APPENDIX 7.1 ENVIRONMENTAL ASSESSMENT (SITE INVESTIGATION)

Granary House
Rutland Street
Cork

Tel. [021]4321521
Fax. [021]4321522

ENVIRONMENTAL ASSESSMENT

DUBLIN CENTRE

Prepared For: -

T.J. O'Connor & Associates,
Consulting Engineers,
Corrig House,
Corrig Road,
Sandyford,
Dublin 18.

Prepared By: -

O'Callaghan Moran & Associates,
Granary House,
Rutland Street,
Cork.

January 2009

TABLE OF CONTENTS

PAGE

1. INTRODUCTION

In 2006 O' Callaghan Moran & Associates (OCM) conducted a preliminary environmental assessment of the proposed Dublin Centre site located between Upper O'Connell Street and Moore Street and between Parnell Street and Henry Street, Dublin. The proposed development comprises a mixed retail and commercial development over deep basement.

The assessment involved a desk study of available information on historic land use and a site inspection, based on which OCM prepared a Map outlining areas of potential high, moderate and low risk of contamination (Ref.: Figure 1).

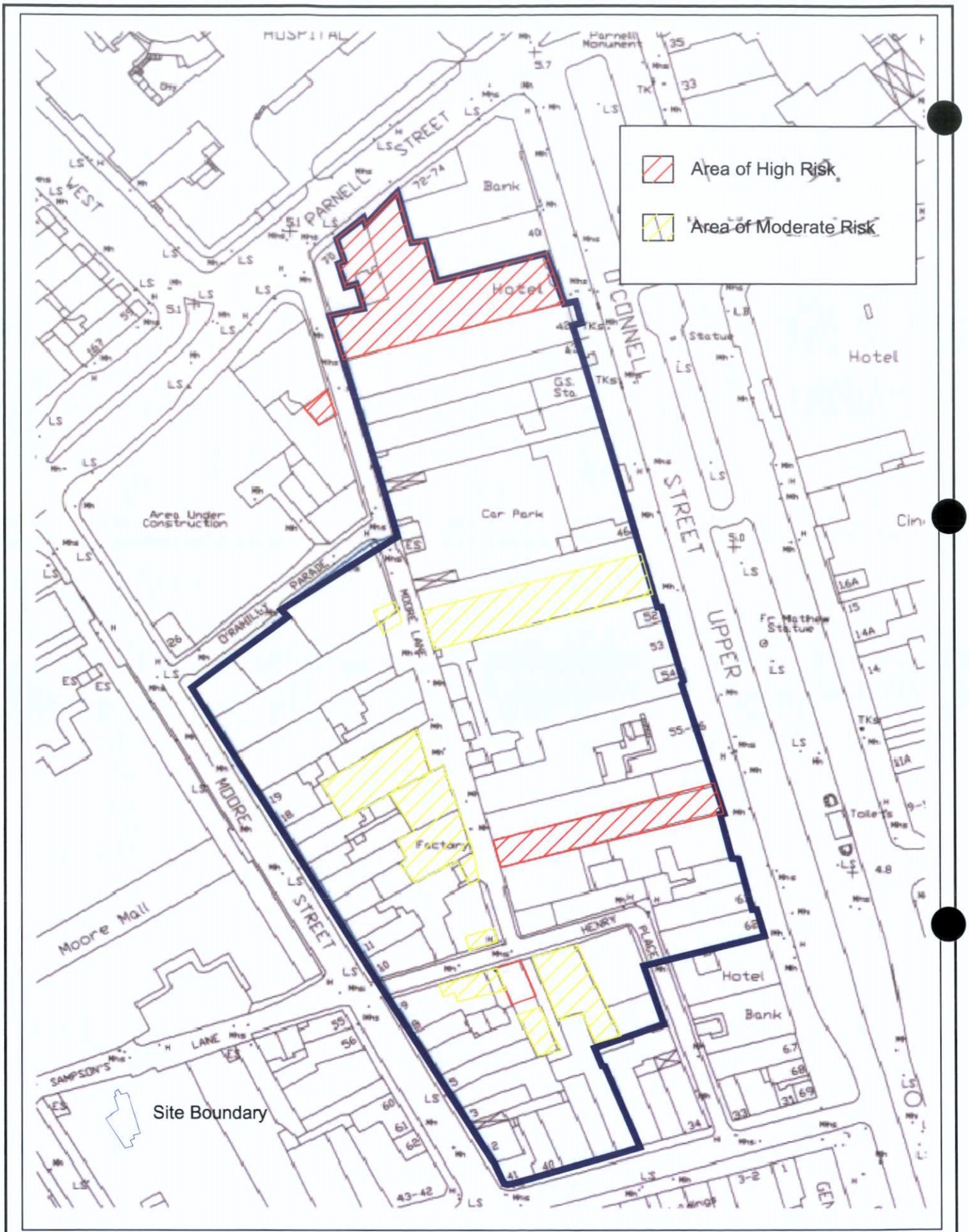
In 2008 a joint geotechnical and environmental site investigation was undertaken comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The geotechnical investigations were supervised by AGL while the environmental elements of the investigation were supervised by OCM.

The purpose of the environmental investigation was to identify if there was contamination in the subsoils or groundwater; identify appropriate management options for any contaminated subsoils that may have to be removed from the site during the redevelopment; and establish the status of groundwater quality. This report presents the findings of the environmental investigation.

1.1 Investigation Scope

The scope comprised: -

- Collection of samples of the fill material and the underlying subsoils for laboratory analysis to establish if these materials have been impacted by historical activities;
- Characterisation of the impacted soils, based on the laboratory testing, to identify suitable off-site disposal/recovery outlets for any soils that have to be removed;
- Collection and analysis of groundwater samples from the subsoils and bedrock to provide data for an application to Dublin City Council for a trade effluent discharge license for dewatering during the construction of the basement.



O' Callaghan Moran & Associates.
Granary House, Rutland Street,
Cork, Ireland.
Tel. (021) 321521 Fax. (021) 321522
email : info@ocallaghanmoran.com

CLIENT
Chartered Land Ltd.

TITLE
Areas of Risk from 2006

DETAILS

Figure No.
1

SCALE
NTS

REV

1.1.1 Limitations

While every effort was made to target the areas of concern identified in OCM 2006 Report, the intrusive investigations were confined to open areas in the middle of the site and around the site parameter. This was due to the fact that most of the premises within the development footprint were either still occupied, or in the case of those that had been vacated, had not yet been demolished. Therefore it is possible that there areas of localized contamination at the site that have not been identified in this assessment.

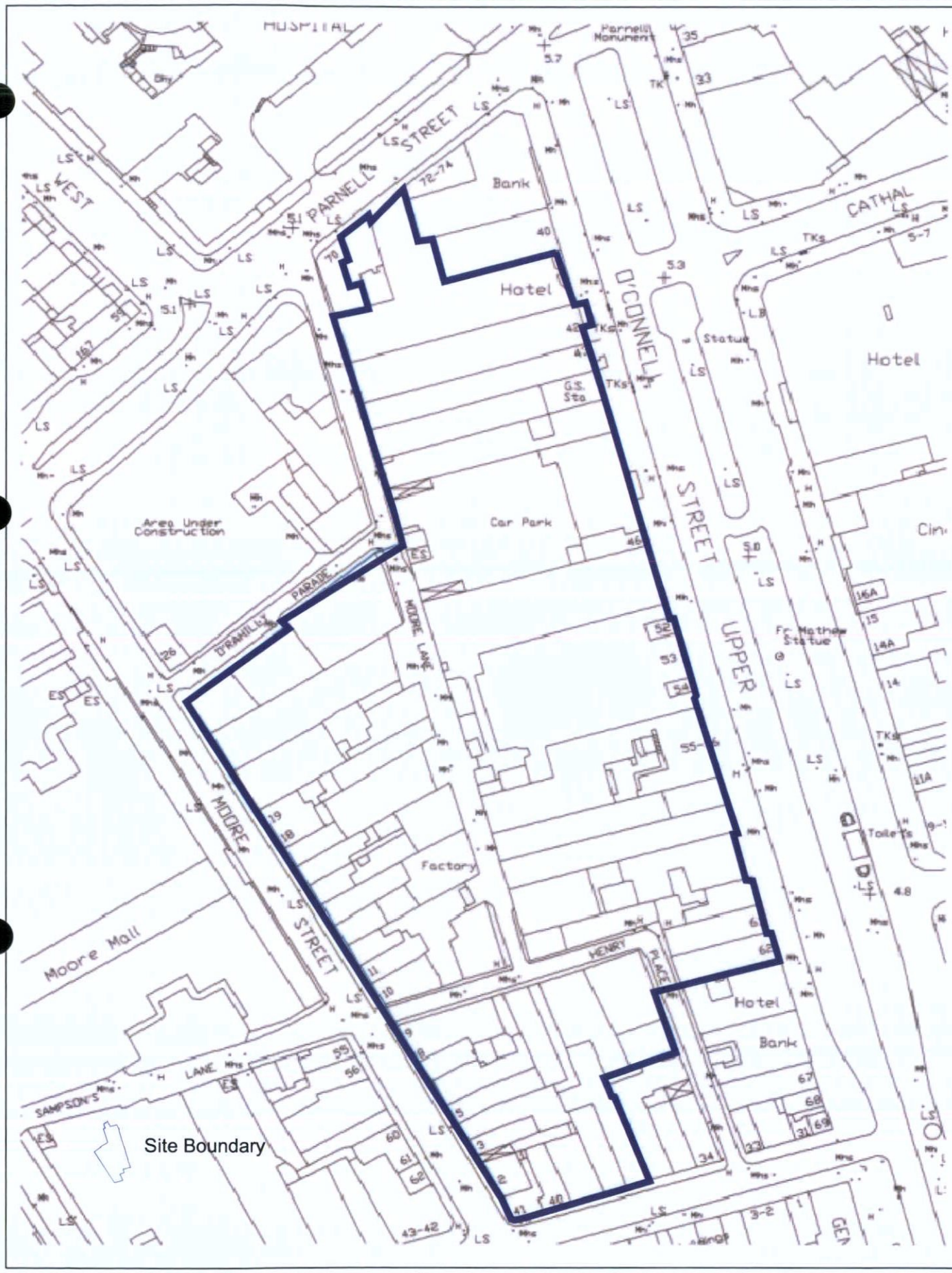
2. SITE DESCRIPTION

2.1 Location

Dublin Centre is bounded to the east by O'Connell Street Upper, to the North by Parnell Street and O'Rahilly Parade, to the south by Henry Street and to the west by Moore Street and Moore Lane. Henry Place is also part of the development area as shown on Figure 2.1.

2.2 Site Layout and Current Use

In 2006 OCM conducted a site walkover to determine the use of the buildings at that time. The occupier of each building and type of activity carried out therein are listed in Table 2.1.



O' Callaghan Moran & Associates.
Granary House, Rutland Street,
Cork, Ireland.
Tel. (021) 321521 Fax. (021) 321522
email : info@ocallaghanmoran.com

CLIENT
Chartered Land Ltd.

DETAILS

Figure No.
2.1

TITLE
Site Location

SCALE
NTS

REV.
REV

Table 2.1 Name and Address of Occupiers within the subject area

Address	Name	Type of Activity
41 – 42 O'Connell Street Upper	Royal Dublin Hotel	Hotel
43 O'Connell Street Upper	Ned Kelly's	Snooker Hall
44 O'Connell Street Upper	An Garda Síochana	Offices
	Vacant	
	Vacant	
	Londis	Grocery/Newsagent
	Dr. Quirkey's	Amusement Arcade
52 O'Connell Street Upper	Slattery's	Camera Shop
52 – 54 O'Connell Street Upper	Carlton Cinema (Closed)	Cinema
55 – 56 O'Connell Street Upper	Dr. Quirkey's	Amusement Arcade
57 – 58 O'Connell Street Upper	Carroll's	Irish Gift Shop
58 O'Connell Street Upper	Profiles (Above Carroll's)	Ladies Gym
59 – 60 O'Connell Street Upper	Dublin Bus (Closed)	Office
61 O'Connell Street Upper	Flanagan's	Restaurant
62 O'Connell Street Upper	McDonalds	Fast Food Restaurant
37 Henry Street	The Card Company	Card shop
38 Henry Street	NoName	Clothes shop
39 Henry Street	Game	Electronic Game Shop
40 Henry Street	Simon Hart	Shoe Shop
41 Henry Street	McGiveney's	Optician & Jewellers
4 Henry Place	Unknown possibly The Mint	Tattoo parlour
5 – 9 Henry Place	Han Yang Asian Market	Asian Food Shop
1 Moore Street	Everyday Seafood & Grocery	Grocery shop
1 Moore Street (upstairs)		Hairdresser
3 Moore Street	Paddy Power	Bookmaker
4 Moore Street	Bryan's (Closed)	Shoe Repair/Key Cutting
5 Moore Street	Doyle's (Closed)	Bingo/ Hardware
6 Moore Street	Talk Cents	Internet/Phone Shop
7 Moore Street	Troy's Butchers	Butcher's Shop
8 – 9 Moore Street	Hair Extension Master / Central Supermarket (Closed)	Supermarket and Hairdressers
10 Moore Street	Rong Xing	Chinese Supermarket
11 Moore Street	Home Store	Hardware/Homeware shop
12 Moore Street	Oceanic Superstore	Asian Food Shop
13 Moore Street	Pat's Household	Homeware shop
14 Moore Street	Charity Hair Studio	Hairdressers
15 Moore Street	Larmints Paylink	Money Transfer shop
16 Moore Street	Plunketts	Closed
17 Moore Street	Mobile Phone Centre	Phone / electronic shop
18 Moore Street	Crystal Superstores	Afro-Caribbean shop
19 Moore Street	American Design Wears	Basketball & sports shop
20 Moore Street	Unknown	Chinese Restaurant & Hairdressers upstairs
21 Moore Street	Madina Asian Food Co.	Asian Food Market
22 Moore Street	China House	Restaurant
23 Moore Street	Vacant	Possibly offices upstairs
1 – 2 O'Rahilly Parade	Dublin City Council	Waste management equipment storage
3 – 8 O'Rahilly Parade	Dublin City Council	Storage Containers for the Moore St. Traders

O'Connell Street Upper

The lots on Upper O'Connell Street were occupied by eight retail outlets; the Royal Dublin Hotel and two restaurants (Flanagan's and McDonalds).

Parnell Street

The Royal Dublin Hotel was the only lot on Parnell Street.

Henry Street

There were 5 No. retail outlets in 37 to 41 Henry Street.

Henry Place

Two buildings on Henry Place were being used for retail purposes (one Asian food market and one tattoo parlour). The remaining area was occupied by derelict buildings. The rear gardens or yard areas of the lots on O'Connell Street form the eastern and northern boundary of Henry Place.

Moore Street

All of the buildings on Moore Street where occupied were retail outlets, which include restaurants, general shops and food markets. Of the 23 buildings 4 were vacant.

Moore Lane

The rear of the buildings on O'Connell Street Upper form the eastern boundary of Moore Lane. Derelict buildings and yards and the rear of the buildings on Moore Street form the western boundary of Moore Lane.

O'Rahilly Parade

O'Rahilly Parade is occupied by two yards. 1 – 2 which are used by Dublin City Council as a storage area for bins and street cleaning equipment. 3 to 8 O'Rahilly Parade was being used by Dublin City Council as a storage area for the Moore Street Traders.

2.3 Services

OCM understand that heating for all of the buildings is either by gas supplied by Bord Gais and/or individual electric heating systems. OCM did not observe any heating oil storage tanks

in the rear of any of the premises. While it is unlikely that oil is widely used for heating purposes, it is possible that there may be some individual heating oil storage tanks in use.

Water is supplied from the Dublin City Council mains supply. OCM did not identify the presence of any supply wells and a review of Geological Survey of Ireland records indicates that there are no water supply wells in the area.

Sanitary wastewater discharges to the Dublin City Council foul sewer, while storm water is discharged to the municipal Storm Sewer. No records of any Trade Effluent Discharge Licences were identified in the review of Dublin City Council files, the details of which are discussed in Section 3.

An ESB transformer station was identified in the basement of 40 and 41 O'Connell Street Upper during OCMs 2006 assessment. It is understood that the transformer was installed in the mid 1960's, but OCM could not establish either the exact installation time or whether it is still in place. This transformer, if present, may have coolants containing PCBs , which would require specialist handling.

3. PHYSICAL SETTING

3.1 Geology

Information on the local and regional geology was obtained from the GSI databases and the geotechnical investigation, which comprised the installation of cable tool percussion (shell & auger) and rotary cores boreholes. The site investigation findings are discussed in detail in Section 4.

3.1.1 Bedrock

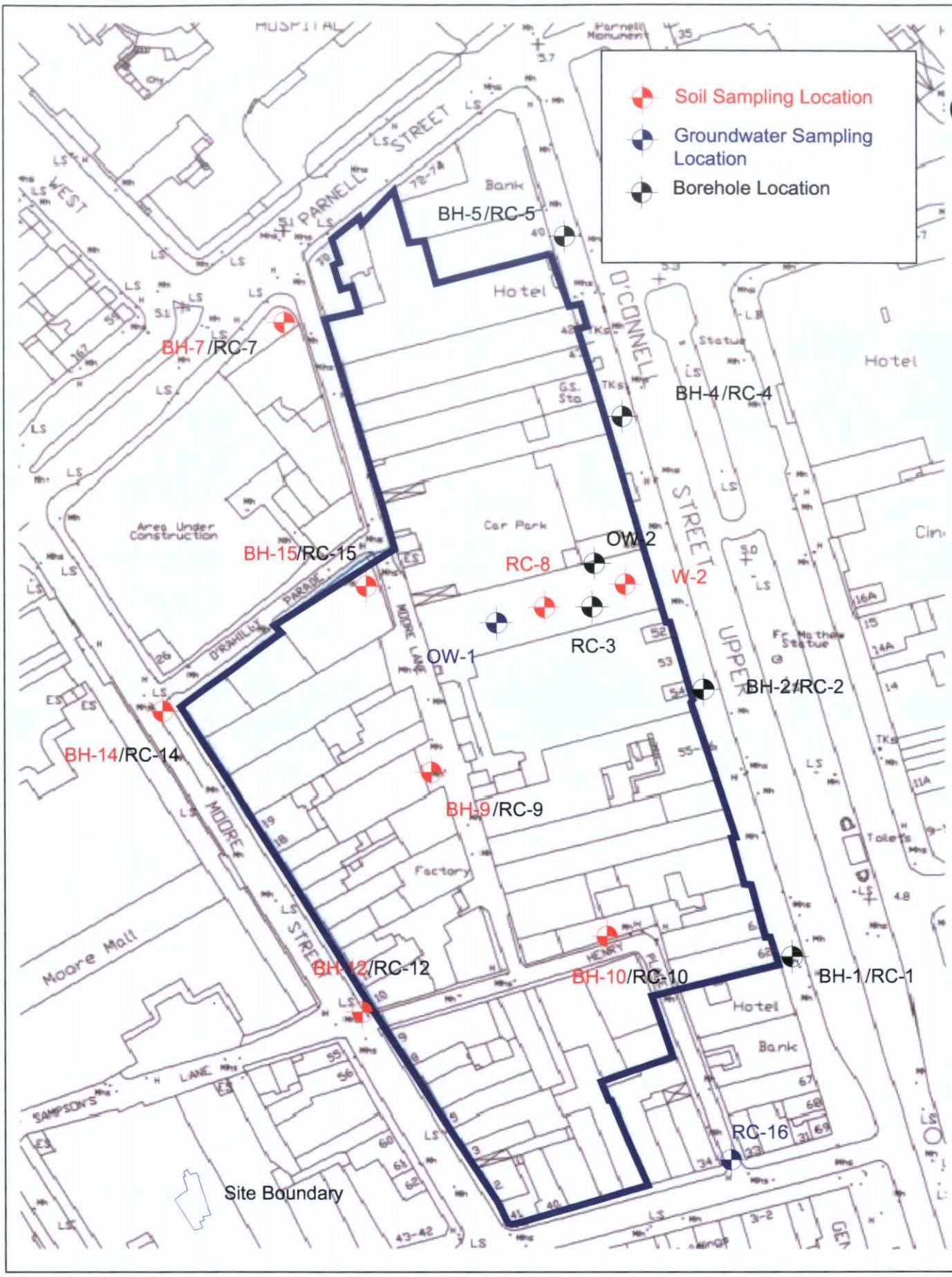
The GSI bedrock "Geology of Kildare – Wicklow", Map 1994 states that the subject area is underlain by dark grey to black limestones and shales of the Calp Limestones. Calp units typically consist of dark grey, fine grained, graded limestone with interbedded black, poorly fossiliferous shales. The limestone bed thickness, grain size, colour and proportion of shale vary widely.

The borehole locations used for environmental sampling purposes are shown on Figure 3.1 and the complete map showing all the site investigation locations is included in Appendix 1 The borehole logs are included in Appendix 2.

