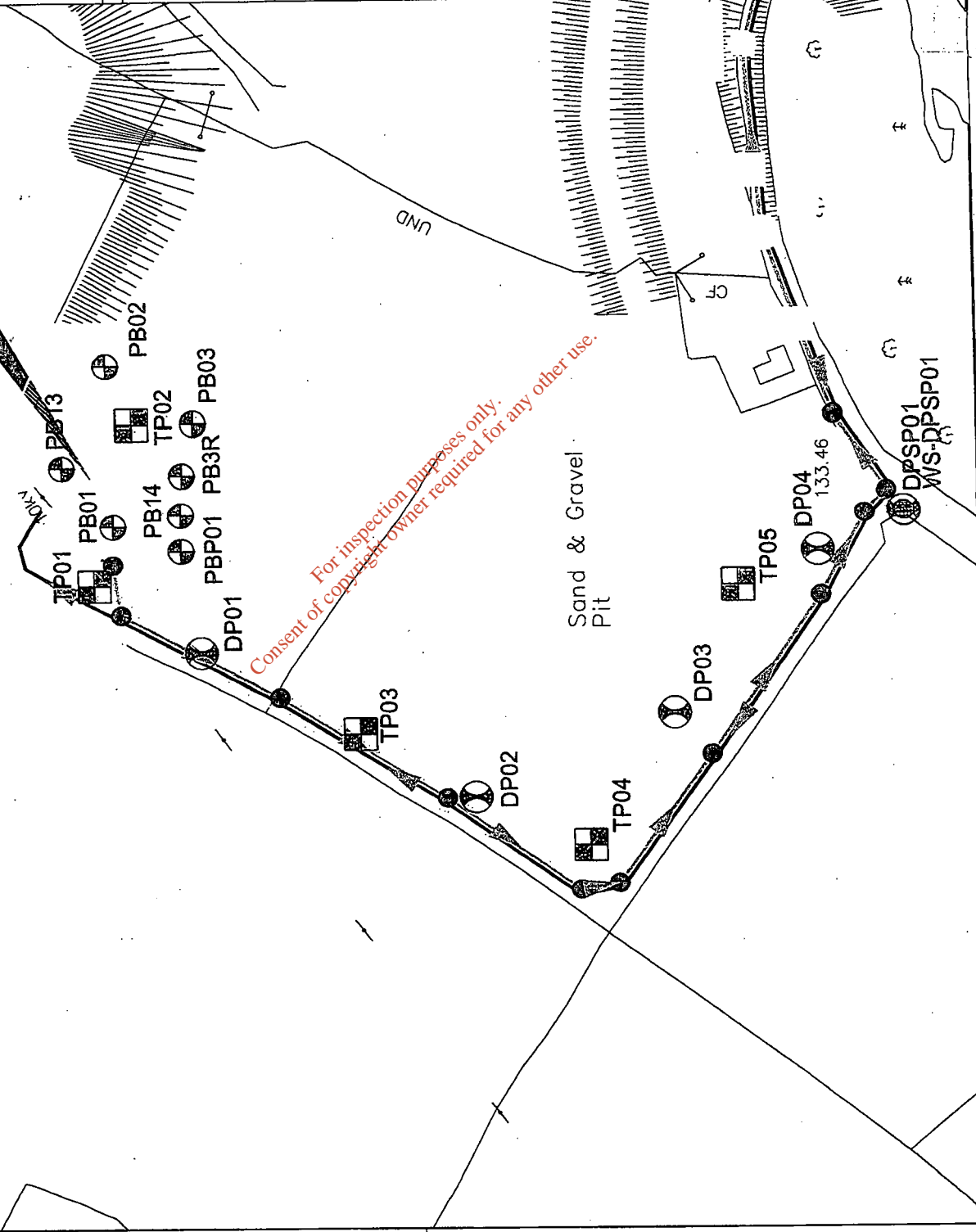
Title
SITE PLAN

Project
BALLYMRE EUSTACE SEWERAGE SCHEME

Client
KILDARE COUNTY COUNCIL

	Date	Drawn By	Apprv. By
	OCT 2008	AC	AC
Sheet Size	Scale	Project No	
A3	1:1250	KD8089	
Drawing No	01	Rev	1

PROPOSED WASTEWATER TREATMENT PLANT SITE



STATES
STMS
SFLS

APPENDIX D
Waste Management Plan for Construction
Period

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Ballymore Eustace WWTP

PROJECT C&D WASTE MANAGEMENT PLAN

Description of Project:

The Project consists of the construction of a Wastewater Treatment Plant on a Greenfield site. The project is situated in the village of Ballymore Eustace, Co. Kildare, in the administrative area of Kildare Council. The site of the works is located approximately 1km from the village and access will be via the Coughlanstown road.

Assignment of Responsibilities

Allen Dolan Project Manager shall be designated as the C&D Waste Manager and have overall responsibility for the implementation of the Project C&D Waste Management Plan. The C&D Waste Manager will be assigned the authority to instruct all site personnel to comply with the specific provisions of the Plan.

At the operational level, the site foreman from Response Engineering and appropriate personnel from each sub-contractor on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in the Project C&D Waste Management Plan are performed on an on-going basis.

