# APPENDIX 7.1 ENVIRONMENTAL ASSESSMENT (SITE INVESTIGATION)

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### **ENVIRONMENTAL ASSESSMENT**

### **DUBLIN CENTRE**

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### 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).

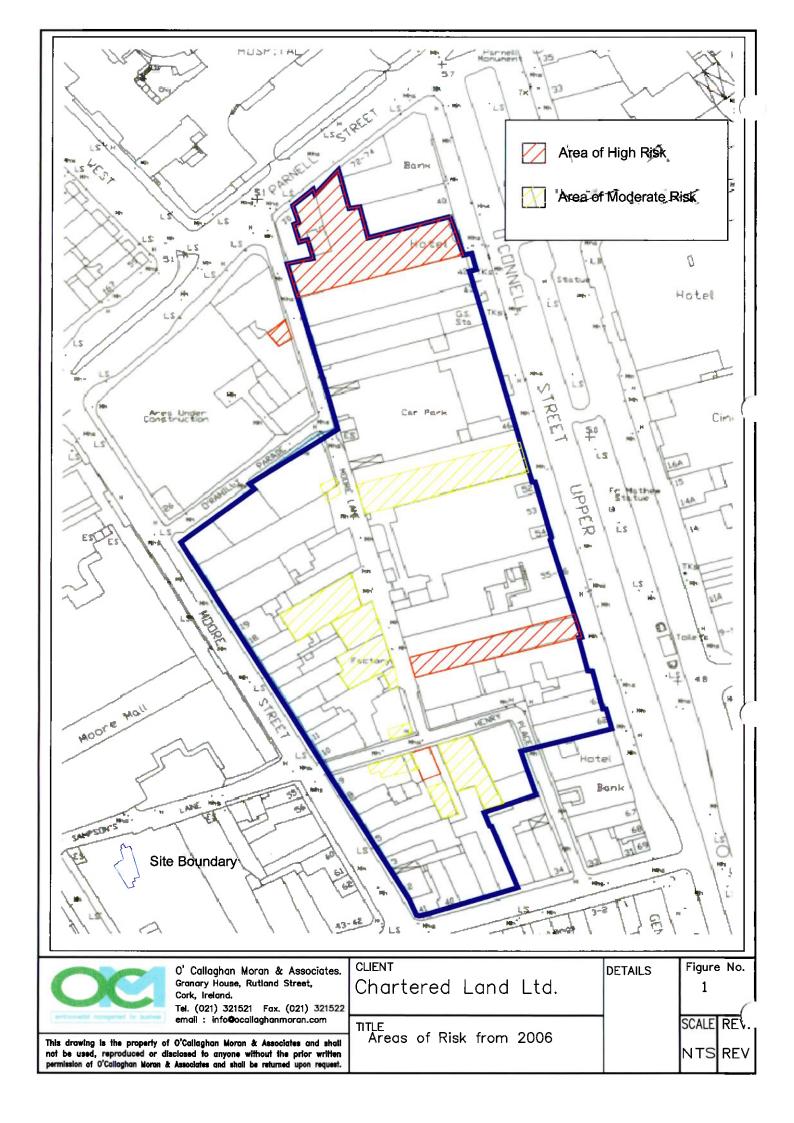
In 2008 a joint geotechnical and environmental site investigation was undertaken comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The geotechnical investigations were supervised by AGL while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