The rotary core borehole logs indicate that the bedrock is mostly interbedded black calcareous shale, argillaceous limestone and siliceous limestone. In OW-1 and OW-2, located in the centre of the site, the bedrock is described as limestone. In BH-5 the bedrock encountered was interbedded limestone and shale and grey blue limestone. The depth to bedrock ranged from 12.6 m below ground level (bgl) for RC-16 to 27.3 m bgl for RC-4 in the northeast of the site.

3.1.2 Subsoils/Quaternary Geology

According to the quaternary map of Dublin, the area is underlain by made ground, alluvium deposits close to the Liffey and glacial till. Much of the central Dublin area is underlain by fill material comprising gravels and clays interspersed with glass pottery and in some cases ash, which was deposited in the 17th and 18th century particularly in the low lying areas close to the Liffey.



O' Callaghan Moran & Associates.
Granary House, Rutland Street,
Cork, Ireland.
Tel. (021) 321521 Fax. (021) 321522
email : info@ocallaghanmoran.com

CLIENT
Chartered Land Ltd.

DETAILS

Figure No.
3.1

TITLE
Borehole Locations

SCALE
NTS

REV

The borehole logs indicate that the subsoils range in thickness from between 12.6 m to 27.3 m across the site and comprises fill material underlain by natural ground. The fill material ranges from 2 m thick at RC-8 to 5 m at BH-4 and is thickest at the O'Connell Street, eastern side of the site. The fill is described as brown grey slightly gravelly clay with cobbles and fragments of brick and concrete. Underneath the fill material, the natural ground comprises mostly gravels underlain by a brown clay.

3.2 Hydrogeology

3.2.1 Aquifer Classification and Vulnerability

The bedrock aquifer beneath the site is classified locally by the GSI as a locally important aquifer (Ll) which is moderately productive only in local zones, indicating that water movement through the bedrock is very slow and along short flow paths. The limited groundwater movement within the rock tends to be restricted to the surficial weathered horizons (top1-3m) or to non-extensive fractured zones. These zones tend to have a limited hydraulic continuity, low storage capacity and potential yield.

It is likely that groundwater flow locally is from north to south toward the River Liffey which is approximately 500 m to the south of the site.

Vulnerability is defined by the GSI as the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. The GSI uses four groundwater vulnerability categories – extreme (<3m), high (3-5m), moderate (5-8m) and low>10m) - for mapping purposes and in the assessment of risk to groundwaters. Groundwater is most at risk where the subsoils are either absent or thin. The data from the borehole logs indicates that the vulnerability of the bedrock aquifer is moderate to low.

3.2.2 Hydrogeological Risk Assessment

The development site is predominantly covered by paved areas, roofs roads and pavement, but there may be some very small unpaved areas to the rear of some of the buildings. Most of the incident rainfall runs off to storm sewer, with infiltration to ground limited to open green or unpaved yard areas.

Beneath the site the subsurface materials comprise made ground, gravels and clay. The thickness of these materials above the bedrock according to the borehole logs ranges from 12.6 – 23.3 m. It is likely therefore that any impacts on the subsurface associated with historical landuse are localised as vertical migration of contamination to the bedrock aquifer will have been greatly inhibited by the type and thickness of the subsoils and in particular the brown clay underlying the gravels.

The development will involve deep excavation into the bedrock will be opened at the site. OCM understand that groundwater pumping tests have been undertaken separately by AGL Consulting Engineers to assess the impacts of dewatering on the local hydrogeological conditions. The impact of dewatering is not therefore been discussed in this report, except in relation to the quality of the groundwater that will be discharged during the dewatering activities.

Post development, the extent of hard standing will be similar to the existing conditions. Therefore the amount of direct recharge as a result of rainfall will be very low and similar to the existing situation.

4. SITE INVESTIGATION

4.1 Sample Locations

The geotechnical investigation comprised the installation of eleven (11) shell and augur boreholes and fifteen (15) rotary core boreholes. The locations are shown on Figure 3.1. The environmental investigation involved the collection of samples of the fill material and underlying natural ground and groundwater samples from selected boreholes identified by OCM.

Fill and subsoil samples were collected from eight boreholes, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2. Groundwater samples were collected at both RC-16 and OW-1, where two standpipes were located with one in the subsoil and one in the bedrock aquifer.

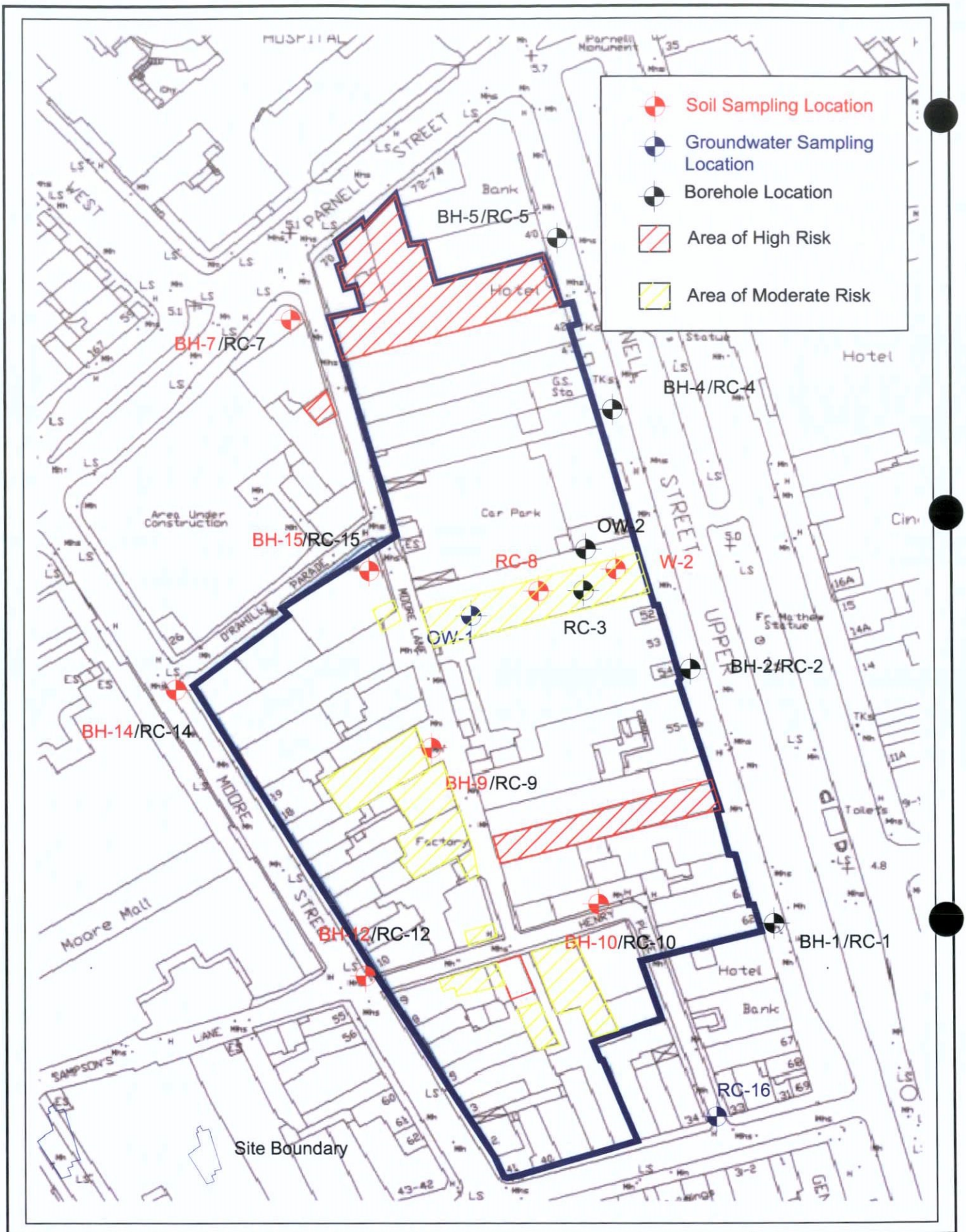
As none of the buildings identified in the 2006 assessment had been demolished, the boreholes had to be positioned in open areas and around the site perimeter and could not be located in all of the risk areas identified in the 2006 assessment. Figure 4.1 shows the location of the boreholes and the areas of risk identified in the assessment. This meant that only W-2 and RC-8 were located directly in an area identified in 2006 assessment as being at risk. Both were in an unpaved area used as a staff car park and storage area for Dr. Quirke's Emporium, which had been identified as being at moderate risk.

BH-7 was located on Parnell Street within 10 m of the rear entrance of the Royal Dublin Hotel which was considered an area of high risk in the 2006 site assessment. BH-9 was located directly beside buildings on Moore Lane, which had been designated at moderate risk. On Henry Place BH-10 was located across the lane from areas that had been designated at moderate and high risk. The remainder of the boreholes BH-12, 14 and 15, were considered to provide a representative spread of samples throughout the site.

4.2 Borehole Installation

The subsoil boreholes were drilled using a shell and augur (cable tool percussion) drill rig. The rotary core boreholes were drilled using a rotary core drill rig. All boreholes were drilled by IGSL and were logged for geotechnical purposes by IGSL personnel.

The installation of the boreholes from which samples for environmental testing purposes were collected were supervised by an OCM scientist and logged in accordance with BS5930. The Borehole logs are included in Appendix 2.



O' Callaghan Moran & Associates.
Granary House, Rutland Street,
Cork, Ireland.
Tel. (021) 321521 Fax. (021) 321522
email : info@ocallaghanmoran.com

CLIENT
Chartered Land Ltd.

DETAILS

Figure No.
4.1

TITLE
Sample Locations and Areas of Risk

SCALE
NTS

REV

4.3 Soil

4.3.1 Sampling

The purpose of the soil sampling was to establish the presence or absence of contamination and to characterise the fill and subsoils. The samples were collected in accordance with OCM soil sampling protocol, a copy of which is included in Appendix 3.

4.3.2 Laboratory Analysis

All samples were sent to the STL laboratory in Blanchardstown, Dublin for analysis. The range of parameters tested was based on the nature of the historical site activities. In addition selected samples were tested for a range of parameters specified in the EU Council Decision establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.

The Decision specifies Waste Acceptance Criteria (WAC) for a range of inorganic and organic parameters that define whether a waste is suitable for disposal to an inert, non-hazardous or hazardous waste landfill. Materials that comply with the inert WAC are deemed to be essentially inert and present a minimal environmental risk.

Three (3) samples of the fill material from BH-7, 9 and 10 were analysed for Total Petroleum Hydrocarbons (TPH), BETX (benzene, toluene, ethylbenzene and xylene), PAH (polycyclic aromatic hydrocarbons) and metals (arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium and zinc).

Nineteen (19) samples, of the fill and natural ground from, BH-7, 9, 10, 12, 14, 15, RC-8 and W-2, were tested for the WAC, which included Total Organic Carbon (TOC), BETX, PCBs (polychlorinated biphenyls, 7 congeners), Mineral Oil (C10 to C40) and PAH sum of 17. They were also subjected to leach testing at a liquid to solid ratio of 10:1 and the leachate analysed for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, tin, selenium, zinc, chloride, fluoride, sulphate, phenols, dissolved organic carbon and total dissolved solids.

Details of the sample points, sample depth, nature of the sample and analytical tests are presented in Table 4.1

Table 4.1

Summary of Soils Samples				
Borehole Name	Sample Type	Sample Type	Sample Depth	Type of Subsoil
BH-7	Fill Material	Soil	0.5-1 m	
	Natural Ground	WAC	4-5 m	Gravel
	Natural Ground	WAC	12-13m	Gravel
BH-9	Fill Material	Soil	0.4-0.8m	
	Natural Ground	WAC	4-5m	Gravel
BH-10	Fill Material	Soil	1.7.2.5m	
BH-12	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	3-4m	
	Natural Ground	WAC	4-5m	Clay
	Natural Ground	WAC	8-10m	Clay
BH-14	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	
	Fill Material	WAC	2-3m	
	Natural Ground	WAC	3-4m	Clay
	Natural Ground	WAC	8-10m	Gravel
RC-8	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	
W-2	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	

4.3.3 Results

The results of analysis of three solid samples of the fill material are shown in Table 4.2. The Table includes, for comparative purposes, the EU Council Decision WAC and the Dutch Government Soil Quality Standards commonly referred to as the Dutch List. These guidelines specify two categories, a target level (D) and an intervention level (I). The (D) level is considered representative of background conditions. The (I) level is one at or above which remedial action may be considered necessary depending on the potential environmental exposure risk. Many Irish Local Authorities use these standards to assess the potential for contamination. These samples were also compared with the EPA typical range for non-polluted soils for major elements and trace elements.

TPH was detected in BH-7 (180 mg/kg) and in BH-9 (150 mg/kg). Although this is above the Dutch D limit of 50 mg/kg they are considerably below the Dutch I limit of 5000 mg/kg and also below the inert WAC of 500 mg/kg.

Cadmium was detected in BH-9 and BH-10 at levels of 1.2 mg/kg and 1.6 mg/kg respectively. These are slightly above the Dutch D limit of 0.8 mg/kg, but below the I limit of 12 mg/kg. In BH-9, the mercury level (0.34 mg/kg) is marginally above the Dutch D limit of 0.3 mg/kg. All the remaining heavy metals were below the Dutch D limit and within the EPA range for non-polluted soils.

Table 4.2 Soil Results Dublin Centre 2008

Parameter	Sample ID / Sample Depth / Units	BH-7 0.5-1m	BH-9 0.4-0.8m	BH-10 1.7-2.5m	EPA Range for Non-polluted Soils	Dutch D Values	Dutch I values	EU limits for Inert landfill
Antimony	mg/kg	1.6	1.6	1.7	0.2-3	3	15	0.06
Arsenic	mg/kg	16	12	13	1.0-50	29	55	0.5
Barium	mg/kg	150	72	79	NE	160	625	20
Cadmium	mg/kg	0.65	1.2	1.6	0.1-1	0.8	12	0.04
Chromium	mg/kg	11	14	14	5-250	100	380	0.5
Copper	mg/kg	19	28	30	2-100	36	190	2
Iron	mg/kg	8900	20000	25000	10000-50000	-	-	-
Lead	mg/kg	42	79	59	2.0-80	85	530	0.5
Manganese	mg/kg	830	1100	1500	20-3000	NE	NE	-
Mercury	mg/kg	<0.25	0.34	<0.25	0.3-0.8	0.3	10	0.01
Nickel	mg/kg	24	31	37	0.5-100	35	210	0.4
Tin	mg/kg	<2.0	3.5	3.7	1.0-40	NE	900	-
Zinc	mg/kg	68	86	94	10-200	140	720	4
TPH C6-C40	mg/kg	180	150	<50	NE	50*	5000*	500
BTEX	mg/kg	<0.2	<0.2	<0.2	NE	NE	100	6
PAHs (sum of 10)	mg/kg	17.3	2.9	0.3	NE	1	40	-
PAHs (sum of 16)	mg/kg	23.0	3.7	<1.0	NE	NE	-	100

*Denotes limit for mineral oil

In BH-7 and BH-9 PAHs (sum of 10) the PAH, 17.3 mg/kg and 2.9 mg/kg respectively, exceeded the D value of 1 mg/kg, but are well below the 100 mg/kg limit applied at Irish inert waste disposal landfills.

Waste Acceptance Criteria (WAC) Testing

The results of the WAC testing of the fill material and the natural susbsoils are shown in Table 4.3 and 4.4 respectively. The Tables include the WAC for inert and non-inert landfills. The EU Council Decision does not include a WAC for PAH, but allows individual member states to apply their own limits. The limit used in this assessment is derived from the Waste Licence issued by the EPA for an inert landfill in County Dublin.

TPH was detected above the inert WAC (500 mg/kg) in four of the fill material samples- RC-8 (510 mg/kg and 1800 mg/kg); BH-12 (640 mg/kg), and W-2 (5000 mg/kg).

Antimony exceeded the inert WAC of 0.06 mg/kg in the upper fill sample of OW2 (0.36 mg/kg), but was less than the non-hazardous WAC (0.7 mg/kg). The chromium level in BH-14 (0.53 mg/kg) was slightly above the inert WAC of 0.5 mg/kg, but well below the non-hazardous WAC of 10 mg/kg.

Mercury was detected in samples of the fill taken in BH-12 (0.5-1m) and BH-14 (2-3m) and the natural ground (BH 7 (4-5m) marginally above the inert WAC of 0.01 mg/kg, but below the non-hazardous WAC of 0.2 mg/kg.

PAH levels greater that the inert WAC (100 mg/kg) were detected in both samples from OW-2, 230 mg/kg and 570 mg/kg respectively and the lower sample from RC-8 (280 mg/kg). There is no non-hazardous WAC for PAH.

PCBs were only detected in one sample at RC-8 (0.5-1m) at 0.028 mg/kg. This is considerably below the EU limit of 1 mg/kg.

Sulphate levels exceeded the inert WAC (1000 mg/kg) in two samples from RC-8, however the levels -15000 mg/kg (0.5-1m) and 14000 mg/kg (1-2m) respectively- were less than the non-hazardous WAC of 20,000 mg/kg. The TDS of both samples from RC-8 exceeded the inert WAC, but were less than the non-hazardous WAC.

Table 4.3 Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-12 0.5-1m	BH-12 3-4 m	BH-14 0.5-1m	BH-14 1-2m	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.50	<0.50	<0.50	0.5	2
Barium	mg/kg	0.19	0.033	0.12	0.097	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	0.33	<0.10	0.53	0.48	0.5	10
Copper	mg/kg	<0.10	<0.10	0.24	0.44	2	50
Mercury	mg/kg	0.016	<0.003	0.0051	0.0068	0.01	0.2
Molybdenum	mg/kg	0.084	0.31	0.27	0.43	0.5	10
Nickel	mg/kg	<0.10	<0.10	<0.10	<0.10	0.4	10
Lead	mg/kg	<0.10	<0.10	<0.10	<0.10	0.5	10
Antimony	mg/kg	<0.30	<0.30	<0.30	<0.30	0.06	0.7
Selenium	mg/kg	<0.060	<0.060	<0.060	<0.060	0.1	0.5
Zinc	mg/kg	<0.10	<0.10	<0.10	<0.10	4	50
Chloride	mg/kg	<25	<25	<25	29	800	15000
Fluoride	mg/kg	3	2.3	<2	2	10	150
Sulphate	mg/kg	910	300	190	820	1,000	20000
Phenols	mg/kg	<0.50	<0.50	<0.50	<0.50	1	-
Dissolved Organic Carbon	mg/kg	26	22	58	69	500	800
Total Dissolved Solids	mg/kg	3200	<2000	2900	<2000	4000	60000
Total Organic Carbon	%	5.3	3	4.4	3.8	3*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	640	170	99	180	500**	-
PAH (16)	mg/kg	6.6	<1.0	8.1	8.3	-	-
PAH (17).	mg/kg	6.6	<1.0	8.1	8.3	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-14 2-3m	BH-15 0.5-1	BH-15 1.0-2.0	BH-8 0.5-1	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.5	<0.5	<0.5	0.5	2
Barium	mg/kg	0.13	0.06	0.055	0.21	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	0.17	0.18	<0.1	<1	0.5	10
Copper	mg/kg	0.47	0.36	0.28	<1	2	50
Mercury	mg/kg	0.012	0.0035	0.0049	<0.003	0.01	0.2
Molybdenum	mg/kg	0.34	0.16	0.13	0.1	0.5	10
Nickel	mg/kg	0.12	0.15	0.14	<1	0.4	10
Lead	mg/kg	<0.10	0.42	0.43	<1	0.5	10
Antimony	mg/kg	<0.30	<0.3	<0.3	<0.3	0.06	0.7
Selenium	mg/kg	<0.060	<0.06	<0.06	<0.06	0.1	0.5
Zinc	mg/kg	<0.10	<0.1	0.13	<1	4	50
Chloride	mg/kg	54	<25	<25	43	800	15000
Fluoride	mg/kg	<2	2.3	<2	<2	10	150
Sulphate	mg/kg	140	500	190	15000	1,000	20000
Phenols	mg/kg	<0.50	<0.5	<0.5	<0.5	1	-
Dissolved Organic Carbon	mg/kg	82	62	36	52	500	800
Total Dissolved Solids	mg/kg	<2000	4200	<2000	24000	4000	60000
Total Organic Carbon	%	3.6	3.6	5.2	3.1	3.33%	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	0.028	1	-
Mineral Oil	mg/kg	<50	120	86	510	500	-
PAH (16)	mg/kg	<1.0	4.2	1.4	44	-	-
PAH (17).	mg/kg	<1.0	4.2	1.4	44	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.3 continued Fill Material WAC Dublin Centre 2008