Training

Copies of the Project C&D Waste Management Plan will be made available to all relevant personnel on site. All site personnel and sub-contractors will be instructed about the objectives of the Project C&D Waste Management Plan and informed of the responsibilities which fall upon them as a consequence of its provisions. Where source segregation, selective demolition and material reuse techniques apply, each member of staff will be given instructions on how to comply with the Project C&D Waste Management Plan. Posters will be designed to reinforce the key messages within the Project C&D Waste Management Plan and will be displayed prominently for the benefit of site staff.



Proposals for Minimisation, Reuse and Recycling of C&D Waste

Construction waste will arise on the Project mainly from excavation and unavoidable construction waste, material surpluses or damaged materials, cleaning of concrete wagons. The Response Group Purchasing Manager shall ensure that materials are ordered so that the quantity delivered, the timing of the delivery and the storage is not conducive to the creation of unnecessary waste.

In the course of the Project, it is estimated that the following quantities of C&D wastes/material surpluses will arise: C&D Waste Material	Quantity (tonnes)
Clay and Stones	0
Concrete	1cu.m
Masonry	0.5cu.m
Wood	0.5cu.m
Packaging	5cu.m
Hazardous Materials	0
Other Waste Materials	Diesel spill
TOTAL Arisings	7cu.m

- Excavated clay will be carefully stored in segregated piles on the site for subsequent reuse or removed from site for direct beneficial use elsewhere (it is not envisaged to remove any excavated material from site). The site is located on an existing waste collection facility which is fully licensed (KTK fill site), details of permits are available and will be presented if the need for disposal is required.
- Concrete and Masonry waste will be collected in receptacles with mixed construction waste materials, for subsequent separation and recovery at a remote facility.
- Concrete wash out facility will be in place using a pit 2x2x0.5m with teram on base and filled with clean stone. All concrete wagons will use this area for cleaning trucks after each pour.
- Timber will be source segregated and collected in receptacles for recycling at a remote facility.
- Packaging will be source segregated for recycling or returned to suppliers.
- Hazardous wastes will be identified, removed and kept separate from other construction waste materials in order to avoid further contamination.
- Other construction waste materials will be collected in receptacles with mixed construction waste materials, for subsequent separation and disposal at a remote facility.
- Refuelling of plant– all diesel fuels will be stored in a bunded tank and located in 1 location on the site. Spill kits will be on site for the event of any accidental spillage during refuelling. All maintenance all plant will be carried out in a designated area with spill kits on standby.
- Overpumping of excavations – it is not envisaged that any overpumping of excavations will be required however in the event that excavations need dewatering, a suitably sized pump will be used and the discharge will be filtered using stray balls before entering the existing open drain. The site is surrounded by a deep open drain.



Licence Requirements

It is anticipated that waste materials will have to be moved off site. It is the intention to engage specialist waste service Contractors, who will possess the requisite authorisations, for the collection and movement of waste off-site, and to bring the material to a facility which currently holds a Waste Licence Certificate of Registration. Accordingly, it will be necessary to arrange the following waste authorisations specifically for the Project:

Authorisation Type	Specific Need for Project (Yes/No?)
Waste Licence	Yes
Waste Permit	Yes
Waste Collection Permit	Yes
Transfrontier Shipment Notification	No
Movement of Hazardous Waste Form	No

Table SF3: Specific Waste Authorisations Necessary for the Scheme

Demolition Procedures –N/A to this project

Demolition works shall be undertaken in a manner which maximises the potential for recycling, including source segregating waste where appropriate. Activities shall be carried out in the following sequence:

Demolition Activity Sequence	General Description
Disconnection of Services/Vermin Control	Shutoff of E.S.B., Gas etc.
Inventory of Hazardous Wastes	e.g. Asbestos etc.
Removal of Abandoned Furniture/Equipment	e.g. Furniture/White Goods
Removal of Asbestos/Hazardous Materials	e.g. Application of H&S Procedures
Removal of Fixtures	e.g. Fitted Presses etc.
Removal of Timber	e.g. Removal of Floors, Trusses, Rafters
Demolition of Structure Shell	Manual or Mechanical Demolition
Source Segregation of Material Fractions	Separation into Designated Material Fractions
Transport of Material from Site to Treatment Facilities	e.g. C&D Waste Recycling Facility



Waste Auditing

The C&D Waste Manager shall arrange for full details of all arisings, movements and treatment of construction and demolition waste discards to be recorded during the construction stage of the Project. Each consignment of C&D waste taken from the site will be subject to documentation, which will conform with Table SF4 and ensure full traceability of the material to its final destination.

Detail	Particulars
Name of Project of Origin	
Material being Transported	
Quantity of Material	
Date of Material Movement	
Name of Carrier	
Destination of Material	
Proposed Use	

Table SF4: Details to be Included within Transportation Dockets

Details of the inputs of materials to the construction site and the outputs of wastage arising from the Project will be investigated and recorded in a Waste Audit, which will identify the amount, nature and composition of the waste generated on the site. The Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of construction and demolition waste. The measured waste quantities will be used to quantify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences which can be applied to future projects.

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