Parameter	Sample I.D.	BH-8	W-2	W-2		EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
	Depth (m)	1.0-2.0	0.5-1	1.0-2.0			
	Unit						
Arsenic	mg/kg	<0.5	<0.5	<0.5		0.5	2
Barium	mg/kg	0.25	0.24	0.18		20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001		0.04	1
Chromium	mg/kg	<1	0.21	<1		0.5	10
Copper	mg/kg	<1	0.34	<1		2	50
Mercury	mg/kg	<0.003	<0.003	<0.003		0.01	0.2
Molybdenum	mg/kg	0.095	0.066	0.081		0.5	10
Nickel	mg/kg	<1	0.13	<1		0.4	10
Lead	mg/kg	<1	0.43	<1		0.5	10
Antimony	mg/kg	<0.3	0.36	<0.3		0.06	0.7
Selenium	mg/kg	<0.06	<0.06	<0.06		0.1	0.5
Zinc	mg/kg	<1	0.11	<1		4	50
Chloride	mg/kg	58	27	140		800	15000
Fluoride	mg/kg	<2	4.1	<2		10	150
Sulphate	mg/kg	14000	440	1600		1,000	20000
Phenols	mg/kg	<0.5	<0.5	<0.5		1	-
Dissolved Organic Carbon	mg/kg	73	45	60		500	800
Total Dissolved Solids	mg/kg	24000	2100	4200		4000	60000
Total Organic Carbon	%	3	5.6	5.4		3.33%	-
BTEX	mg/kg	<0.5	<0.5	<0.5		6	-
PCBs	mg/kg	<0.01	<0.01	<0.01		1	-
Mineral Oil	mg/kg	1800	150	5000		500	-
PAH (16)	mg/kg	272	228.5	566		-	-
PAH (17).	mg/kg	280	230	570		Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.4 Natural Ground WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-7 4-5 m	BH-7 13-14 m	BH-9 4-5 m	BH-12 4-5 m	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.5	<0.50	<0.50	0.5	2
Barium	mg/kg	0.084	0.14	0.076	0.068	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	<0.10	<0.1	<0.10	<0.10	0.5	10
Copper	mg/kg	<0.10	<0.1	<0.10	<0.10	2	50
Mercury	mg/kg	0.012	0.0038	0.0078	<0.003	0.01	0.2
Molybdenum	mg/kg	<0.03	0.085	0.056	0.2	0.5	10
Nickel	mg/kg	<0.10	<0.1	<0.10	<0.10	0.4	10
Lead	mg/kg	<0.10	<0.1	<0.10	<0.10	0.5	10
Antimony	mg/kg	<0.30	<0.3	<0.30	<0.30	0.06	0.7
Selenium	mg/kg	<0.060	<0.06	<0.060	<0.060	0.1	0.5
Zinc	mg/kg	<0.10	<0.1	<0.10	<0.10	4	50
Chloride	mg/kg	<25	71	<25	<25	800	15000
Fluoride	mg/kg	3	4.2	2.7	2.9	10	150
Sulphate	mg/kg	<110	<110	<110	<110	1,000	20000
Phenols	mg/kg	<0.50	<0.5	<0.50	<0.50	1	-
Dissolved Organic Carbon	mg/kg	13	39	14	19	500	800
Total Dissolved Solids	mg/kg	<2000	<2000	<2000	<2000	4000	60000
Total Organic Carbon	%	3.1	0.52	2.8	2.4	3%*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	<50	<50	<50	57	500**	-
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	-	-
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

Table 4.4 continued Natural Ground WAC Dublin Centre 2008

Parameter	Sample I.D. / Depth (m) / Unit	BH-12 8-10m	BH-14 3-4m	BH-14 8-10m	BH-15 12.0-13.0	EU Limits for Inert Landfill	EU Limits for Non-Hazardous Landfill
Arsenic	mg/kg	<0.50	<0.50	<0.50	<0.5	0.5	2
Barium	mg/kg	0.17	0.046	0.27	0.17	20	100
Cadmium	mg/kg	<0.001	<0.001	<0.001	<0.001	0.04	1
Chromium	mg/kg	<0.10	<0.10	<0.10	<0.1	0.5	10
Copper	mg/kg	<0.10	<0.10	<0.10	0.15	2	50
Mercury	mg/kg	0.0047	0.0039	0.0036	<0.003	0.01	0.2
Molybdenum	mg/kg	0.1	0.18	0.15	0.046	0.5	10
Nickel	mg/kg	<0.10	<0.10	<0.10	0.14	0.4	10
Lead	mg/kg	<0.10	<0.10	<0.10	0.41	0.5	10
Antimony	mg/kg	<0.30	<0.30	<0.30	<0.3	0.06	0.7
Selenium	mg/kg	0.079	<0.060	<0.060	<0.06	0.1	0.5
Zinc	mg/kg	0.19	<0.10	<0.10	<0.1	4	50
Chloride	mg/kg	41	<25	35	100	800	15000
Fluoride	mg/kg	2.7	2.3	2.4	4.7	10	150
Sulphate	mg/kg	250	<110	420	130	1,000	20000
Phenols	mg/kg	<0.50	<0.50	<0.50	<0.5	1	-
Dissolved Organic Carbon	mg/kg	19	27	23	37	500	800
Total Dissolved Solids	mg/kg	<2000	<2000	<2000	<2000	4000	60000
Total Organic Carbon	%	1.4	3.5	1.4	0.34	3%*	-
BTEX	mg/kg	<0.5	<0.5	<0.5	<0.5	6	-
PCBs	mg/kg	<0.01	<0.01	<0.01	<0.01	1	-
TPH	mg/kg	<50	<50	<50	<50	500**	-
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	-	-
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	-

*If DOC is less than 500 then a higher limit can be accepted

** Limit is for Mineral Oil

4.4 Groundwater

Samples were collected from four groundwater monitoring wells, OW-1 Subsoils (OW-1 S) and OW-1 Bedrock (OW-1 B) and RC-16 Subsoils (RC-16 S) and RC-16 Bedrock (RC-16 B). The samples were collected in accordance with OCM's Groundwater Sampling Protocol, a copy of which is included in Appendix 5.

All the samples were sent to the STL laboratory in Santry for analysis. The range of parameters tested was based on the nature of the historical site activities and included dissolved metals (arsenic, antimony, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, tin and zinc.), sodium, chloride, potassium, magnesium, sulphate, sulphide, total hardness, bicarbonate, TPH, BTEX and PAH.

The laboratory test report is included in Appendix 5 and the results are shown in Table 4.5. The results are compared for discussion purposes with the EPA Interim Guideline Values (IGVs). The IGVs are not statutory guidelines but have been prepared by the EPA to assist in the assessment of impacts on groundwater quality.

TPH was only detected in one well-RC-16- at a level of 8 mg/l, which is above the IGV of 0.01 mg/l. Iron, manganese and potassium exceeded their respective IGVs in both the subsoil and bedrock samples from RC -16. Barium, sodium and copper exceeded the IGV in the bedrock sample from RC-16 and PAH exceeded the IGV in the bedrock sample from RC-16.

PAHs exceeded the IGV in the subsoil and bedrock samples from RC-16 Subsoil and the bedrock sample in OW-1.

Chloride exceeded the IGV of 30 mg/l in both subsoil and bedrock samples from RC-16 and OW-1. The sulphate level in the bedrock sample marginally exceeded the IGV and hardness also exceeded the IGV in the subsoil sample from OW-1 and both subsoil and bedrock samples from RC-16.

Table 4.5 Groundwater Results Dublin Centre December 2008

Sample I.D.	Units	Subsoil Wells		Bedrock Wells		IGV
		RC-16 Subsoil	OW-1 Subsoil	RC-16 Bedrock	OW-1 Bedrock	
Antimony	mg/l	0.00048	0.00017	0.0023	0.00015	-
Arsenic	mg/l	0.0069	<0.0001	0.0059	<0.0001	0.01
Barium	mg/l	0.056	0.015	0.12	0.018	0.1
Cadmium	mg/l	<0.0001	0.00014	0.00024	<0.0001	0.005
Chromium	mg/l	<0.03	<0.03	<0.03	<0.03	0.03
Copper	mg/l	0.025	<0.007	0.096	<0.007	0.03
Iron	mg/l	0.41	0.045	0.55	0.041	0.2
Lead	mg/l	0.0033	<0.0005	0.00081	<0.0005	0.01
Manganese	mg/l	0.17	0.022	0.07	<0.01	0.05
Mercury	mg/l	<0.0003	<0.00030	0.00074	<0.00030	0.001
Nickel	mg/l	0.006	<0.0005	0.0039	0.0005	0.02
Tin	mg/l	<0.01	<0.01	<0.01	<0.01	-
Zinc	mg/l	0.053	<0.005	0.016	0.005	0.1
Magnesium	mg/l	6.6	8.8	28	8.4	50
Potassium	mg/l	60	11	7.6	10	5
Sodium	mg/l	100	35	680	35	150
Hardness (as CaCO3)	mg/l	100	360	210	360	200
Bicarbonate as CaCO3	mg/l	710	200	350	200	-
Chloride as Cl	mg/l	150	39	860	41	30
Sulphate as SO4	mg/l	<11	150	230	160	200
Sulphide as S	mg/l	0.14	<0.010	0.011	<0.010	-
TPH	mg/l	8	<0.1	<0.1	<0.1	0.01
PAH Total (Sum of 16)	µg/l	16	<0.10	0.25	1.7	0.1
Benzene	µg/l	<10	<10	<10	<10	1
Toluene	µg/l	<10	<10	<10	<10	10
Ethylbenzene	µg/l	<10	<10	<10	<10	10
p & m xylene	µg/l	<20	<20	<20	<20	10
o-Xylene	µg/l	<10	<10	<10	<10	10

5. DISCUSSION

5.1 Discussion

The purpose of environmental site investigation was to establish if there was contamination in the subsoils or groundwater associated with the historical use of the site. It was also undertaken to establish the nature of the fill material and underlying subsoils in terms of off-site management options for such materials that will have to be removed during site development.

The majority of the Dublin Centre area has been in use as shops, offices, stores and houses since the late 1700's. The 2006 assessment concluded that, given the nature of these historic landuses, the potential for subsurface soil or groundwater contamination is considered to be low. However, the assessment identified areas where there was potential for subsurface contamination. These included the Royal Dublin Hotel; car parking area for Dr. Quirke's Emporium; 5-11 Moore Lane, and 4-8 Henry Place.

The environmental investigation, in so far as the ground conditions allowed, targeted those risk areas identified in the 2006 assessment. Boreholes RC-8 and W-2 were installed in 48A-50 O' Connell Street, which had been designated at moderate risk. It is presently used as an unpaved car park and storage area for Dr. Quirke's Emporium.

5.2 Soils

In RC-8 and W-2, the levels of sulphate, total dissolved solids, TPH and PAHs exceeded the inert waste WAC. However all of the levels were less than the non-hazardous WAC.

In BH-12, which was located on the southeast perimeter of the site TPH and mercury were detected above the inert waste WAC in the upper fill sample; however the levels of these parameters in the underlying fill and natural ground were less than the inert WAC.

There was no evidence of significant contamination in any of the other samples and the tested parameters, where detected, are at levels generally below the inert WAC.

5.3 Groundwater

TPH and PAHs above the IGV limits were detected in the well installed in the subsoil in RC-16. A strong hydrocarbon odour was noted during sampling. No TPH or PAH was detected in the bedrock well. RC-16 is located immediately to the south and not within the portion of the site where deep excavation will occur. It is possible therefore that the hydrocarbons detected in this well originate from an off-site location and not from within the development site.

Low levels of PAH were detected in the subsoil and bedrock wells at OW-1 in the centre of the site. While the levels detected are above the IGV limits, they are not indicative of significant pollution.

The elevated iron and manganese levels detected in the subsoil and bedrock wells and are most likely naturally occurring. The copper level detected in OW-1, while slightly above the IGV is less than the drinking water standard for this parameter (2mg/L) and this detection is not therefore considered to be significant.

Elevated potassium and chloride levels were detected in both wells with higher chloride leves detected in RC-16, which is closest to the River Liffey. The levels detected are not indicative of significant contamination from historical site activities and it is possible that there is link via the gravels beneath the site and the brackish waters in the River Liffey.

OCM understand that pumping tests have been carried out to estimate the dewatering rate that will be necessary during the deep excavation and construction of the basement. While the volumes of groundwater in the fill, subsoil and bedrock, higher volumes may be expected from the gravels where present in significant thickness.

The groundwater quality monitoring data indicates that while low levels of PAH are present, the water should be suitable for discharge to sewer. Dublin City Council are likely to require on-site settlement to treat suspended solids and possibly pH control during any concrete forming or piling works.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

The subsurface comprises made ground ranging in thickness from 2 – 5.2 m, which contains mainly grey brown gravelly clay fill with red brick. This is underlain by natural ground of between 11.1 m and 23.3 m in thickness, that comprises gravels underlain by clay. The minimum depth to bedrock is 12.6 m while the maximum is 27.3 m.

The bedrock ranges from interbedded argillaceous limestone, siliceous limestone and black fossiliferous shale which are part of the Calp Limestone formation. The bedrock is considered to be a Locally Important Aquifer (Ll), which is moderately productive only in local zones. Aquifer vulnerability is considered to be moderate to low.

The investigation has established that the fill material and the underlying subsoils can generally be categorised as inert and suitable either for disposal at inert landfill or for use in land reclamation projects. There are localised zones in the fill such as at BH-12, RC-8 and W-2, where the contaminant levels exceed the inert category limits. However in these cases the materials fall into the non-hazardous waste category.

Elevated PAH levels were detected in the groundwater wells immediately to the south but not within the portion of the site where deep excavation will occur. It is possible therefore that these from an off-site location and not from within the development site. Low levels of PAH were detected in the subsoil and bedrock wells in the centre of the site. While the levels are above the IGV limits they are not indicative of significant pollution and the water should be suitable for discharge to sewer during the dewatering programme.

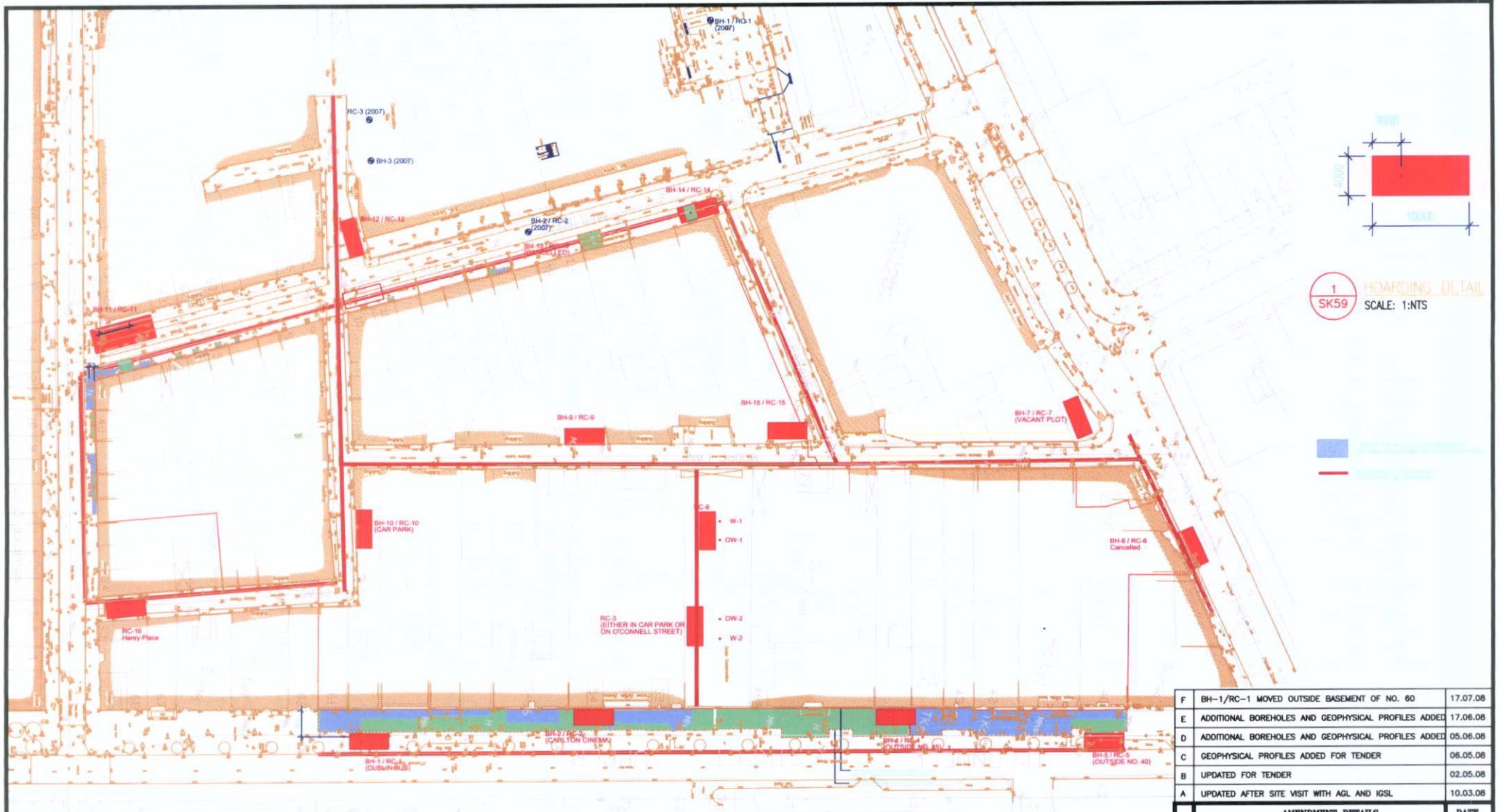
6.2 Recommendations

OCM recommend that following site clearance and as part of the bulk excavation samples of the fill and subsoil excavated in the vicinity of BH-12, W-2 and RC-8 be tested to confirm the waste characterisation i.e. inert or non-hazardous.

OCM recommend that all material excavated and removed from the site be disposed of in accordance with Dublin City Council Waste Management Regulations to suitably permitted or licensed waste management facilities.

APPENDIX 1

Site Map



1 SK59 HOARDING DETAIL
SCALE: 1:NTS

	AMENDMENT DETAILS	DATE
F	BH-1/RC-1 MOVED OUTSIDE BASEMENT OF NO. 60	17.07.08
E	ADDITIONAL BOREHOLES AND GEOPHYSICAL PROFILES ADDED	17.06.08
D	ADDITIONAL BOREHOLES AND GEOPHYSICAL PROFILES ADDED	05.06.08
C	GEOPHYSICAL PROFILES ADDED FOR TENDER	06.05.08
B	UPDATED FOR TENDER	02.05.08
A	UPDATED AFTER SITE VISIT WITH AGL AND IGSL	10.03.08

T.J.O'CONNOR & ASSOCIATES
CONSULTING ENGINEERS
CORRIG HOUSE, CORRIG ROAD, SANDYFORD, DUBLIN 18.
Tel: 295 2321 Fax: 295 4541

PROJECT: DUBLIN CENTRAL PROJECT
CLIENT: CHARTERED LAND
DRAWING TITLE: BOREHOLE LOCATIONS

SCALE: 1:500	JOB NO: 2643	DRAWING NO: SK59 F
DATE: 17.07.08	DRAWN BY: DD	

APPENDIX 2

Borehole Logs

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH7**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
		DATE STARTED	05/08/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE COMPLETED	12/08/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	16.00
		BORED BY	J. O'Hara
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	16.00
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of concrete.									
	MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick.			0.30						
1					AF4959	B	1.50-1.50		N = 7 (1, 1, 1, 2, 2, 2)	
2									N = 57 (5, 7, 15, 13, 11, 18)	
					AF4960	B	2.70-2.70			
3									N = 63 (6, 5, 9, 13, 17, 24)	
					AF4961	B	3.60-3.60			
4									N = 100/225 mm (9, 20, 33, 38, 29)	
	Dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			4.20	AF4962	B	4.50-4.50			
5									N = 26 (7, 7, 6, 7, 6, 7)	
					AF4963	B	5.50-5.50			
6					AF4964	B	6.30-6.30		N = 31 (2, 4, 6, 8, 8, 9)	
7					AF4965	B	7.30-7.30		N = 13 (5, 3, 3, 3, 3, 4)	
8					AF4966	B	8.30-8.30		N = 21 (1, 1, 3, 5, 5, 8)	
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.2	0.5	Boulder
5.6	9	8	Hard Strata Boring
9	12.6	8	Hard Strata Boring
12.5	13.5	4	Hard Strata Boring
13.5	16	7	Hard Strata Boring
16	16	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-08-08	15.00	13.00	15.00	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Blowing gravels from 5.6m bgl to base of hole. Falling and rising head test completed.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.00	5.00	No	5.00	20	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
01-08-08	2.00	2.00	-	End of shift
05-08-08	2.00	2.00	-	Start of shift
05-08-08	5.60	6.00	5.10	End of shift
06-08-08	5.00	6.00	4.80	Start of shift
06-08-08	8.60	9.00	5.40	End of shift
07-08-08	8.60	9.00	5.00	Start of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH7**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	05/08/2008
		DATE COMPLETED	12/08/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	16.00
		BORED BY	J. O'Hara
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	16.00
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Dense grey slightly clayey/silty sandy GRAVEL with many cobbles and lenses of brown slightly sandy gravelly clay. Gravel is fine to coarse and subrounded to subangular of limestone.			10.00	AF4967	B	10.20-10.20		N = 25 (8, 7, 7, 6, 6, 6)	
				10.40						
11	Very dense grey slightly sandy GRAVEL with some cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.				AF4968	B	11.00-11.00		N = 100 (12, 15, 16, 21, 25, 38)	
12					AF4969	B	12.00-12.00		N = 100/225 mm (11, 20, 26, 33, 41)	
13					AF4970	B	13.00-13.00		N = 100/90 mm (25, 44, 56)	
14					AF4971	B	14.00-14.00		N = 100/185 mm (8, 11, 33, 48, 19)	
15					AF4972	B	15.00-15.00		N = 100/150 mm (17, 27, 39, 61)	
16	Hard brown slightly sandy gravelly CLAY with some cobbles.			15.80	AF4973	B	15.90-15.90		N = 100/90 mm (25, 40, 60)	
	Obstuction - possible boulder			16.00	AF4974	B	16.00-16.00			
	End of Borehole at 16.00 m									
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4	4.2	0.5	Boulder
5.6	9	8	Hard Strata Boring
9	12.6	8	Hard Strata Boring
12.5	13.5	4	Hard Strata Boring
13.5	16	7	Hard Strata Boring
16	16	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-08-08	15.00	13.00	15.00	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Blowing gravels from 5.6m bgl to base of hole. Falling and rising head test completed.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
07-08-08	12.50	12.50	7.70	End of shift
08-08-08	12.50	12.50	6.40	Start of shift
08-08-08	13.50	13.50	2.70	End of shift
11-08-08	13.50	13.50	6.20	Start of shift
11-08-08	16.00	16.00	4.80	End of shift
12-08-08	16.00	16.00	5.20	Start of shift
12-08-08	16.00	16.00	8.80	End of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH9**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	15/07/2008
		DATE COMPLETED	23/07/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	17.50
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	17.50
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of reinforced concrete.									
	MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick.			0.20						
1					AF1908	B	1.00-1.00		N = 7 (2, 2, 2, 1, 1, 3)	
2	Very dense grey brown slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			2.00	AF1909	B	2.10-2.10		N = 36 (4, 6, 7, 2, 10, 17)	
					AF1910	B	2.50-2.50			
3					AF1911	B	3.00-3.00		N = 39 (7, 9, 8, 10, 10, 11)	
4					AF1912	B	4.00-4.00		N = 28 (2, 3, 6, 7, 8, 7)	
5					AF1913	B	5.00-5.00		N = 34 (3, 4, 7, 7, 9, 11)	
6					AF1914	B	6.00-6.00		N = 27 (3, 3, 4, 8, 8, 7)	
7					AF1915	B	7.00-7.00		N = 77 (7, 18, 20, 25, 20, 12)	
8					AF1916	B	8.00-8.00		N = 69 (6, 12, 16, 20, 20, 13)	
9					AF1917	B	9.00-9.00		N = 18 (6, 6, 5, 5, 5, 3)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
16.2	16.5	1	Boulder
17	17.5	2	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
5.50	5.50	No	3.10	5	Rapid

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15-07-08	2.00	2.00	-	End of shift
16-07-08	2.00	2.00	-	Start of shift
16-07-08	7.00	7.00	4.50	End of shift
17-07-08	7.00	7.00	4.50	Start of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
22-07-08	13.50	12.00	13.50	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Falling and rising head tests completed. Standing from 24th to 28th July - No access

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH9**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	15/07/2008
		DATE COMPLETED	23/07/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	17.50
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	17.50
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Very dense grey brown slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. *(continued)* No CPT as gravel blowing up casing				AF1918	B	10.00-10.00			
11					AF1919	B	11.00-11.00		N = 41 (11, 13, 11, 10, 10, 10)	
12					AF1920	B	12.00-12.00		N = 43 (7, 5, 8, 8, 13, 14)	
13					AF1921	B	13.00-13.00		N = 78 (6, 6, 10, 18, 25, 25)	
	Hard dark brown slightly sandy gravelly CLAY with occasional cobbles.			13.50						
14					AF1922	B	14.00-14.00		N = 68 (6, 11, 15, 17, 19, 17)	
	Very dense grey brown slightly sandy GRAVEL with some cobbles. Gravel is medium to coarse and subrounded to subangular of limestone.			14.20	AF1923	B	14.40-14.40			
				14.50	Failed	U	14.50-14.50	0% rec 100 blows		
15	Hard dark brown slightly sandy gravelly CLAY with occasional cobbles.				AF1924	B	15.00-15.00		N = 45/150 mm (20, 35, 20, 25)	
16	Very dense grey brown slightly sandy GRAVEL with some cobbles. Gravel is medium to coarse and subrounded to subangular of limestone.			15.90	AF1925	B	16.00-16.00			
	Hard black slightly sandy gravelly CLAY with occasional cobbles.			16.50	AF1828	B	16.80-16.80			
17	Obstuction - possible boulder			17.00	AF1829	B	17.10-17.10		N = 100 (8, 12, 20, 30, 30, 20)	
	End of Borehole at 17.50 m			17.50						
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
16.2	16.5	1	Boulder
17	17.5	2	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
17-07-08	13.00	13.00	5.00	End of shift
18-07-08	13.00	13.00	4.60	Start of shift
18-07-08	16.50	16.50	5.80	End of shift
21-07-08	16.50	16.50	4.65	Start of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
22-07-08	13.50	12.00	13.50	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Falling and rising head tests completed. Standing from 24th to 28th July - No access

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
		DATE STARTED	30/07/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE COMPLETED	13/08/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	15.45
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	15.45
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of concrete.			0.10						
	MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick.				AF1830	B	1.00-1.00			
1										
2					AF1831	B	2.00-2.00		N = 6 (1, 1, 2, 1, 1, 2)	
3	Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			3.00	AF1832	B	3.00-3.00		N = 51 (8, 18, 16, 11, 17, 7)	
4					AF1833	B	4.00-4.00		N = 30 (3, 5, 7, 7, 8, 8)	
5					AF1834	B	5.00-5.00		N = 50 (8, 8, 14, 14, 12, 10)	
	Dense grey slightly clayey/silty sandy GRAVEL with many cobbles. GRAVEL is fine to coarse and subrounded to subangular of limestone.			5.50						
6					AF1835	B	6.00-6.00		N = 28 (4, 6, 6, 7, 7, 8)	
7	Very stiff black slightly sandy gravelly CLAY with occasional cobbles			6.80	AF1836	B	7.00-7.00		N = 56 (3, 15, 18, 12, 11, 15)	
	Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			7.50						
8					AF1837	B	8.00-8.00		N = 100/225 mm (15, 24, 25, 30, 45)	
9					AF1838	B	9.00-9.00		N = 52 (7, 9, 14, 15, 13, 10)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
8	11	8	Hard Strata Boring
11	14.5	8	Hard Strata Boring
15.4	15.45	2	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.00	8.00	No	6.50	20	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
30-07-08	6.00	6.00	4.80	End of shift
08-08-08	6.00	6.00	4.80	Start of shift
08-08-08	8.00	8.00	6.10	End of shift
11-08-08	8.00	8.00	4.55	Start of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 9.5m to 10.5m and 11.5m to 12.0m bgl. Falling and rising head test completed. Standing 5.5 days - stopped by Client due to Landowner request.

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**RIG TYPE**	Dando 150
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	30/07/2008
		DATE COMPLETED	13/08/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	15.45
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	15.45
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. *(continued)*				AF1839	B	10.00-10.00		N = 76 (9, 13, 16, 24, 19, 17)	
11					AF1840	B	11.00-11.00		N = 100/160 mm (13, 39, 50, 40, 10)	
12					AF1841	B	12.00-12.00		N = 100/170 mm (12, 30, 40, 45, 15)	
13					AF1842	B	13.00-13.00		N = 100/125 mm (12, 23, 62, 38)	
14	Hard black slightly sandy gravelly CLAY with occasional cobbles.			13.80	AF1843	B	14.00-14.00		N = 100/230 mm (4, 10, 20, 35, 40, 5)	
15					AF1844	B	15.00-15.00		N = 100/75 mm (12, 43, 100)	
	Obstuction - possible boulder			15.40	AF1845	B	15.45-15.45			
	End of Borehole at 15.45 m			15.45						
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
8	11	8	Hard Strata Boring
11	14.5	8	Hard Strata Boring
15.4	15.45	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 9.5m to 10.5m and 11.5m to 12.0m bgl. Falling and rising head test completed. Standing 5.5 days - stopped by Client due to Landowner request.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11-08-08	11.00	11.00	4.90	End of shift
12-08-08	11.00	11.00	4.60	Start of shift
12-08-08	14.50	14.50	5.60	End of shift
13-08-08	14.50	14.50	4.50	Start of shift
13-08-08	15.45	15.45	5.60	End of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH12**
		SHEET	Sheet 1 of 2
CO-ORDINATES		**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	12/10/2008
		DATE COMPLETED	16/10/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	13.60
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	13.60
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete.									
1					AF4857	B	1.00-1.00		N = 14 (2, 2, 3, 3, 4, 4)	
2					AF4858	B	2.00-2.00		N = 11 (2, 2, 2, 3, 3, 3)	
3					AF4859	B	3.00-3.00		N = 30 (4, 8, 10, 8, 6, 6)	
	Firm becoming stiff brown slightly sandy gravelly CLAY with occasional cobbles.			3.40						
4					AF4860	B	4.00-4.00		N = 17 (4, 3, 4, 4, 4, 5)	
5					AF4861	B	5.00-5.00		N = 34 (4, 6, 8, 8, 9, 9)	
	Very stiff becoming hard black slightly sandy gravelly CLAY with occasional cobbles			6.00						
6					AF4862	B	6.00-6.00		N = 49 (6, 6, 9, 10, 12, 18)	
7					AF4863	B	7.00-7.00		N = 100/200 mm (14, 20, 35, 35, 30)	
8					AF4864	B	8.00-8.00		N = 54 (6, 8, 12, 12, 14, 16)	
9					AF4865	B	9.00-9.00		N = 55 (7, 8, 11, 14, 14, 16)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
7.1	7.5	1	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-10-08	1.20	1.20	-	End of shift
13-10-08	1.20	1.20	-	Start of shift
14-10-08	7.00	7.00	-	End of shift
14-10-08	7.00	7.00	6.70	Start of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-10-08	13.60	11.50	13.60	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Night work - shift started at 1800hrs.

BH LOG DCD 13696.GPJ IGSL.GDT 5/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH12**
		SHEET	Sheet 2 of 2
CO-ORDINATES		**RIG TYPE**	Dando 2000
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	13.60
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	13.60
		DATE STARTED	12/10/2008
		DATE COMPLETED	16/10/2008
		BORED BY	J. McDonnell
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
10	Very stiff becoming hard black slightly sandy gravelly CLAY with occasional cobbles *(continued)*				AF4866	B	10.00-10.00		N = 100/50 mm (8, 42, 100)	
11					AF4867	B	11.00-11.00		N = 100/90 mm (10, 38, 80, 20)	
12	Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			11.50	AF4868	B	12.00-12.00		N = 68 (9, 11, 15, 16, 18, 19)	
13	Hard black slightly sandy gravelly CLAY with occasional cobbles			12.50	AF4869	B	13.00-13.00		N = 100/150 mm (22, 35, 40, 60)	
	Obstuction - possible boulder			13.50						
14	End of Borehole at 13.60 m			13.60						
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
13.5	13.6	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-10-08	13.60	11.50	13.60	50mm SP

REMARKS Hand dug inspection pit excavated to 1.20m. Night work - shift started at 1800hrs.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
11.50	11.50	No	10.50	20	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15-10-08	12.50	12.50	11.50	End of shift
15-10-08	12.50	12.50	11.50	Start of shift
16-10-08	13.60	13.60	13.00	End of shift

BH LOG DCD 13696.GPJ IGSL.GDT 5/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**W2**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**RIG TYPE**	Dando 3000
		DATE STARTED	25/09/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	
		DATE COMPLETED	10/10/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.40
		BORED BY	J. Edwards / J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete.				AG3601	B	0.50-0.50			
	MADE GROUND consisting of concrete.			0.60						
1	MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete.			0.90	AG3602	B	1.00-1.00			
2					AG3603	B	2.00-2.00			
3					AG3604	B	3.00-3.00			
4					AG3605	B	4.00-4.00			
	Grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			4.20						
5					AG3606	B	5.00-5.00			
6					AG3607	B	6.00-6.00			
	Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to subangular of limestone.			6.50						
7					AG3608	B	7.00-7.00			
8					AG3609	B	8.00-8.00			
9					AG3610	B	9.00-9.00			

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.7	1.8	1	Made Ground Obstruction
2.1	2.2	1	Made Ground Obstruction
3.1	3.2	0.75	Made Ground Obstruction
4.8	4.9	1	Boulder
5.2	5.3	1	Boulder
5.7	5.8	1	Boulder
6	8	10	6.5hrs Chiselling 3.5hrs Hard Strata Boring
8	9	10	7hrs Chiselling 3hrs Hard Strata Boring
9	11	10	7.5hrs Chiselling 2.5hrs Hard Strata Boring

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.80	4.80	No	4.30	20	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
25-09-08	2.00	2.00	-	End of shift
26-09-08	2.00	2.00	-	Start of shift
26-09-08	6.00	6.00	5.50	End of shift
27-09-08	6.00	6.00	5.40	Start of shift
27-09-08	8.00	8.00	5.00	End of shift
28-09-08	8.00	8.00	4.20	Start of shift
28-09-08	9.00	9.00	4.80	End of shift
29-09-08	9.00	9.00	4.50	Start of shift

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 4.9m to 6m bgl. Casing size reduced from 300mm to 250mm diameter at 14.0m bgl. Casing left in borehole to allow rotary follow on. ~~Re set up rig on 09/10/08 to advance hole after rotary rig~~ advanced to rockhead and gravel falling in behind hammer.

BH LOG DCD 13696.GPJ IGSL.GDT 5/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**W2**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**RIG TYPE**	Dando 3000
		DATE STARTED	25/09/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	
		DATE COMPLETED	10/10/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.40
		BORED BY	J. Edwards / J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to subangular of limestone. *(continued)*				AG3611	B	10.00-10.00			
11					AG3612	B	11.00-11.00			
	Grey slightly clayey/silty sandy GRAVEL with many cobbles and bands of dark grey clay. Gravel is medium to coarse and subrounded to subangular of limestone.			11.20						
				11.40						
12	Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to subangular of limestone.				AG3613	B	12.00-12.00			
13					AG3614	B	13.00-13.00			
14					AG3615	B	14.00-14.00			
15					AG3616	B	15.00-15.00			
	Brown slightly sandy gravelly CLAY with occasional cobbles			15.50						
16					AG3617	B	16.00-16.00			
	Black slightly sandy gravelly CLAY with occasional cobbles Re-set up rig after rotary rig advanced to rockhead - gravel falling behind hammer so must be cased off.			16.40						
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
11	12.2	10	7hrs Chiselling 3hrs Hard Strata Boring
12.2	14	10	7hrs Chiselling 3hrs Hard Strata Boring
14	16	10	6hrs Chiselling 4hrs Hard Strata Boring
16	16.2	2	Hard Strata Boring
16.2	16.4	3	Boulder
16.4	19.5	8	1hr Chiselling 7hrs Hard Strata Boring
19.5	21.4	8	2hrs Chiselling 6hrs Hard Strata Boring

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 4.9m to 6m bgl. Casing size reduced from 300mm to 250mm diameter at 14.0m bgl. Casing left in borehole to allow rotary follow on. ~~Re-set up rig on 09/10/08 to advance hole after rotary rig~~ advanced to rockhead and gravel falling in behind hammer.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
29-09-08	11.00	11.00	4.80	End of shift
30-09-08	11.00	11.00	4.50	Start of shift
30-09-08	12.20	12.20	4.80	End of shift
01-10-08	12.20	12.20	4.80	Start of shift
01-10-08	14.00	14.00	5.00	End of shift
02-10-08	14.00	14.00	4.50	Start of shift
02-10-08	16.00	16.00	5.00	End of shift
03-10-08	16.00	16.00	4.50	Start of shift
03-10-08	16.40	16.40	4.90	End of shift
09-10-08	16.40	16.40	4.80	Start of shift
09-10-08	19.50	19.50	5.10	End of shift
10-10-08	19.50	19.50	4.90	Start of shift

BH LOG DCD 13696.GPJ IGSL.GDT 5/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**W2**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**RIG TYPE**	Dando 3000
		DATE STARTED	25/09/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	
		DATE COMPLETED	10/10/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.40
		BORED BY	J. Edwards / J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
20	Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to subangular of limestone.			20.00						
21	Obstuction - rockhead			21.30						
	End of Borehole at 21.40 m			21.40						
22										
23										
24										
25										
26										
27										
28										
29										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-10-08	21.40	21.40	5.00	End of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 4.9m to 6m bgl. Casing size reduced from 300mm to 250mm diameter at 14.0m bgl. Casing left in borehole to allow rotary follow on. ~~Re set up rig on 09/10/08 to advance hole after rotary rig~~ advanced to rockhead and gravel falling in behind hammer.

BH LOG DCD 13696 GPJ IGSL.GDT 5/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH14**
		SHEET	Sheet 1 of 2
CO-ORDINATES( )	**RIG TYPE** Dando 2000	**DATE STARTED**	09/11/2008
GROUND LEVEL (m AOD)	**BOREHOLE DIAMETER (mm)** 200	**DATE COMPLETED**	13/11/2008
CLIENT Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)** 12.00	**BORED BY**	J. McDonnell
ENGINEER AGL Consulting Ltd	**CASING DEPTH (m)** 12.00	**PROCESSED BY**	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of granite cobblelock.			0.10						
	MADE GROUND consisting of concrete.			0.20						
	MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete.									
1					AF4832	ENV B	1.00-1.00 1.00-1.00		N = 18 (3, 3, 5, 5, 4, 4)	
2					AF4833	ENV B	2.00-2.00 2.00-2.00		N = 12 (2, 2, 3, 3, 3, 3)	
3					AF4834	ENV B	3.00-3.00 3.00-3.00		N = 11 (2, 2, 2, 3, 3, 3)	
	Stiff brown slightly sandy gravelly CLAY.			3.20						
4					AF4835	ENV B	4.00-4.00 4.00-4.00		N = 22 (3, 3, 5, 5, 6, 6)	
5	Very stiff brown slightly sandy very gravelly CLAY.			5.00	AF4836	B	5.00-5.00		N = 57 (8, 14, 16, 16, 15, 10)	
6					AF4837	B	6.00-6.00		N = 84 (14, 20, 20, 24, 20, 20)	
	Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			6.50						
7					AF4838	B	7.00-7.00		N = 84 (9, 14, 15, 19, 20, 30)	
8					AF4839	B	8.00-8.00		N = 100/225 mm (14, 21, 30, 30, 40)	
9					AF4840	B	9.00-9.00		N = 100/275 mm (12, 16, 20, 20, 32, 28)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
8.1	8.3	1	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.60	6.60	No	5.00	5	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-11-08	6.50	6.50	-	End of shift
11-11-08	6.50	6.50	6.00	Start of shift
12-11-08	9.70	9.70	5.60	End of shift
13-11-08	9.70	9.70	5.40	Start of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Night work - shift started at 1800hrs to accommodate Moore Street traders. Shift finished at 2300hrs due to T2 licence restrictions. Standing 5 hours each day totalling 20 hours standing. 2 No. Falling and 1 No. Rising head test completed. Casing left in borehole to allow rotary follow on.

BH LOG DCD 13696.GPJ IGSL.GDT 26/11/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH14**
		SHEET	Sheet 2 of 2
CO-ORDINATES( )	**RIG TYPE** Dando 2000	**DATE STARTED**	09/11/2008
GROUND LEVEL (m AOD)	**BOREHOLE DIAMETER (mm)** 200	**DATE COMPLETED**	13/11/2008
CLIENT Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)** 12.00	**BORED BY**	J. McDonnell
ENGINEER AGL Consulting Ltd	**CASING DEPTH (m)** 12.00	**PROCESSED BY**	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. *(continued)*				AF4841	B	10.00-10.00		N = 82 (9, 13, 16, 19, 22, 25)	
11					AF4842	B	11.00-11.00		N = 100/225 mm (15, 19, 35, 31, 34)	
12	End of Borehole at 12.00 m			12.00						
13										
14										
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
11.9	12	1.25	Boulder

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
13-11-08	12.00	12.00	5.50	End of shift

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Night work - shift started at 1800hrs to accommodate Moore Street traders. Shift finished at 2300hrs due to T2 licence restrictions. Standing 5 hours each day totalling 20 hours standing. 2 No. Falling and 1 No. Rising head test completed. Casing left in borehole to allow rotary follow on.

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH15**
		SHEET	Sheet 1 of 3
CO-ORDINATES		**RIG TYPE**	Dando 150
		DATE STARTED	15/09/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE COMPLETED	24/09/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.20
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	21.20
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND consisting of tarmacadam.									
	MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick, ash and concrete.			0.20						
1					AF4821	B	1.20-1.20		N = 4 (1, 1, 1, 1, 1, 1)	
2					AF4822	B	2.00-2.00		N = 7 (1, 2, 2, 2, 1, 2)	
3					AF4823	B	3.00-3.00		N = 17 (4, 4, 4, 3, 2, 8)	
	Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.			3.50						
4					AF4824	B	4.00-4.00		N = 111 (12, 16, 25, 30, 27, 29)	
5					AF4825	B	5.00-5.00		N = 100/150 mm (35, 48, 52)	
6					AF4826	B	6.00-6.00		N = 119 (15, 22, 30, 29, 27, 33)	
7					AF4827	B	7.00-7.00		N = 17 (4, 6, 4, 5, 4, 4)	
8					AF4828	B	8.00-8.00		N = 56 (6, 9, 11, 16, 15, 14)	
9					AF4829	B	9.00-9.00		N = 87 (9, 11, 16, 25, 20, 26)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.5	3.8	0.5	Boulder
3.9	4	0.5	Boulder
4.8	5	1	Boulder
5.8	6	0.5	Boulder
11	14.4	8	Hard Strata Boring
14.4	16.7	8	Hard Strata Boring
16.7	18.5	8	Hard Strata Boring
18.5	21	6	Hard Strata Boring
21	21.2	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.00	6.00	No	4.70	5	Moderate

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15-09-08	3.50	3.50	-	End of shift
16-09-08	3.50	3.50	-	Start of shift
16-09-08	6.00	6.00	-	End of shift
17-09-08	6.00	6.00	-	Start of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH15**
		SHEET	Sheet 2 of 3
CO-ORDINATES		**RIG TYPE**	Dando 150
		DATE STARTED	15/09/2008
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE COMPLETED	24/09/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.20
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	21.20
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. *(continued)*				AF4830	B	10.00-10.00		N = 54 (7, 10, 11, 11, 17, 15)	
11					AF4831	B	11.00-11.00		N = 47 (3, 5, 9, 9, 14, 15)	
12					AF4832	B	12.00-12.00		N = 69 (5, 7, 20, 15, 16, 18)	
13					AF4833	B	13.00-13.00		N = 100/150 mm (3, 11, 26, 74)	
14					AF4834	B	14.00-14.00			
	Hard black slightly sandy gravelly CLAY with occasional cobbles			14.40	AF4835	U	14.50-14.50	1% rec 150 blows		
15					AF4836	B	15.50-15.50		N = 100/240 mm (11, 15, 20, 25, 45, 10)	
16					AF4837	B	16.50-16.50		N = 100 (10, 15, 19, 24, 30, 27)	
17					AF4838	B	17.50-17.50		N = 100/150 mm (20, 29, 40, 60)	
18					AF4839	B	18.50-18.50		N = 100/210 mm (12, 26, 34, 37, 29)	
19					AF4840	B	19.50-19.50		N = 100/180 mm (12, 30, 36, 44, 20)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.5	3.8	0.5	Boulder
3.9	4	0.5	Boulder
4.8	5	1	Boulder
5.8	6	0.5	Boulder
11	14.4	8	Hard Strata Boring
14.4	16.7	8	Hard Strata Boring
16.7	18.5	8	Hard Strata Boring
18.5	21	6	Hard Strata Boring
21	21.2	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
17-09-08	11.00	11.00	5.50	End of shift
18-09-08	11.00	11.00	5.50	Start of shift
18-09-08	14.40	14.40	5.80	End of shift
19-09-08	14.40	14.40	5.80	Start of shift
19-09-08	16.70	16.70	6.40	End of shift
22-09-08	16.70	16.70	6.10	Start of shift
22-09-08	18.50	18.50	6.50	End of shift
23-09-08	18.50	18.50	6.40	Start of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL BORING RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**BOREHOLE NO.**	**BH15**
		SHEET	Sheet 3 of 3
CO-ORDINATES		**RIG TYPE**	Dando 150
GROUND LEVEL (m AOD)		**BOREHOLE DIAMETER (mm)**	200
		DATE STARTED	15/09/2008
		DATE COMPLETED	24/09/2008
CLIENT	Dublin Central Developments Ltd	**BOREHOLE DEPTH (m)**	21.20
		BORED BY	J. McDonnell
ENGINEER	AGL Consulting Ltd	**CASING DEPTH (m)**	21.20
		PROCESSED BY	S. Letch

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
20	Hard black slightly sandy gravelly CLAY with occasional cobbles *(continued)*				AF4841	B	20.50-20.50		N = 100/175 mm (13, 29, 35, 42, 23)	
21	End of Borehole at 21.20 m			21.20						
22										
23										
24										
25										
26										
27										
28										
29										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.5	3.8	0.5	Boulder
3.9	4	0.5	Boulder
4.8	5	1	Boulder
5.8	6	0.5	Boulder
11	14.4	8	Hard Strata Boring
14.4	16.7	8	Hard Strata Boring
16.7	18.5	8	Hard Strata Boring
18.5	21	6	Hard Strata Boring
21	21.2	2	Boulder

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
23-09-08	21.20	21.20	6.00	End of shift

BH LOG DCD 13696.GPJ IGSL.GDT 1/10/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**OW1**
		SHEET	Sheet 1 of 4
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	
		DATE STARTED	15/09/2008
		DATE COMPLETED	16/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								Inspection Pit - observed by driller as made ground consisting of gravel and cobbles.	1.20				
1								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as madeground consisting of brick, wood and clay.	4.20				
2													
3													
4								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel					
5													
6													
7													
8													
9													

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-09-08	13.50	10.50	13.50	50mm SP
16-09-08	33.00	27.00	33.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**OW1**
		SHEET	Sheet 2 of 4
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	
		DATE STARTED	15/09/2008
		DATE COMPLETED	16/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel *(continued)*					
11													
12													
13									13.20				
14								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clay and gravel					
15													
16									16.20				
17								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clay					
18													
19									19.20				

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-09-08	13.50	10.50	13.50	50mm SP
16-09-08	33.00	27.00	33.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	OW1
		SHEET	Sheet 3 of 4
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	
		DATE STARTED	15/09/2008
		DATE COMPLETED	16/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
20								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clay and gravel *(continued)*	20.70				
21								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel and cobbles.	21.50				
22								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of weathered rock	22.00				
23								OPEN HOLE DRILLING: No recovery, observed by driller as returns of rock.					
24													
25													
26													
27													
28													
29													

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-09-08	13.50	10.50	13.50	50mm SP
16-09-08	33.00	27.00	33.00	50mm SP

IGSL RC NEWLOG 10M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**OW1**
		SHEET	Sheet 4 of 4
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	
		DATE STARTED	15/09/2008
		DATE COMPLETED	16/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
30								OPEN HOLE DRILLING: No recovery, observed by driller as returns of rock. *(continued)*					
31													
32													
33									33.00				
								End of Corehole at 33 (m)					
34													
35													
36													
37													
38													
39													

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
16-09-08	13.50	10.50	13.50	50mm SP
16-09-08	33.00	27.00	33.00	50mm SP

IGSL RC NEWLOG 10M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 1 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		DATE STARTED	13/09/2008
		CORE DIAMETER (mm)	102
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								Inspection Pit - observed by driller as made ground consisting of gravel, sand, brick and timber.					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 2 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
1								Inspection Pit - observed by driller as made ground consisting of gravel, sand, brick and timber. *(continued)*	1.20				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay with cobbles					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 4 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
3								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 5 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
4								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay *(continued)*	4.20				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel.					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 6 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
5								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 7 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		INCLINATION	-90
CLIENT	Dublin Central Developments Ltd.	**FLUSH**	Polymer Gel
ENGINEER	AGL Consulting Engineers	**DATE STARTED**	13/09/2008
		DATE COMPLETED	14/09/2008
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
6								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 8 of 33
CO-ORDINATES(_)	**GROUND LEVEL (m)**	**DATE STARTED**	13/09/2008
	CORE DIAMETER (mm) 102	**DATE COMPLETED**	14/09/2008
CLIENT Dublin Central Developments Ltd.	**INCLINATION** -90	**DRILLED BY**	Millennium
ENGINEER AGL Consulting Engineers	**FLUSH** Polymer Gel	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
7								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 9 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		INCLINATION	-90
		FLUSH	Polymer Gel
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**DRILLED BY**	Millennium
ENGINEER	AGL Consulting Engineers	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
8								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 10 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
9								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 11 of 33
CO-ORDINATES(_)	**GROUND LEVEL (m)**	**DATE STARTED**	13/09/2008
	CORE DIAMETER (mm) 102	**DATE COMPLETED**	14/09/2008
CLIENT Dublin Central Developments Ltd.	**INCLINATION** -90	**DRILLED BY**	Millennium
ENGINEER AGL Consulting Engineers	**FLUSH** Polymer Gel	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 12 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
11								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. *(continued)*					
									11.70				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay.					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 13 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
12								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 14 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
13								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 15 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		INCLINATION	-90
CLIENT	Dublin Central Developments Ltd.	**FLUSH**	Polymer Gel
ENGINEER	AGL Consulting Engineers	**DATE STARTED**	13/09/2008
		DATE COMPLETED	14/09/2008
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
14								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. *(continued)*					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 16 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
15	15.00							SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. *(continued)*	16.00				

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 17 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
16	16.00							Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded)					N = 100/80 mm (10, 15, 30, 60, 10)
		100	0	0									

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 18 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
17	17.00								17.05				N = 55/31 mm (25, 45, 55)
		100	0	0				Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded)					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 19 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
18	18.00							Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded) *(continued)*					
		100	0	0									
	18.50												N = 50/20 mm (25, 50, 50)

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 20 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
19								Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded) *(continued)*					
		100	0	0					19.40				
								Firm (19.4-19.6) to soft green brown SILT					
	19.90								19.90				
		100	0	0				Firm slightly gravelly green brown CLAY	20.00				

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 21 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
20	20.00							Mottled brown black clayey, very gravelly SAND (medium grained) with local cobbles. Gravel is predominantly coarse and rounded to sub-angular.					N = 39/30 mm (25, 61, 39)
		100	31	26					20.80	Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.			

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 22 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
21								Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. *(continued)*		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°. *(continued)*			
	21.50								21.87				
								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally		Discontinuities are smooth and planar, and clay smeared throughout. Dips are sub-10° with hairline and insipient clay smeared fractures throughout.			

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 23 of 33
CO-ORDINATES(_)	**GROUND LEVEL (m)**	**DATE STARTED**	13/09/2008
	CORE DIAMETER (mm) 102	**DATE COMPLETED**	14/09/2008
CLIENT Dublin Central Developments Ltd.	**INCLINATION** -90	**DRILLED BY**	Millennium
ENGINEER AGL Consulting Engineers	**FLUSH** Polymer Gel	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
22								moderately weathered. Pyrite dispersed. Incipient fractures common. Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. *(continued)*		Discontinuities are smooth and planar, and clay smeared throughout. Dips are sub-10° with hairline and insipient clay smeared fractures throughout. *(continued)*			
		100	0	0									
	22.80												
		100	0	0									

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 24 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
23								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. *(continued)*		Discontinuities are smooth and planar, and clay smeared throughout. Dips are sub-10° with hairline and insipient clay smeared fractures throughout. *(continued)*			
	23.10								23.46				
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.		Discontinuities are smooth and planar. Dips are sub-10° with local sub-70° calcite fracture.			
		100	57	50									

540

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 25 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
24								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. *(continued)*	24.37	Discontinuities are smooth and planar. Dips are sub-10° with local sub-70° calcite fracture. *(continued)*			
								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.	24.49	Discontinuities are smooth and planar and locally clay smeared. Dips are sub-10° with hairline fractures.			
	24.60	100	0	0				Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	24.80	Discontinuities are smooth and planar and clay smeared. Dips are sub-10° with sub vertical fractures.			
	24.80							Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.			

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 26 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
25								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. *(continued)*	25.21	Discontinuities are smooth and planar and clay smeared. Dips are sub-10°. *(continued)*			
		100	75	45				Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	25.72	Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.			
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.			

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 27 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Discontinuities
26							Discontinuities are smooth and planar and clay smeared. Dips are sub-10°. *(continued)*
						26.11	
					Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.		Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.
	26.30					26.32	
		100	30	0	Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.		Discontinuities are smooth and planar and slightly clay smeared. Dips are sub-10° with iron oxide stained sub-vertical fracture.
	26.60						

Fracture Spacing (mm): 0 250 500

Legend; Non-intact zones (shaded); Elevation; Standpipe Details; SPT (N Value)

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 28 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
27								Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. *(continued)*		Discontinuities are smooth and planar and slightly clay smeared. Dips are sub-10° with iron oxide stained sub-vertical fracture. *(continued)*			
		100	61	7					27.52				
								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.			

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 29 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
28	28.00							Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. *(continued)*		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°. *(continued)*			
		100	58	0									
	28.40								28.42				
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.		Discontinuities are smooth and planar. Dips are sub-10°.			
		100	83	69	760								

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 30 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Discontinuities
29							Discontinuities are smooth and planar. Dips are sub-10°. *(continued)*
						29.17	
					Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.
						29.28	
					Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.		Discontinuities are smooth and planar and clay smeared. Dips are sub-10°.
						29.46	
	29.50				Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.		Discontinuities are smooth to slightly rough and clay smeared. Non-intact.
							Discontinuities are smooth and slightly undulose. Dips are sub-10°.
						29.79	
		100	27	27	Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.		Discontinuities are smooth and planar. Dips are sub-10° with undulose sub-vertical fracture.

Fracture Spacing (mm): 0 250 500

Legend; Non-intact zones (shaded); Elevation; Standpipe Details; SPT (N Value)

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC08
		SHEET	Sheet 31 of 33
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	INCLINATION	-90
ENGINEER	AGL Consulting Engineers	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
30								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. *(continued)*		Discontinuities are smooth and planar. Dips are sub-10° with undulose sub-vertical fracture. *(continued)*			
	30.10								30.26				
								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common.		Discontinuities are smooth and planar with local clay gravel infill (30.32-30.34m, 30.47-30.48m). Dips are sub-10°.			
									30.51				
		100	76	58	510			Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.		Discontinuities are smooth and planar, slightly clay smeared. Dips are sub-10°.			
									30.95				

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 32 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
31	31.00							Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. *(continued)*	31.02	Discontinuities are smooth to slightly rough and clay smeared. Non-intact.			
								Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.	31.19	Discontinuities are smooth and planar. Dips are sub-10° with undulose sub-vertical calcite vein fracture.			
		100	17	0				Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout.	31.42	Discontinuities are smooth and planar. Dips are sub-10° with undulose sub-vertical calcite vein fracture.			
	31.70							Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	31.72				
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	31.99				

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 33 of 33
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	13/09/2008
		DATE COMPLETED	14/09/2008
CLIENT	Dublin Central Developments Ltd.	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Engineers	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
32								Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. *(continued)*		Discontinuities are smooth and planar. Dips are sub-10°. *(continued)*			
		100	50	50					32.11	Discontinuities are smooth and planar. Dips are sub-10° with sub-vertical calcite vein fracture. Pyrite lense 32.34m			
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	32.35	Discontinuities are smooth and planar. Dips are sub-10°.			
	32.50							Strong to moderately strong, thin to medium bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining.	32.50				
								End of Corehole at 32.5 (m)					

REMARKS

Hand dug inspection pit to 1.2m.

INSTALLATION REMARKS

Headworks.

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
14-09-08	13.00	6.00	13.00	50mm SP
14-09-08	32.50	26.50	32.50	50mm SP

IGSL RC NEWLOG 1M PER PG 13696.GPJ IGSL.GDT 11/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 1 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		DATE STARTED	18/11/2008
		CORE DIAMETER (mm)	102
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
0								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of fill (concrete, brick, black/brown clay					
1									1.20				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles					

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 2 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
2								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles *(continued)*	2.50				
								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay					N = 4 (20, 5, 1, 1, 1, 1)
3													

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 3 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
4								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay *(continued)*					N = 22 (1, 12, 8, 6, 1, 7)
5													N = 45 (1, 4, 7, 9, 12, 17)

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC16
		SHEET	Sheet 4 of 15
CO-ORDINATES(_)		DATE STARTED	18/11/2008
GROUND LEVEL (m)		DATE COMPLETED	19/11/2008
CORE DIAMETER (mm)	102		
CLIENT	Dublin Central Developments Ltd	INCLINATION	-90
ENGINEER	AGL Consulting Ltd	DRILLED BY	Millennium
FLUSH	Polymer Gel	LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
6								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay *(continued)*					
7													N = 41 (1, 2, 2, 4, 15, 20)

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 5 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
8								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay *(continued)*					N = 46 (2, 4, 8, 10, 12, 16)
9									10.00				

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 6 of 15
CO-ORDINATES(_)	**GROUND LEVEL (m)**	**DATE STARTED**	18/11/2008
	CORE DIAMETER (mm) 102	**DATE COMPLETED**	19/11/2008
CLIENT Dublin Central Developments Ltd	**INCLINATION** -90	**DRILLED BY**	Millennium
ENGINEER AGL Consulting Ltd	**FLUSH** Polymer Gel	**LOGGED BY**	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
10	10.00							Clayey GRAVEL (rounded and coarse).	10.20				N = 50 (2, 3, 3, 11, 17, 19)
		87	0	0				Dark brown, firm, sandy gravelly CLAY. Gravel is rounded and medium grained.	10.85				
	10.40							Dark brown, slightly gravelly (fine) SAND (medium to fine)	11.10				
11		100	0	0				Dark brown, firm to stiff, slightly sandy, gravelly CLAY. Gravel is fine to medium, sub-angular to sub-rounded.	11.90				
	11.90												

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 7 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
12													
		100	0	0				Dark brown, firm to stiff, slightly sandy, gravelly CLAY with occasional cobbles. Gravel is fine to coarse, sub-angular to sub-rounded. Loss of recovery 0.2m. *(continued)*					
	12.30								12.60				
								Very clayey (brown/black) gravelly cobbles of argillaceous LIMESTONE (probable moderate to highly weathered bedrock).					
13									13.03				
		100	41	9				Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly weathered with incipient fractures.		Discontinuities are smooth and planar. Clay smeared and slightly iron oxide stained (13.51m-13.7m) Dips are sub-10°.			
									13.70				
	13.90							Strong to locally moderately strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly weathered.		Discontinuities are smooth to slightly rough and planar. Iron oxide stained 13.7m-13.9m. Heavily clay smeared 13.9m-14.02m. Dips are sub-10°.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC16
		SHEET	Sheet 8 of 15
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	INCLINATION	-90
ENGINEER	AGL Consulting Ltd	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
14								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to slightly weathered with incipient fractures.	14.02	Non-Intact. Discontinuities are smooth and planar and heavily clay smeared. Dips are sub-10° with variable fractures.			
									14.28				
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh.		Discontinuities are smooth and planar. Dips are sub-10°.			
									14.48				
		100	43	29				Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh		Discontinuities are smooth and planar. Clay smeared 14.48m-14.71m. Dips are sub-10°.			
									14.90				
15								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered.	15.01	Discontinuities are smooth and planar. Clay smeared 15.01m. Dips are sub-10°.			
										Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			
								Strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly weathered. Pyrite lense 15.25m.	15.28	Discontinuities are smooth and planar. Dips are sub-10°.			
	15.40							Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh. Pyrite lense 15.36m.					
									15.84	Discontinuities are smooth and planar. Dips are sub-10°.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 9 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
16		100	94	82				Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered. *(continued)*		Discontinuities are smooth and planar. Dips are sub-10°. *(continued)*			
17	17.10	100	100	100				Strong to locally moderately strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE with argillaceous zones. Slightly weathered with sub-vertical calcite vein throughout.	17.20	Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC16
		SHEET	Sheet 10 of 15
CO-ORDINATES(_)		DATE STARTED	18/11/2008
GROUND LEVEL (m)		DATE COMPLETED	19/11/2008
CORE DIAMETER (mm)	102		
CLIENT	Dublin Central Developments Ltd	INCLINATION	-90
ENGINEER	AGL Consulting Ltd	DRILLED BY	Millennium
FLUSH	Polymer Gel	LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
18								Strong to locally moderately strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE with argillaceous zones. Slightly weathered with sub-vertical calcite vein throughout. *(continued)*		Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout. *(continued)*			
	18.20								18.92				
		100	100	91									
19	19.00							Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE (slightly siliceous). Fresh to locally slightly weathered. Pyrite lense 19.39m.		Discontinuities are smooth and planar. Dips are sub-10° with sub-vertical fractures 19.14m-19.39m.			
		100	43	33					19.68				
	19.80							Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh to locally slightly weathered. Incipient fractures common.	19.80	Discontinuities are smooth and planar. Dips are sub-10°. Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC NEWLOG 2M PER PG 13696.GPJ IGSL.GDT 28/11/08

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 11 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
20					610			Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE, locally argillaceous zones. Fresh. *(continued)*	20.41	Discontinuities are smooth to slightly rough and planar. Dips are sub-10°. *(continued)*			
		100	59	57				Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered.	20.88	Discontinuities are smooth and planar. Dips are sub-10° with sub-vertical fractures 20.7m-20.88m.			
21								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh. Pyrite lense 20.93 & 21.14m.	21.14	Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical fracture 20.88m-20.97m.			
	21.20							Moderately strong to moderately weak, thinly bedded, black, calcareous SHALE. Fresh to locally slightly weathered with incipient fractures.	21.42	Discontinuities are smooth and planar. Black clay infilled 21.2m-21.24m. Dips are sub-10°.			
								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered.		Discontinuities are smooth and planar. Dips are sub-10° with sub-vertical fractures 21.51-21.68m, 21.76m-21.92m and 22.45m-22.69m-clay smeared.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC16
		SHEET	Sheet 12 of 15
CO-ORDINATES(_)		DATE STARTED	18/11/2008
GROUND LEVEL (m)		DATE COMPLETED	19/11/2008
CORE DIAMETER (mm)	102		
CLIENT	Dublin Central Developments Ltd	INCLINATION	-90
ENGINEER	AGL Consulting Ltd	DRILLED BY	Millennium
FLUSH	Polymer Gel	LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
22		100	55	47				Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered. *(continued)*	22.70	Discontinuities are smooth and planar. Dips are sub-10° with sub-vertical fractures 21.51-21.68m, 21.76m-21.92m and 22.45m-22.69m-clay smeared. *(continued)*			
	22.90							Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to locally slightly weathered.	23.50	Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			
23		100	100	87									
	23.50							Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered. Pyrite lense 23.95m.	23.99	Discontinuities are smooth and planar. Clay smeared 23.5m-23.58m. Dips are sub-10°.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 13 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION**	-90
		DRILLED BY	Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH**	Polymer Gel
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
24								Moderately strong to moderately weak, thinly bedded to laminated, black, calcareous SHALE. Fresh *(continued)*	24.21	Discontinuities are smooth and planar. Dips are sub-10°. *(continued)*			
		100	91	73				Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered. Pyrite lense 24.35m & 24.8m.		Discontinuities are smooth and planar. Dips are sub-10°.			
	24.90								25.21				
25								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh.		Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			
		100	100	95					26.00				

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	DRILLHOLE NO	RC16
		SHEET	Sheet 14 of 15
CO-ORDINATES(_)		GROUND LEVEL (m)	
		CORE DIAMETER (mm)	102
		DATE STARTED	18/11/2008
		DATE COMPLETED	19/11/2008
CLIENT	Dublin Central Developments Ltd	INCLINATION	-90
ENGINEER	AGL Consulting Ltd	FLUSH	Polymer Gel
		DRILLED BY	Millennium
		LOGGED BY	A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
26								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh.	26.22	Discontinuities are smooth and planar. Dips are sub-10°.			
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh.	26.50	Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			
	26.50							Moderately strong to moderately weak, thinly bedded, black, calcareous SHALE. Fresh	26.56	Discontinuities are smooth and planar. Dips are sub-10°.			
27								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE with interbedded siliceous limestone. Fresh. Pyrite lense 27.0m.	27.25	Discontinuities are smooth and planar. Dips are sub-10°.			
		100	97	87				Moderately strong to moderately weak, thinly bedded, black, calcareous SHALE. Fresh	27.44	Discontinuities are smooth and planar. Dips are sub-10°.			
								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh.	27.78	Discontinuities are smooth and planar. Dips are sub-10°.			
								Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh.		Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 13696

CONTRACT	Dublin Central Development - Draft	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 15 of 15
CO-ORDINATES(_)		**GROUND LEVEL (m)**	**DATE STARTED** 18/11/2008
		CORE DIAMETER (mm) 102	**DATE COMPLETED** 19/11/2008
CLIENT	Dublin Central Developments Ltd	**INCLINATION** -90	**DRILLED BY** Millennium
ENGINEER	AGL Consulting Ltd	**FLUSH** Polymer Gel	**LOGGED BY** A. Mahony

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Discontinuities	Elevation	Standpipe Details	SPT (N Value)
28									28.10				
	28.10							Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh.	28.48	Discontinuities are smooth and planar. Dips are sub-10°.			
								Moderately strong to moderately weak, thinly bedded, black, calcareous SHALE. Fresh	28.70	Discontinuities are smooth and planar. Dips are sub-10°.			
		100	86	74				Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh.	29.25	Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.			
29								Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE. Fresh to locally slightly weathered.	29.80	Discontinuities are smooth and planar. Dips are sub-10°.			
	29.80							End of Corehole at 29.8 (m)					

REMARKS

18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto location.

INSTALLATION REMARKS

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
19-11-08	8.00	4.50	8.00	50mm SP
19-11-08	25.00	20.00	25.00	50mm SP

APPENDIX 3

Soil Sampling Protocol

STANDARD OPERATING PROCEDURE

SOIL SAMPLING

The soil sampling technique described below will be followed to ensure that soil samples are representative of the environment which they are intended to characterise.

1.0 SAMPLING

(A) Locate the soil sampling station in accordance with the workplan which will specify the number and type of samples to be taken. Place a wooden stake into the ground one metre from the sample location and record sample location on the stake.

(B) Record the location in the field logbook and, if possible, photograph the location.

(C) Collect soil samples from the depth specified in the workplan and record the depth in the field notebook. Describe the colour and texture of each sample and record in notebook.

(D) Wear appropriate level of protection when taking samples (gloves, safety glasses, hard hat etc.) as specified in the workplan. Collect soil samples as specified in the workplan using decontaminated stainless steel trowel, soil corer, or similar device. Collect discrete soil samples from each station.

(E) If required by the workplan, composite discreet soil samples by placing equal volumes of soil into the container and mixing thoroughly to a homogenous mixture. Samples may be hand picked, if necessary, to remove larger materials, such as leaves, sticks, gravel, rocks etc., if specified in the workplan. Record in notebook the nature of any materials removed from soil samples.

(F) Deposit each soil sampled into a (clean, pre-washed) container. At the time of collection, the sample bottle will be filled to the top with soil sample.

(G) Fill out labels with waterproof ink and attach to the sample container. The following information will be recorded on each sample label: -

- Client/Site Name
- Date Collected
- Time Collected
- Analysis
- Preservative
- Sample Identification Number

(H) Decontaminate sampling equipment as described below unless otherwise specified in the site workplan. When using stainless steel sampling equipment: -

- wash with non-phosphate detergent in potable water,
- rinse sequentially in potable water, methanol, acetone, methanol and D1 water and;
- allow to air dry in a containment free area.

(I) Wrap the decontaminated sampling equipment in aluminium foil which has been decontaminated in accordance with Section H.

2.0 FIELD DOCUMENTATION

Record sample information in the field notebook. Provide a complete description of the sample location, and a photograph, if necessary. Describe the soil appearance, especially if the presence of oil or an odour is noted. Document the sample bottle lot numbers in the field notebook. Record weather conditions at the time of sampling. The Field Team Leader will initial the logbook entries for correctness.

3.0 FIELD QA/QC SAMPLES

See the separate SOP on Field QA/QC samples for appropriateness and preparation of D1 Water Field Blanks, Cross-contamination Field Blanks, Trip Blanks and Field Duplicate Samples.

4.0 PACKAGING AND TRANSPORT

Check to be sure that all necessary information is on the sample container label. Complete the chain-of custody form. Package, label and transport the samples to the testing laboratory in accordance with requirements for packing, shipping and labelling environmental samples.

END.

APPENDIX 4

Groundwater Sampling Protocol

STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLING

The primary objective of groundwater sampling is to evaluate whether the potential contaminant sources at a site have impacted the quality of the groundwater in the underlying aquifer. The additional objective is to measure hydraulic gradient, or slope, of the water table in the shallow aquifer in an effort to evaluate the direction of groundwater flow.

The purpose of this procedure is to ensure that representative samples of groundwater are collected and documented using consistent methods to ensure sample integrity.

1.0 SAMPLING PROCEDURES

1.1 Well Operating and Purging Procedures

All groundwater sampling will be conducted after the installed and developed wells have been allowed to equilibrate for at least 2 to 3 days. A Field Data Sheet for Well Sampling will be completed for each well.

Groundwater sampling teams will use to following procedure for approaching, opening, purging and sampling all wells unless directed otherwise by the workplan.

1) Prior to placing any equipment into the well, decontaminate the sampling equipment according to standard decontamination protocol.

2) Approach the well with a working FID/PID , a well key, and a depth-to-water meter.

3) Unlock and open the well cap just enough to insert the probe of the PID/FID. Take and record a reading. A decision to upgrade PPE may be necessary based on the FID/PID readings in the breathing zone.

4) Where practical, the surface water column will be visually examined for the presence of hydrocarbons, if present or suspected, the thickness of the hydrocarbon layer will be measured using an oil/water interface probe prior to taking the depth-to-water measurement.

5) Insert the water level probe into the well and measure and record the static water level to the nearest 0.01 m with respect to the established survey point on top of the well casing.

6) Decontaminate the water level probe with DDI water (Do not rinse with any solvents unless product was encountered).

7) Calculate and record the minimum volume of water to be purged according to the following conversion factors: -

1 well volume	=	water column in metres x litres/linear metre
2 inch casing	=	2.0 LPM
4 inch casing	=	8.1 LPM
6 inch casing	=	18.2 LPM
8 inch casing	=	32.4 LPM

8) Purge the well of at least 3 casing volumes by pumping using a peristaltic pump with flow controller or bailing with a decontaminated submersible pump or PVC bailer equipped with a bottom filling check valve (if the purge volume is low, generally less than 100 litres, the sampling team might find it more efficient to purge with a bailer than a pump). Use a graduated bucket to track the amount of water removed from the well. The determination of purging and sampling will depend on parameters being analysed. Where VOCs or SVOCs are required it is recommended that slow purging using peristaltic pumping be undertaken. Periodically determine the pH, temperature and specific conductance of the purged water. Continue purging until the well has been completely evacuated or until the pH and specific conductance measurements have stabilised for at least one well volume. Wells that become dewatered prior to producing three casing volumes will be sampled as soon as practical once they recover sufficiently.

9) Dispose of purge water collected in the graduated bucket by dumping onto the ground at a distance of 50 to 60 metres from the vicinity of the well. If the water is known or suspected to be significantly contaminated, it may be necessary to store the purge water in a secure container, such as a drum, pending proper disposal.

10) Be aware and record any unusual occurrence during purging such as cascading (a shallow water entry zone that trickles into the borehole).

1.2 Field Parameter Measurement

Measurements of field parameters of pH, temperature and electrical conductivity are collected and organic vapour screening is conducted while the well is purged. To facilitate the collection of basic field parameters, the field team needs to: -

- Purge three well volumes of water from the well and measure field parameters for each well volume removed.

- Collection of water samples should take place after stabilisation of the following parameters: -

  - Temperature $^{+}$/- 1^{o}C
  - pH (meter or paper) $^{+}$/- 0.2 units
  - Specific conductivity $^{+}$/- 5%

- If the aforementioned parameters do not stabilise within three purge volumes, the well will be purged up to a maximum of six borehole volumes unless two consecutive sets of stabilised parameters are obtained.

- Note any observations in the field logbook.

1.3 Collection of Water Samples

All samples or chemical analysis will be placed in laboratory prepared bottles. The types of sample containers and preservative required for each type of analysis are described in the workplan. Where product layers are present a procedure and rational for the collection of such layers should be outlined in the site specific work plan. If required, preservatives will be placed in the sample containers prior to collecting the samples.

The following procedure will be used to sample a well: -

1) After the well has been purged and allowed to recover, sample the well using a properly decontaminated or dedicated disposable bailer. Gently lower the bailer into the water column. Allow the bailer to sink and fill with a minimum of surface disturbance.

2) Slowly raise the bailer out of the well. Do not allow the bailer line to contact the ground, either by coiling it on a clean plastic sheet or by looping it from arm to arm as the line is extracted from the well.

3) Samples will be collected for VOCs analysis immediately after purging is complete and before other samples are collected. Pour the samples slowly into the laboratory prepared 40 ml glass vial. Overfill each vial slightly to eliminate air bubbles, a convex meniscus should be present at the top of the vial. Ensure that the Teflon liner of the septum cap is facing inward and that no bubbles are entrapped. After capping securely, turn bottle upside-down, tap it against your other hand, and observe sample water for bubbles. If bubbles are observed, remove the cap, overfill the vial and reseal. Repeat this step for each vial until the samples with no bubbles are obtained.

4) Place a label on the container and enter the following information: -

   Client/Site Name
   Date Collected
   Time Collected
   Analysis
   Preservative
   Sample Identification Number

5) Record pertinent information in the field logbook and on the Field Data Sheet for Well Sampling. Complete chain-of-custody form.

6) Place custody seals on the container caps. As soon as possible, place sample containers in a cooler with bagged ice and maintain at 4°C until extraction. Surround the bottles with vermiculite.

7) Obtain the semi-volatile compound/pesticides/PCBs sample(s) by transferring the water to a laboratory prepared 1000 ml amber glass bottle with Teflon-lined cap. Fill the bottle to the bottom of the neck and follow steps 4, 5 and 6 above.

8) Dissolved metals (if necessary) requires the team to filter the sample water through a .45 micron filter. The water is collected in a 1 litre, unpreserved, plastic or glass bottle with HNO_3 preservative. Filtering must be done within 15 minutes of sample collection.

9) Obtain the total metals sample by directly transferring the water from the bailer into a laboratory prepared 1000 ml plastic or glass bottle with HNO_3 preservative.

10) Be sure the pH of the metals sampled is less than 2 by pouring off an aliquot in a clean jar and testing for pH using litmus paper. Dispose of this water and rinse the jar.

11) Collect and prepare Field QA/QC samples in accordance with separate SOP.

12) Be sure to record all data required on the Field Data Sheet or Well Sampling and appropriate entries into the field logbook.

13) Secure the well cap and replace the locking cover.

14) Decontaminate all sampling equipment according to procedure.

15) Decontaminate submersible pumps as follows: -

Scrub pump and cord in a tub of Liquinox/or similar and potable water
Pump at least 80 litres of soapy water through pump
Rinse with potable water
Pump at least 80 litres of rinse water through the pump
Rinse with D1 water before lowering pump into the next well.

END.

APPENDIX 5

Laboratory Results

SEVERN TRENT STL

Mr Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

14 August 2008

Test Report: MID/538002/2008

Dear Mr Crean

Analysis of your sample(s) submitted on 11 August 2008 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7658 4800 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed: L. Ellis

Name: L. Ellis

Title: Team Leader

Report Summary

1314
0897
1229
1510

SEVERN TRENT STL

Mr Donal Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

Date of Issue: **14 August 2008**

Report Number: **MID/538002/2008** Issue **1**

Job Description: Donal Crean

Number of Samples included in this report **3**

Job Received: **11 August 2008**

Number of Test Results included in this report **117**

Analysis Commenced: **11 August 2008**

Signed: L. Ellis

Name: **L. Ellis** Date: **14 August 2008**

Title: **Team Leader**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715372** Sample **1** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 0.50m-1.00m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
Antimony as Sb, dry weight	1.6	mg/kg	Y	Mid	30C
Arsenic as As, dry weight	16	mg/kg	Y	Mid	30/30C
Barium as Ba, dry weight	150	mg/kg	Y	Mid	30
Cadmium as Cd, dry weight	0.65	mg/kg	Y	Mid	30
Chromium as Cr, dry weight	11	mg/kg	Y	Mid	30
Copper as Cu, dry weight	19	mg/kg	Y	Mid	30
Iron as Fe, dry weight	8900	mg/kg	Y	Mid	30
Lead as Pb, dry weight	42	mg/kg	Y	Mid	30
Manganese as Mn, dry weight	830	mg/kg	Y	Mid	30
Mercury as Hg, dry weight	<0.25	mg/kg	Y	Mid	30C
Nickel as Ni, dry weight	24	mg/kg	Y	Mid	30
Tin as Sn,dry weight	<2.0	mg/kg	Y	Mid	30
Zinc as Zn, dry weight	68	mg/kg	Y	Mid	30
TPH >C6 - C10	<50	mg/kg	Y	Mid	317
TPH >C10 - C20	<50	mg/kg	Y	Mid	317
TPH >C20 - C40	180	mg/kg	Y	Mid	317
TPH >C6 - C40, Total	180	mg/kg	Y	Mid	317
naphthalene	0.80	mg/kg	Y	Mid	307
acenaphthylene	<0.10	mg/kg	Y	Mid	307
acenaphthene	0.48	mg/kg	Y	Mid	307
fluorene	0.32	mg/kg	Y	Mid	307
phenanthrene	4.0	mg/kg	Y	Mid	307
anthracene	0.92	mg/kg	Y	Mid	307
fluoranthene	4.0	mg/kg	Y	Mid	307
pyrene	3.7	mg/kg	Y	Mid	307
benzo(a)anthracene	1.7	mg/kg	Y	Mid	307
chrysene	1.6	mg/kg	Y	Mid	307
benzo(b)fluoranthene	1.4	mg/kg	Y	Mid	307
benzo(k)fluoranthene	0.70	mg/kg	Y	Mid	307
benzo(a)pyrene	1.6	mg/kg	Y	Mid	307
Dibenz(a,h)anthracene	0.17	mg/kg	Y	Mid	307
Benzo(g,h,i)perylene	1.1	mg/kg	Y	Mid	307
Indeno(1,2,3-c,d)pyrene	0.83	mg/kg	Y	Mid	307
PAH, Total of 16 EPA	23	mg/kg	Y	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715372** Sample **1** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 0.50m-1.00m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327

Analyst Comments for 10715372: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered, I/S=Insufficient sample

Certificate of Analysis

UKAS TESTING
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715373** Sample **2** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH9 0.50m-1.00m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
Antimony as Sb, dry weight	1.6	mg/kg	Y	Mid	30C
Arsenic as As, dry weight	12	mg/kg	Y	Mid	30/30C
Barium as Ba, dry weight	72	mg/kg	Y	Mid	30
Cadmium as Cd, dry weight	1.2	mg/kg	Y	Mid	30
Chromium as Cr, dry weight	14	mg/kg	Y	Mid	30
Copper as Cu, dry weight	28	mg/kg	Y	Mid	30
Iron as Fe, dry weight	20000	mg/kg	Y	Mid	30
Lead as Pb, dry weight	79	mg/kg	Y	Mid	30
Manganese as Mn, dry weight	1100	mg/kg	Y	Mid	30
Mercury as Hg, dry weight	0.34	mg/kg	Y	Mid	30C
Nickel as Ni, dry weight	31	mg/kg	Y	Mid	30
Tin as Sn,dry weight	3.5	mg/kg	Y	Mid	30
Zinc as Zn, dry weight	86	mg/kg	Y	Mid	30
TPH >C6 - C10	<50	mg/kg	Y	Mid	317
TPH >C10 - C20	<50	mg/kg	Y	Mid	317
TPH >C20 - C40	150	mg/kg	Y	Mid	317
TPH >C6 - C40, Total	150	mg/kg	Y	Mid	317
naphthalene	0.24	mg/kg	Y	Mid	307
acenaphthylene	<0.10	mg/kg	Y	Mid	307
acenaphthene	<0.10	mg/kg	Y	Mid	307
fluorene	<0.10	mg/kg	Y	Mid	307
phenanthrene	0.62	mg/kg	Y	Mid	307
anthracene	0.13	mg/kg	Y	Mid	307
fluoranthene	0.63	mg/kg	Y	Mid	307
pyrene	0.51	mg/kg	Y	Mid	307
benzo(a)anthracene	0.27	mg/kg	Y	Mid	307
chrysene	0.26	mg/kg	Y	Mid	307
benzo(b)fluoranthene	0.25	mg/kg	Y	Mid	307
benzo(k)fluoranthene	0.13	mg/kg	Y	Mid	307
benzo(a)pyrene	0.25	mg/kg	Y	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	Y	Mid	307
Benzo(g,h,i)perylene	0.25	mg/kg	Y	Mid	307
Indeno(1,2,3-c,d)pyrene	0.22	mg/kg	Y	Mid	307
PAH, Total of 16 EPA	3.7	mg/kg	Y	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715373** Sample **2** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH9 0.50m-1.00m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327

Analyst Comments for 10715373: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

UKAS
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715374** Sample **3** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH10 1.70m-2.50m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
Antimony as Sb, dry weight	1.7	mg/kg	Y	Mid	30C
Arsenic as As, dry weight	13	mg/kg	Y	Mid	30/30C
Barium as Ba, dry weight	79	mg/kg	Y	Mid	30
Cadmium as Cd, dry weight	1.6	mg/kg	Y	Mid	30
Chromium as Cr, dry weight	14	mg/kg	Y	Mid	30
Copper as Cu, dry weight	30	mg/kg	Y	Mid	30
Iron as Fe, dry weight	25000	mg/kg	Y	Mid	30
Lead as Pb, dry weight	59	mg/kg	Y	Mid	30
Manganese as Mn, dry weight	1500	mg/kg	Y	Mid	30
Mercury as Hg, dry weight	<0.25	mg/kg	Y	Mid	30C
Nickel as Ni, dry weight	37	mg/kg	Y	Mid	30
Tin as Sn,dry weight	3.7	mg/kg	Y	Mid	30
Zinc as Zn, dry weight	94	mg/kg	Y	Mid	30
TPH >C6 - C10	<50	mg/kg	Y	Mid	317
TPH >C10 - C20	<50	mg/kg	Y	Mid	317
TPH >C20 - C40	<50	mg/kg	Y	Mid	317
TPH >C6 - C40, Total	<50	mg/kg	Y	Mid	317
naphthalene	<0.10	mg/kg	Y	Mid	307
acenaphthylene	<0.10	mg/kg	Y	Mid	307
acenaphthene	<0.10	mg/kg	Y	Mid	307
fluorene	<0.10	mg/kg	Y	Mid	307
phenanthrene	0.20	mg/kg	Y	Mid	307
anthracene	<0.10	mg/kg	Y	Mid	307
fluoranthene	0.13	mg/kg	Y	Mid	307
pyrene	<0.10	mg/kg	Y	Mid	307
benzo(a)anthracene	<0.10	mg/kg	Y	Mid	307
chrysene	<0.10	mg/kg	Y	Mid	307
benzo(b)fluoranthene	<0.10	mg/kg	Y	Mid	307
benzo(k)fluoranthene	<0.10	mg/kg	Y	Mid	307
benzo(a)pyrene	<0.10	mg/kg	Y	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	Y	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	Y	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	Y	Mid	307
PAH, Total of 16 EPA	<1.0	mg/kg	Y	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **MID/538002/2008** Issue **1**
Laboratory Number: **10715374** Sample **3** of **3**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH10 1.70m-2.50m**

Sample Date: Sample Received **11 August 2008** Analysis Complete: **14 August 2008**

Test Description	Result	Units	Accreditation		Method
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327

Analyst Comments for 10715374: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Signed: L. Ellis Name: **L. Ellis** Date: **14 August 2008**
Title: **Team Leader**

SEVERN TRENT STL

Mr Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

19 November 2008

Test Report: COV/558587/2008

Dear Mr Crean

Analysis of your sample(s) submitted on 31 October 2008 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out is included with this report.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed: L. Ellis

Name: L. Ellis

Title: Team Leader

Report Summary

1314
0897
1229
1510

Mr Donal Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

Date of Issue: **19 November 2008**

Report Number: **COV/558587/2008** Issue **1**

Job Description: Donal Crean

Job Location: 08-014-05

Number of Samples included in this report **16**

Job Received: **31 October 2008**

Number of Test Results included in this report **400**

Analysis Commenced: **31 October 2008**

Signed: L. Ellis

Name: **L. Ellis** Date: **19 November 2008**

Title: **Team Leader**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Certificate of Analysis

1314
0897
1229
1510

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888346** Sample **1** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 13.0-14.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	1.19	% ratio	N	Mid	33
Moisture at 105c	1.2	%	N	Mid	33
TOC by Ignition in O2	0.52	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	<0.10	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.83	%	N	Mid	Calculated

Analyst Comments for 10888346: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888347** Sample **2** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 0.5-1.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	2.13	% ratio	N	Mid	33
Moisture at 105c	2.1	%	N	Mid	33
TOC by Ignition in O2	3.6	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	120	mg/kg	Y	Mid	317
Naphthalene	0.20	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	0.44	mg/kg	N	Mid	307
Anthracene	0.10	mg/kg	N	Mid	307
Fluoranthene	0.50	mg/kg	N	Mid	307
Pyrene	0.43	mg/kg	N	Mid	307
Benzo(a)anthracene	0.34	mg/kg	N	Mid	307
Chrysene	0.63	mg/kg	N	Mid	307
Benzo(b)fluoranthene	0.41	mg/kg	N	Mid	307
Benzo(k)fluoranthene	0.21	mg/kg	N	Mid	307
Benzo(a)pyrene	0.39	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	0.35	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	0.18	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	4.2	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	97.91	%	N	Mid	Calculated

Analyst Comments for 10888347: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888348** Sample **3** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 1.0-2.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	1.51	% ratio	N	Mid	33
Moisture at 105c	1.5	%	N	Mid	33
TOC by Ignition in O2	5.2	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	86	mg/kg	Y	Mid	317
Naphthalene	0.16	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	0.42	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	0.14	mg/kg	N	Mid	307
Pyrene	0.12	mg/kg	N	Mid	307
Benzo(a)anthracene	0.12	mg/kg	N	Mid	307
Chrysene	0.32	mg/kg	N	Mid	307
Benzo(b)fluoranthene	0.13	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	1.4	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.51	%	N	Mid	Calculated

Analyst Comments for 10888348: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888349** Sample **4** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 12.0-13.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.79	% ratio	N	Mid	33
Moisture at 105c	0.79	%	N	Mid	33
TOC by Ignition in O2	0.34	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	<0.10	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.21	%	N	Mid	Calculated

Analyst Comments for 10888349: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888350** Sample **5** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **W2 0.50-1.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.99	% ratio	N	Mid	33
Moisture at 105c	0.98	%	N	Mid	33
TOC by Ignition in O2	5.6	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	150	mg/kg	Y	Mid	317
Naphthalene	5.5	mg/kg	N	Mid	307
Acenaphthylene	0.11	mg/kg	N	Mid	307
Acenaphthene	7.1	mg/kg	N	Mid	307
Fluorene	4.4	mg/kg	N	Mid	307
Phenanthrene	40	mg/kg	N	Mid	307
Anthracene	13	mg/kg	N	Mid	307
Fluoranthene	38	mg/kg	N	Mid	307
Pyrene	34	mg/kg	N	Mid	307
Benzo(a)anthracene	18	mg/kg	N	Mid	307
Chrysene	17	mg/kg	N	Mid	307
Benzo(b)fluoranthene	14	mg/kg	N	Mid	307
Benzo(k)fluoranthene	7.7	mg/kg	N	Mid	307
Benzo(a)pyrene	19	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	1.1	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	6.9	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	6.9	mg/kg	N	Mid	307
Coronene	1.5	mg/kg	N	Mid	307
PAH, Total of 17 WAC	230	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.02	%	N	Mid	Calculated

Analyst Comments for 10888350: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888351** Sample **6** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **W2 1.00-2.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	2.00	% ratio	N	Mid	33
Moisture at 105c	2.0	%	N	Mid	33
TOC by Ignition in O2	5.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	5000	mg/kg	Y	Mid	317
Naphthalene	16	mg/kg	N	Mid	307
Acenaphthylene	0.29	mg/kg	N	Mid	307
Acenaphthene	16	mg/kg	N	Mid	307
Fluorene	8.1	mg/kg	N	Mid	307
Phenanthrene	97	mg/kg	N	Mid	307
Anthracene	25	mg/kg	N	Mid	307
Fluoranthene	87	mg/kg	N	Mid	307
Pyrene	88	mg/kg	N	Mid	307
Benzo(a)anthracene	44	mg/kg	N	Mid	307
Chrysene	42	mg/kg	N	Mid	307
Benzo(b)fluoranthene	35	mg/kg	N	Mid	307
Benzo(k)fluoranthene	19	mg/kg	N	Mid	307
Benzo(a)pyrene	47	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	3.0	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	20	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	18	mg/kg	N	Mid	307
Coronene	4.0	mg/kg	N	Mid	307
PAH, Total of 17 WAC	570	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.04	%	N	Mid	Calculated

Analyst Comments for 10888351: {/*}TPH soils: detection limits raised due to original sample being over-range.{*/}

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888352** Sample **7** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH8 0.50-1.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	2.38	% ratio	N	Mid	33
Moisture at 105c	2.3	%	N	Mid	33
TOC by Ignition in O2	3.1	%	N	Mid	27
PCB, Total of 7 Congeners	0.028	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	510	mg/kg	Y	Mid	317
Naphthalene	1.3	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	0.56	mg/kg	N	Mid	307
Fluorene	1.3	mg/kg	N	Mid	307
Phenanthrene	5.3	mg/kg	N	Mid	307
Anthracene	1.7	mg/kg	N	Mid	307
Fluoranthene	8.4	mg/kg	N	Mid	307
Pyrene	6.4	mg/kg	N	Mid	307
Benzo(a)anthracene	3.8	mg/kg	N	Mid	307
Chrysene	3.4	mg/kg	N	Mid	307
Benzo(b)fluoranthene	2.9	mg/kg	N	Mid	307
Benzo(k)fluoranthene	1.6	mg/kg	N	Mid	307
Benzo(a)pyrene	3.8	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	0.23	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	1.4	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	1.3	mg/kg	N	Mid	307
Coronene	0.52	mg/kg	N	Mid	307
PAH, Total of 17 WAC	44	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	97.67	%	N	Mid	Calculated

Analyst Comments for 10888352: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888353** Sample **8** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH8 1.00-2.00m**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	1.50	% ratio	N	Mid	33
Moisture at 105c	1.5	%	N	Mid	33
TOC by Ignition in O2	3.0	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	1800	mg/kg	Y	Mid	317
Naphthalene	11	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	3.3	mg/kg	N	Mid	307
Fluorene	4.6	mg/kg	N	Mid	307
Phenanthrene	33	mg/kg	N	Mid	307
Anthracene	13	mg/kg	N	Mid	307
Fluoranthene	52	mg/kg	N	Mid	307
Pyrene	43	mg/kg	N	Mid	307
Benzo(a)anthracene	23	mg/kg	N	Mid	307
Chrysene	21	mg/kg	N	Mid	307
Benzo(b)fluoranthene	16	mg/kg	N	Mid	307
Benzo(k)fluoranthene	9.5	mg/kg	N	Mid	307
Benzo(a)pyrene	24	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	1.1	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	8.7	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	9.2	mg/kg	N	Mid	307
Coronene	1.8	mg/kg	N	Mid	307
PAH, Total of 17 WAC	280	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.53	%	N	Mid	Calculated

Analyst Comments for 10888353: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888354** Sample **9** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 13.0-14.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.014	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	12	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.38	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0085	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	7.1	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.42	mg/l	Y	Mid	20
TOC (Filtered)	3.9	mg/l	Y	Mid	41

Analyst Comments for 10888354: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888355** Sample **10** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 0.5-1.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0060	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	54	mg/l	Y	Mid	53F
Chromium, Soluble	18	ug/l	Y	Mid	53F
Copper, Soluble	36	ug/l	Y	Mid	53F
Lead, Soluble	42	ug/l	Y	Mid	53F
Mercury, Soluble	0.35	ug/l	Y	Mid	56
Molybdenum, Soluble	0.016	mg/l	N	Mid	68
Nickel, Soluble	15	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	50	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	420	mg/l	N	Mid	18
Fluoride as F-	0.23	mg/l	Y	Mid	20
TOC (Filtered)	6.2	mg/l	Y	Mid	41

Analyst Comments for 10888355: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted,
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn,
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered, I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888356** Sample **11** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 1.0-2.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0055	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	26	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	28	ug/l	Y	Mid	53F
Lead, Soluble	43	ug/l	Y	Mid	53F
Mercury, Soluble	0.49	ug/l	Y	Mid	56
Molybdenum, Soluble	0.013	mg/l	N	Mid	68
Nickel, Soluble	14	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	13	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	19	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	3.6	mg/l	Y	Mid	41

Analyst Comments for 10888356: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888357** Sample **12** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH15 12.0-13.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.017	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	17	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	15	ug/l	Y	Mid	53F
Lead, Soluble	41	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0046	mg/l	N	Mid	68
Nickel, Soluble	14	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	13	mg/l	Y	Mid	60
Chloride as Cl	10	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.47	mg/l	Y	Mid	20
TOC (Filtered)	3.7	mg/l	Y	Mid	41

Analyst Comments for 10888357: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888358** Sample **13** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **W2 0.50-1.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	0.036	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.024	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	43	mg/l	Y	Mid	53F
Chromium, Soluble	21	ug/l	Y	Mid	53F
Copper, Soluble	34	ug/l	Y	Mid	53F
Lead, Soluble	43	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0066	mg/l	N	Mid	68
Nickel, Soluble	13	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	11	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	44	mg/l	Y	Mid	60
Chloride as Cl	2.7	mg/l	Y	Mid	60
Dissolved Solids	210	mg/l	N	Mid	18
Fluoride as F-	0.41	mg/l	Y	Mid	20
TOC (Filtered)	4.5	mg/l	Y	Mid	41

Analyst Comments for 10888358: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

UKAS
1314
0697
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888359** Sample **14** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **W2 1.00-2.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.018	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	110	mg/l	Y	Mid	53F
Chromium, Soluble	<100	ug/l	Y	Mid	53F
Copper, Soluble	<100	ug/l	Y	Mid	53F
Lead, Soluble	<100	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0081	mg/l	N	Mid	68
Nickel, Soluble	<100	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<100	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	160	mg/l	Y	Mid	60
Chloride as Cl	14	mg/l	Y	Mid	60
Dissolved Solids	420	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	6.0	mg/l	Y	Mid	41

Analyst Comments for 10888359: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888360** Sample **15** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH8 0.50-1.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.021	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	690	mg/l	Y	Mid	53F
Chromium, Soluble	<100	ug/l	Y	Mid	53F
Copper, Soluble	<100	ug/l	Y	Mid	53F
Lead, Soluble	<100	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.010	mg/l	N	Mid	68
Nickel, Soluble	<100	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<100	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	1500	mg/l	Y	Mid	60
Chloride as Cl	4.3	mg/l	Y	Mid	60
Dissolved Solids	2400	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	5.2	mg/l	Y	Mid	41

Analyst Comments for 10888360: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/558587/2008** Issue **1**
Laboratory Number: **10888361** Sample **16** of **16**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH8 1.00-2.00m 10:1**

Sample Date: Sample Received **31 October 2008** Analysis Complete: **13 November 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.025	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	650	mg/l	Y	Mid	53F
Chromium, Soluble	<100	ug/l	Y	Mid	53F
Copper, Soluble	<100	ug/l	Y	Mid	53F
Lead, Soluble	<100	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0095	mg/l	N	Mid	68
Nickel, Soluble	<100	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<100	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	1400	mg/l	Y	Mid	60
Chloride as Cl	5.8	mg/l	Y	Mid	60
Dissolved Solids	2400	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	7.3	mg/l	Y	Mid	41

Analyst Comments for 10888361: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Signed: L. Ellis Name: **L. Ellis** Date: **19 November 2008**
Title: **Team Leader**

SEVERN TRENT STL

Mr Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

24 December 2008

Test Report: COV/569308/2008

Dear Mr Crean

Analysis of your sample(s) submitted on 12 December 2008 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed:

Name: G. Smith

Title: Inorg and License Chem Manager

Report Summary

1314
0897
1229
1510

SEVERN TRENT STL

Mr Donal Crean
O Callaghan Moran & Assoc.
Granary House
Rutland Street
Cork

Date of Issue: **24 December 2008**

Report Number: **COV/569308/2008** Issue **1**

Job Description: Donal Crean

Job Location: O Callaghan Moran & Associates

Number of Samples included in this report **22**

Job Received: **12 December 2008**

Number of Test Results included in this report **550**

Analysis Commenced: **12 December 2008**

Signed:

Name: **G. Smith** Date: **24 December 2008**

Title: **Inorg and License Chem Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Certificate of Analysis

UKAS TESTING
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956741** Sample **1** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 4.00m-5.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.10	% ratio	N	Mid	33
Moisture at 105c	0.10	%	N	Mid	33
TOC by Ignition in O2	3.1	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	<0.10	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.90	%	N	Mid	Calculated

Analyst Comments for 10956741: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956742** Sample **2** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 0.50m-1.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.39	% ratio	N	Mid	33
Moisture at 105c	0.39	%	N	Mid	33
TOC by Ignition in O2	5.3	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	640	mg/kg	Y	Mid	317
Naphthalene	0.47	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	0.18	mg/kg	N	Mid	307
Fluorene	0.11	mg/kg	N	Mid	307
Phenanthrene	1.3	mg/kg	N	Mid	307
Anthracene	0.19	mg/kg	N	Mid	307
Fluoranthene	0.87	mg/kg	N	Mid	307
Pyrene	1.1	mg/kg	N	Mid	307
Benzo(a)anthracene	0.43	mg/kg	N	Mid	307
Chrysene	0.36	mg/kg	N	Mid	307
Benzo(b)fluoranthene	0.26	mg/kg	N	Mid	307
Benzo(k)fluoranthene	0.15	mg/kg	N	Mid	307
Benzo(a)pyrene	0.34	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	0.45	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	0.37	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	6.6	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.61	%	N	Mid	Calculated

Analyst Comments for 10956742: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956743** Sample **3** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 3.00m-4.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.29	% ratio	N	Mid	33
Moisture at 105c	0.29	%	N	Mid	33
TOC by Ignition in O2	3.0	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	170	mg/kg	Y	Mid	317
Naphthalene	<0.10	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	0.11	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.71	%	N	Mid	Calculated

Analyst Comments for 10956743: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956744** Sample **4** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 4.00m-5.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.28	% ratio	N	Mid	33
Moisture at 105c	0.28	%	N	Mid	33
TOC by Ignition in O2	2.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	57	mg/kg	Y	Mid	317
Naphthalene	0.15	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.72	%	N	Mid	Calculated

Analyst Comments for 10956744: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956745** Sample **5** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 8.00m-10.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.37	% ratio	N	Mid	33
Moisture at 105c	0.37	%	N	Mid	33
TOC by Ignition in O2	1.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.18	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.63	%	N	Mid	Calculated

Analyst Comments for 10956745: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected. For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
i/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956746** Sample **6** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 0.50m-1.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	1.60	% ratio	N	Mid	33
Moisture at 105c	1.6	%	N	Mid	33
TOC by Ignition in O2	4.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	99	mg/kg	Y	Mid	317
Naphthalene	0.59	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	0.25	mg/kg	N	Mid	307
Fluorene	0.11	mg/kg	N	Mid	307
Phenanthrene	1.6	mg/kg	N	Mid	307
Anthracene	0.26	mg/kg	N	Mid	307
Fluoranthene	1.1	mg/kg	N	Mid	307
Pyrene	1.2	mg/kg	N	Mid	307
Benzo(a)anthracene	0.60	mg/kg	N	Mid	307
Chrysene	0.57	mg/kg	N	Mid	307
Benzo(b)fluoranthene	0.45	mg/kg	N	Mid	307
Benzo(k)fluoranthene	0.18	mg/kg	N	Mid	307
Benzo(a)pyrene	0.56	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	0.37	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	0.26	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	8.1	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.43	%	N	Mid	Calculated

Analyst Comments for 10956746: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956747** Sample **7** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 1.00m-2.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.91	% ratio	N	Mid	33
Moisture at 105c	0.90	%	N	Mid	33
TOC by Ignition in O2	3.8	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	180	mg/kg	Y	Mid	317
Naphthalene	0.48	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	0.17	mg/kg	N	Mid	307
Fluorene	0.13	mg/kg	N	Mid	307
Phenanthrene	1.7	mg/kg	N	Mid	307
Anthracene	0.27	mg/kg	N	Mid	307
Fluoranthene	1.1	mg/kg	N	Mid	307
Pyrene	1.2	mg/kg	N	Mid	307
Benzo(a)anthracene	0.62	mg/kg	N	Mid	307
Chrysene	0.62	mg/kg	N	Mid	307
Benzo(b)fluoranthene	0.52	mg/kg	N	Mid	307
Benzo(k)fluoranthene	0.23	mg/kg	N	Mid	307
Benzo(a)pyrene	0.44	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	0.43	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	0.39	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	8.3	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.10	%	N	Mid	Calculated

Analyst Comments for 10956747: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956748** Sample **8** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 2.00m-3.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	1.67	% ratio	N	Mid	33
Moisture at 105c	1.6	%	N	Mid	33
TOC by Ignition in O2	3.6	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.32	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	0.19	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	98.36	%	N	Mid	Calculated

Analyst Comments for 10956748: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

UKAS TESTING
1314
0697
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956749** Sample **9** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 3.00m-4.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.40	% ratio	N	Mid	33
Moisture at 105c	0.40	%	N	Mid	33
TOC by Ignition in O2	3.5	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.31	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	0.12	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.60	%	N	Mid	Calculated

Analyst Comments for 10956749: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956750** Sample **10** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 8.00m-10.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.50	% ratio	N	Mid	33
Moisture at 105c	0.49	%	N	Mid	33
TOC by Ignition in O2	1.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.28	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.51	%	N	Mid	Calculated

Analyst Comments for 10956750: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956751** Sample **11** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH9 4.00m-5.00m**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	<0.10	% ratio	N	Mid	33
Moisture at 105c	<0.10	%	N	Mid	33
TOC by Ignition in O2	2.8	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.12	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N	Mid	307
Coronene	<0.10	mg/kg	N	Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N	Mid	307
benzene	<0.10	mg/kg	Y	Mid	327
toluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
m&p-Xylene	<0.20	mg/kg	Y	Mid	327
o-xylene	<0.10	mg/kg	Y	Mid	327
Dry Ratio (BSEN 12457)	99.90	%	N	Mid	Calculated

Analyst Comments for 10956751: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=insufficient sample

Certificate of Analysis

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956752** Sample **12** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH7 4.00m-5.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0084	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	9.7	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	1.2	ug/l	Y	Mid	56
Molybdenum, Soluble	<0.0030	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.30	mg/l	Y	Mid	20
TOC (Filtered)	1.3	mg/l	Y	Mid	41

Analyst Comments for 10956752: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956753** Sample **13** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 0.50m-1.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.019	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	68	mg/l	Y	Mid	53F
Chromium, Soluble	33	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	1.6	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0084	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	91	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	320	mg/l	N	Mid	18
Fluoride as F-	0.30	mg/l	Y	Mid	20
TOC (Filtered)	2.6	mg/l	Y	Mid	41

Analyst Comments for 10956753: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956754** Sample **14** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 3.00m-4.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0033	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	18	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.031	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	30	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.23	mg/l	Y	Mid	20
TOC (Filtered)	2.2	mg/l	Y	Mid	41

Analyst Comments for 10956754: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956755** Sample **15** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 4.00m-5.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0068	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	12	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	<0.30	ug/l	Y	Mid	56
Molybdenum, Soluble	0.020	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.29	mg/l	Y	Mid	20
TOC (Filtered)	1.9	mg/l	Y	Mid	41

Analyst Comments for 10956755: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956756** Sample **16** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH12 8.00m-10.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.017	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	17	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.47	ug/l	Y	Mid	56
Molybdenum, Soluble	0.010	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	7.9	ug/l	N	Mid	25C
Zinc, Soluble	19	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	25	mg/l	Y	Mid	60
Chloride as Cl	4.1	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.27	mg/l	Y	Mid	20
TOC (Filtered)	1.9	mg/l	Y	Mid	41

Analyst Comments for 10956756: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected In volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956757** Sample **17** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 0.50m-1.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.012	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	89	mg/l	Y	Mid	53F
Chromium, Soluble	53	ug/l	Y	Mid	53F
Copper, Soluble	24	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.51	ug/l	Y	Mid	56
Molybdenum, Soluble	0.027	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	19	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	290	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	5.8	mg/l	Y	Mid	41

Analyst Comments for 10956757: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

UKAS TESTING
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956758** Sample **18** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 1.00m-2.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0097	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	69	mg/l	Y	Mid	53F
Chromium, Soluble	48	ug/l	Y	Mid	53F
Copper, Soluble	44	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.68	ug/l	Y	Mid	56
Molybdenum, Soluble	0.043	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	82	mg/l	Y	Mid	60
Chloride as Cl	2.9	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.20	mg/l	Y	Mid	20
TOC (Filtered)	6.9	mg/l	Y	Mid	41

Analyst Comments for 10956758: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956759** Sample **19** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 2.00m-3.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.013	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	130	mg/l	Y	Mid	53F
Chromium, Soluble	17	ug/l	Y	Mid	53F
Copper, Soluble	47	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	1.2	ug/l	Y	Mid	56
Molybdenum, Soluble	0.034	mg/l	N	Mid	68
Nickel, Soluble	12	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	14	mg/l	Y	Mid	60
Chloride as Cl	5.4	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	<0.20	mg/l	Y	Mid	20
TOC (Filtered)	8.2	mg/l	Y	Mid	41

Analyst Comments for 10956759: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956760** Sample **20** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 3.00m-4.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0046	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	18	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.39	ug/l	Y	Mid	56
Molybdenum, Soluble	0.018	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.23	mg/l	Y	Mid	20
TOC (Filtered)	2.7	mg/l	Y	Mid	41

Analyst Comments for 10956760: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956761** Sample **21** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH14 8.00m-10.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.027	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	24	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.36	ug/l	Y	Mid	56
Molybdenum, Soluble	0.015	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	42	mg/l	Y	Mid	60
Chloride as Cl	3.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.24	mg/l	Y	Mid	20
TOC (Filtered)	2.3	mg/l	Y	Mid	41

Analyst Comments for 10956761: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/569308/2008** Issue **1**
Laboratory Number: **10956762** Sample **22** of **22**

Sample Source: **O Callaghan Moran & Assoc.**
Sample Point Description: **O Callaghan Moran & Assoc.**
Sample Description: **BH9 4.00m-5.00m 10:1**

Sample Date: Sample Received **12 December 2008** Analysis Complete: **24 December 2008**

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0076	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	10	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/l	Y	Mid	53F
Lead, Soluble	<10	ug/l	Y	Mid	53F
Mercury, Soluble	0.78	ug/l	Y	Mid	56
Molybdenum, Soluble	0.0056	mg/l	N	Mid	68
Nickel, Soluble	<10	ug/l	Y	Mid	53F
Selenium, Soluble	<6.0	ug/l	N	Mid	25C
Zinc, Soluble	<10	ug/l	Y	Mid	53F
Phenol Index	<0.050	mg/l	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.27	mg/l	Y	Mid	20
TOC (Filtered)	1.4	mg/l	Y	Mid	41

Analyst Comments for 10956762: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Signed: Name: **G. Smith** Date: **24 December 2008**
Title: **Inorg and License Chem Manager**

SEVERN TRENT STL

Mr Crean
O Callaghan Moran & Associates
Granary House
Rutland Street
Cork Cork

19 December 2008

Test Report: COV/566856/2008

Dear Mr Crean

Analysis of your sample(s) submitted on 03 December 2008 is now complete and we have pleasure in enclosing the appropriate test report(s).

An invoice for the analysis carried out will be sent under separate cover.

Should you have any queries regarding this report(s) or any part of our service, please contact Customer Services on +44 (0)24 7642 1213 who will be happy to discuss your requirements.

If you would like to arrange any further analysis, please contact Customer Services. To arrange container delivery or sample collection, please call the Couriers Department directly on 024 7685 6562.

Thank you for using STL and we look forward to receiving your next samples.

Yours Sincerely,

Signed: Susa Clancy

Name: S. Clancy

Title: Organic Chemistry Manager

STL Coventry
STL Business Centre, Torrington Avenue,
Coventry, CV4 9GU

Tel: +44 (0)24 7642 1213
Fax: +44 (0)24 7685 6575
www.stl-ltd.com

Report Summary

UKAS
1314
0897
1229
1510

SEVERN TRENT STL

Mr Donal Crean
O Callaghan Moran & Associates
Granary House
Rutland Street
Cork
Cork

Date of Issue: **19 December 2008**

Report Number: **COV/566856/2008** Issue **1**

Job Description: Chemical Analysis

Job Location: 08-014-05

Number of Samples included in this report **4**

Job Received: **03 December 2008**

Number of Test Results included in this report **188**

Analysis Commenced: **03 December 2008**

Signed: Name: **S. Clancy** Date: **19 December 2008**

Title: **Organic Chemistry Manager**

STL was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.
Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.
Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

Certificate of Analysis

UKAS TESTING
1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940877** Sample **1** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **RC-16S**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation	Method
Antimony, Soluble	0.00048	mg/l	Y MID	56
Arsenic, Soluble	0.0069	mg/l	Y MID	56
Barium, Soluble	0.056	mg/l	Y MID	54F
Cadmium, Soluble	<0.00010	mg/l	Y MID	56
Hardness, Calcium as CaCO3	100	mg/l	N MID	53F
Chromium, Soluble	<0.030	mg/l	Y MID	56
Copper, Soluble	0.025	mg/l	Y MID	56
Iron, Soluble	0.41	mg/l	Y MID	56
Lead, Soluble	0.0033	mg/l	Y MID	56
Magnesium, Soluble	6.6	mg/l	Y MID	53F
Manganese, Soluble	0.17	mg/l	Y MID	53F
Mercury, Soluble	<0.00030	mg/l	Y MID	56
Nickel, Soluble	0.0060	mg/l	Y MID	56
Potassium, Soluble	60	mg/l	Y MID	53F
Sodium, Soluble	100	mg/l	Y MID	53F
Tin, Soluble	<0.010	mg/l	N MID	68
Zinc, Soluble	0.053	mg/l	Y MID	56
Sulphate as SO4	<0.011	g/l	Y MID	60
Bicarbonate as CaCO3	710	mg/l	N MID	2
Chloride as Cl	150	mg/l	Y MID	60
Sulphide as S	0.14	mg/l	Y MID	38A
TPH >C6 - C10	<100	ug/l	Y MID	318
TPH >C10 - C20	330	ug/l	Y MID	318
TPH >C20 - C40	7700	ug/l	Y MID	318
TPH >C6 - C40, Total	8000	ug/l	Y MID	318
Naphthalene	2.2	ug/l	Y MID	331
Acenaphthene	0.68	ug/l	Y MID	331
Acenaphthylene	0.12	ug/l	Y MID	331
Fluorene	0.78	ug/l	Y MID	331
Phenanthrene	7.6	ug/l	Y MID	331
Anthracene	1.1	ug/l	Y MID	331
Fluoranthene	5.6	ug/l	Y MID	331
Pyrene	4.6	ug/l	Y MID	331
Benzo(a)anthracene	3.6	ug/l	Y MID	331
Chrysene	7.3	ug/l	Y MID	331

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940877** Sample **1** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **RC-16S**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation		Method
Benzo(b)fluoranthene	0.51	ug/l	Y	MID	331
Benzo(k)fluoranthene	0.36	ug/l	Y	MID	331
Benzo(a)pyrene	0.91	ug/l	Y	MID	331
Dibenz(a,h)anthracene	0.11	ug/l	Y	MID	331
Benzo(g,h,i)perylene	0.65	ug/l	Y	MID	331
Indeno(1,2,3-c,d)pyrene	0.70	ug/l	Y	MID	331
PAH, Total	16	ug/l	Y	MID	331
Benzene	<10	ug/l	N	MID	329
Toluene	<10	ug/l	N	MID	329
Ethylbenzene	<10	ug/l	N	MID	329
m&p-Xylene	<20	ug/l	N	MID	329
o-Xylene	<10	ug/l	N	MID	329

Analyst Comments for 10940877: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940878** Sample **2** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **RC-16B**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation	Method
Antimony, Soluble	0.0023	mg/l	Y MID	56
Arsenic, Soluble	0.0059	mg/l	Y MID	56
Barium, Soluble	0.12	mg/l	Y MID	54F
Cadmium, Soluble	0.00024	mg/l	Y MID	56
Hardness, Calcium as CaCO3	210	mg/l	N MID	53F
Chromium, Soluble	<0.030	mg/l	Y MID	56
Copper, Soluble	0.0096	mg/l	Y MID	56
Iron, Soluble	0.55	mg/l	Y MID	56
Lead, Soluble	0.00081	mg/l	Y MID	56
Magnesium, Soluble	28	mg/l	Y MID	53F
Manganese, Soluble	0.070	mg/l	Y MID	53F
Mercury, Soluble	0.00074	mg/l	Y MID	56
Nickel, Soluble	0.0039	mg/l	Y MID	56
Potassium, Soluble	7.6	mg/l	Y MID	53F
Sodium, Soluble	680	mg/l	Y MID	53F
Tin, Soluble	<0.010	mg/l	N MID	68
Zinc, Soluble	0.016	mg/l	Y MID	56
Sulphate as SO4	0.23	g/l	Y MID	60
Bicarbonate as CaCO3	350	mg/l	N MID	2
Chloride as Cl	860	mg/l	Y MID	60
Sulphide as S	0.011	mg/l	Y MID	38A
TPH >C6 - C10	<100	ug/l	Y MID	318
TPH >C10 - C20	<100	ug/l	Y MID	318
TPH >C20 - C40	<100	ug/l	Y MID	318
TPH >C6 - C40, Total	<100	ug/l	Y MID	318
Naphthalene	0.11	ug/l	Y MID	331
Acenaphthene	<0.010	ug/l	Y MID	331
Acenaphthylene	0.016	ug/l	Y MID	331
Fluorene	0.021	ug/l	Y MID	331
Phenanthrene	0.046	ug/l	Y MID	331
Anthracene	<0.010	ug/l	Y MID	331
Fluoranthene	<0.010	ug/l	Y MID	331
Pyrene	0.016	ug/l	Y MID	331
Benzo(a)anthracene	0.011	ug/l	Y MID	331
Chrysene	<0.010	ug/l	Y MID	331

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940878** Sample **2** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **RC-16B**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation		Method
Benzo(b)fluoranthene	<0.010	ug/l	Y	MID	331
Benzo(k)fluoranthene	<0.010	ug/l	Y	MID	331
Benzo(a)pyrene	<0.010	ug/l	Y	MID	331
Dibenz(a,h)anthracene	<0.010	ug/l	Y	MID	331
Benzo(g,h,i)perylene	<0.010	ug/l	Y	MID	331
Indeno(1,2,3-c,d)pyrene	<0.010	ug/l	Y	MID	331
PAH, Total	0.25	ug/l	Y	MID	331
Benzene	<10	ug/l	N	MID	329
Toluene	<10	ug/l	N	MID	329
Ethylbenzene	<10	ug/l	N	MID	329
m&p-Xylene	<20	ug/l	N	MID	329
o-Xylene	<10	ug/l	N	MID	329

Analyst Comments for 10940878: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940879** Sample **3** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **W1-S**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation	Method
Antimony, Soluble	0.00017	mg/l	Y MID	56
Arsenic, Soluble	<0.0010	mg/l	Y MID	56
Barium, Soluble	0.015	mg/l	Y MID	54F
Cadmium, Soluble	0.00014	mg/l	Y MID	56
Hardness, Calcium as CaCO3	360	mg/l	N MID	53F
Chromium, Soluble	<0.030	mg/l	Y MID	56
Copper, Soluble	<0.0070	mg/l	Y MID	56
Iron, Soluble	0.045	mg/l	Y MID	56
Lead, Soluble	<0.00050	mg/l	Y MID	56
Magnesium, Soluble	8.8	mg/l	Y MID	53F
Manganese, Soluble	0.022	mg/l	Y MID	53F
Mercury, Soluble	<0.00030	mg/l	Y MID	56
Nickel, Soluble	<0.00050	mg/l	Y MID	56
Potassium, Soluble	11	mg/l	Y MID	53F
Sodium, Soluble	35	mg/l	Y MID	53F
Tin, Soluble	<0.010	mg/l	N MID	68
Zinc, Soluble	<0.0050	mg/l	Y MID	56
Sulphate as SO4	0.15	g/l	Y MID	60
Bicarbonate as CaCO3	200	mg/l	N MID	2
Chloride as Cl	39	mg/l	Y MID	60
Sulphide as S	<0.010	mg/l	Y MID	38A
TPH >C6 - C10	<100	ug/l	Y MID	318
TPH >C10 - C20	<100	ug/l	Y MID	318
TPH >C20 - C40	<100	ug/l	Y MID	318
TPH >C6 - C40, Total	<100	ug/l	Y MID	318
Naphthalene	0.054	ug/l	Y MID	331
Acenaphthene	<0.010	ug/l	Y MID	331
Acenaphthylene	<0.010	ug/l	Y MID	331
Fluorene	<0.010	ug/l	Y MID	331
Phenanthrene	0.017	ug/l	Y MID	331
Anthracene	<0.010	ug/l	Y MID	331
Fluoranthene	<0.010	ug/l	Y MID	331
Pyrene	<0.010	ug/l	Y MID	331
Benzo(a)anthracene	<0.010	ug/l	Y MID	331
Chrysene	<0.010	ug/l	Y MID	331

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940879** Sample **3** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **W1-S**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation		Method
Benzo(b)fluoranthene	<0.010	ug/l	Y	MID	331
Benzo(k)fluoranthene	<0.010	ug/l	Y	MID	331
Benzo(a)pyrene	<0.010	ug/l	Y	MID	331
Dibenz(a,h)anthracene	<0.010	ug/l	Y	MID	331
Benzo(g,h,i)perylene	<0.010	ug/l	Y	MID	331
Indeno(1,2,3-c,d)pyrene	<0.010	ug/l	Y	MID	331
PAH, Total	<0.10	ug/l	Y	MID	331
Benzene	<10	ug/l	N	MID	329
Toluene	<10	ug/l	N	MID	329
Ethylbenzene	<10	ug/l	N	MID	329
m&p-Xylene	<20	ug/l	N	MID	329
o-Xylene	<10	ug/l	N	MID	329

Analyst Comments for 10940879: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Certificate of Analysis

UKAS TESTING
1314
0697
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940880** Sample **4** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **W1-B**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation		Method
Antimony, Soluble	0.00015	mg/l	Y	MID	56
Arsenic, Soluble	<0.0010	mg/l	Y	MID	56
Barium, Soluble	0.018	mg/l	Y	MID	54F
Cadmium, Soluble	<0.00010	mg/l	Y	MID	56
Hardness, Calcium as CaCO3	360	mg/l	N	MID	53F
Chromium, Soluble	<0.030	mg/l	Y	MID	56
Copper, Soluble	<0.0070	mg/l	Y	MID	56
Iron, Soluble	0.041	mg/l	Y	MID	56
Lead, Soluble	<0.00050	mg/l	Y	MID	56
Magnesium, Soluble	8.4	mg/l	Y	MID	53F
Manganese, Soluble	<0.010	mg/l	Y	MID	53F
Mercury, Soluble	<0.00030	mg/l	Y	MID	56
Nickel, Soluble	<0.00050	mg/l	Y	MID	56
Potassium, Soluble	10	mg/l	Y	MID	53F
Sodium, Soluble	35	mg/l	Y	MID	53F
Tin, Soluble	<0.010	mg/l	N	MID	68
Zinc, Soluble	<0.0050	mg/l	Y	MID	56
Sulphate as SO4	0.16	g/l	Y	MID	60
Bicarbonate as CaCO3	200	mg/l	N	MID	2
Chloride as Cl	41	mg/l	Y	MID	60
Sulphide as S	<0.010	mg/l	Y	MID	38A
TPH >C6 - C10	<100	ug/l	Y	MID	318
TPH >C10 - C20	<100	ug/l	Y	MID	318
TPH >C20 - C40	<100	ug/l	Y	MID	318
TPH >C6 - C40, Total	<100	ug/l	Y	MID	318
Naphthalene	0.081	ug/l	Y	MID	331
Acenaphthene	0.054	ug/l	Y	MID	331
Acenaphthylene	<0.010	ug/l	Y	MID	331
Fluorene	0.051	ug/l	Y	MID	331
Phenanthrene	0.26	ug/l	Y	MID	331
Anthracene	0.034	ug/l	Y	MID	331
Fluoranthene	0.16	ug/l	Y	MID	331
Pyrene	0.27	ug/l	Y	MID	331
Benzo(a)anthracene	0.15	ug/l	Y	MID	331
Chrysene	0.12	ug/l	Y	MID	331

Certificate of Analysis

1314
0897
1229
1510

SEVERN TRENT STL

Report Number: **COV/566856/2008** Issue **1**
Laboratory Number: **10940880** Sample **4** of **4**

Sample Source: **O Callaghan Moran & Associates**
Sample Point Description: **O Callaghan Moran & Associates**
Sample Description: **W1-B**

Sample Date: **01 December 2008** Sample Received **03 December 2008** Analysis Complete: **18 December 2008**

Test Description	Result	Units	Accreditation	Method
Benzo(b)fluoranthene	0.078	ug/l	Y MID	331
Benzo(k)fluoranthene	0.056	ug/l	Y MID	331
Benzo(a)pyrene	0.13	ug/l	Y MID	331
Dibenz(a,h)anthracene	0.023	ug/l	Y MID	331
Benzo(g,h,i)perylene	0.090	ug/l	Y MID	331
Indeno(1,2,3-c,d)pyrene	0.16	ug/l	Y MID	331
PAH, Total	1.7	ug/l	Y MID	331
Benzene	<10	ug/l	N MID	329
Toluene	<10	ug/l	N MID	329
Ethylbenzene	<10	ug/l	N MID	329
m&p-Xylene	<20	ug/l	N MID	329
o-Xylene	<10	ug/l	N MID	329

Analyst Comments for 10940880: No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.
I/S=Insufficient sample

Signed: Susan Clancy

Name: **S. Clancy** Date: **19 December 2008**
Title: **Organic Chemistry Manager**

SEVERN TRENT STL

ANALYST COMMENTS FOR REPORT COV/566856/2008 Issue 1

Date of Issue: **19 December 2008**

Sample No	Analyst Comments
10940877	
10940878	
10940879	
10940880	

Signed: Susan Clancy

Name: **S. Clancy** Date: **19 December 2008**

Title: **Organic Chemistry Manager**

SEVERN TRENT STL

DETERMINAND COMMENTS FOR REPORT COV/566856/2008 ISSUE 1

Date of Issue : 19 December 2008

Sample No	Description	Determinand	Comments

Signed: Susan Clancy

Name: **S. Clancy** Date: **19 December 2008**

Title: **Organic Chemistry Manager**