### 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.

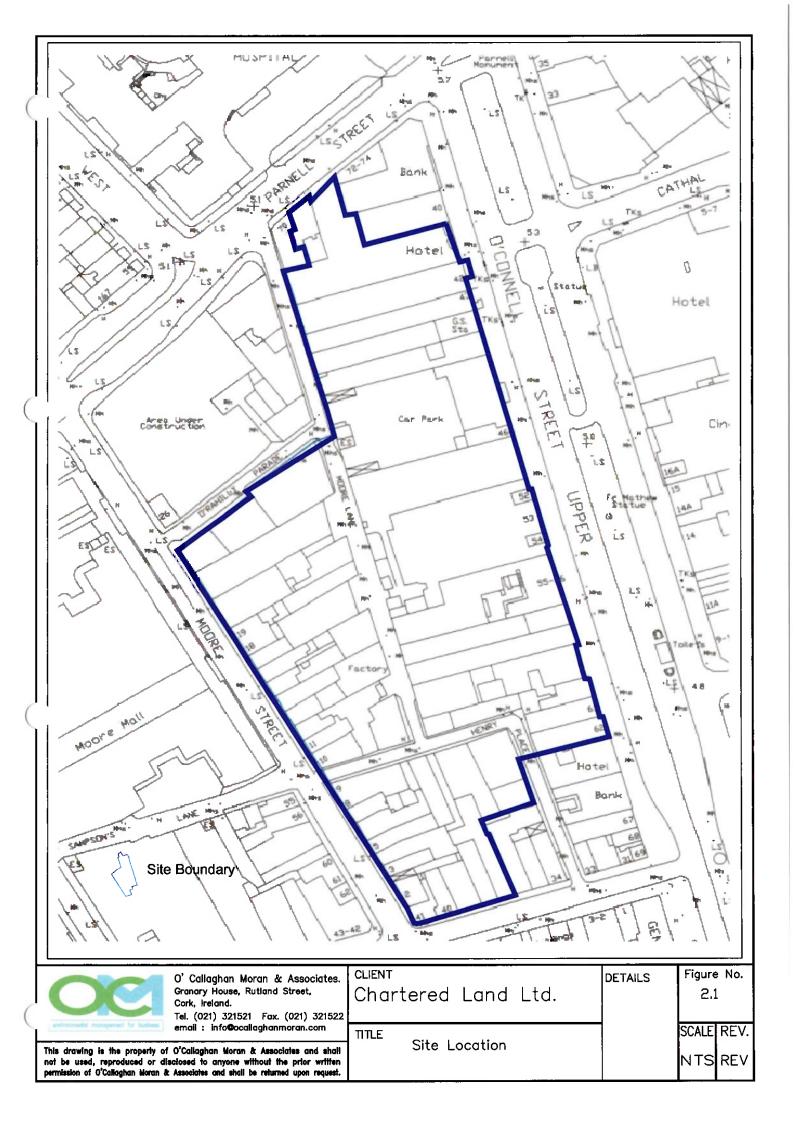


Table 2.1 Name and Address of Occupiers within the subject area

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)	D 11 D	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 and
10 Moore Street	Supermarket (Closed)	Hairdressers
11 Moore Street	Rong Xing Home Store	Chinese Supermarket
12 Moore Street		Hardware/Homeware shop
13 Moore Street	Oceanic Superstore Pat's Household	Asian Food Shop
14 Moore Street		Homeware shop Hairdressers
15 Moore Street	Charity Hair Studio	<del></del>
16 Moore Street	Larmints Paylink Plunketts	Money Transfer shop Closed
17 Moore Street	Mobile Phone Centre	<del></del>
18 Moore Street	Crystal Superstores	Phone / electronic shop
19 Moore Street		Afro-Caribbean shop
1) MOOIC SHEEL	American Design Wears	Basketball & sports shop Chinese Restaurant &
20 Moore Street	Unknown	Hairdressers upstairs
21 Moore Street	Madina Asian Food Co.	Asian Food Market
22 Moore Street	China House	Restaurant
23 Moore Street	Vacant	
23 MOOIC SHEEL	v acalit	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

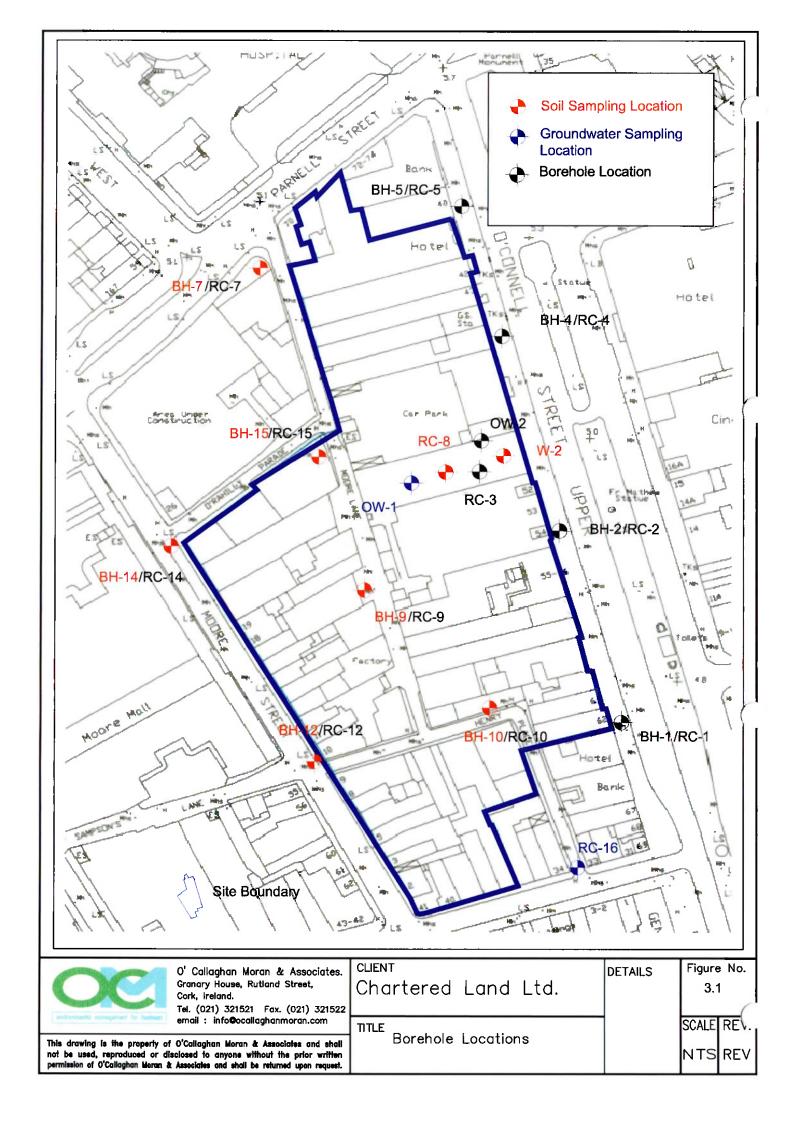
The GSI bedrock "Geology of Kildare – Wicklow", Map 1994 states that the subject area is underlain by dark grey to black limestones and shales of the Calp Limestones. Calp units typically consist of dark grey, fine grained, graded limestone with interbedded black, poorly fossiliferous shales. The limestone 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 17<sup>th</sup> and 18<sup>th</sup> century particularly in the low lying areas close to the Liffey.



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 (LI) 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.

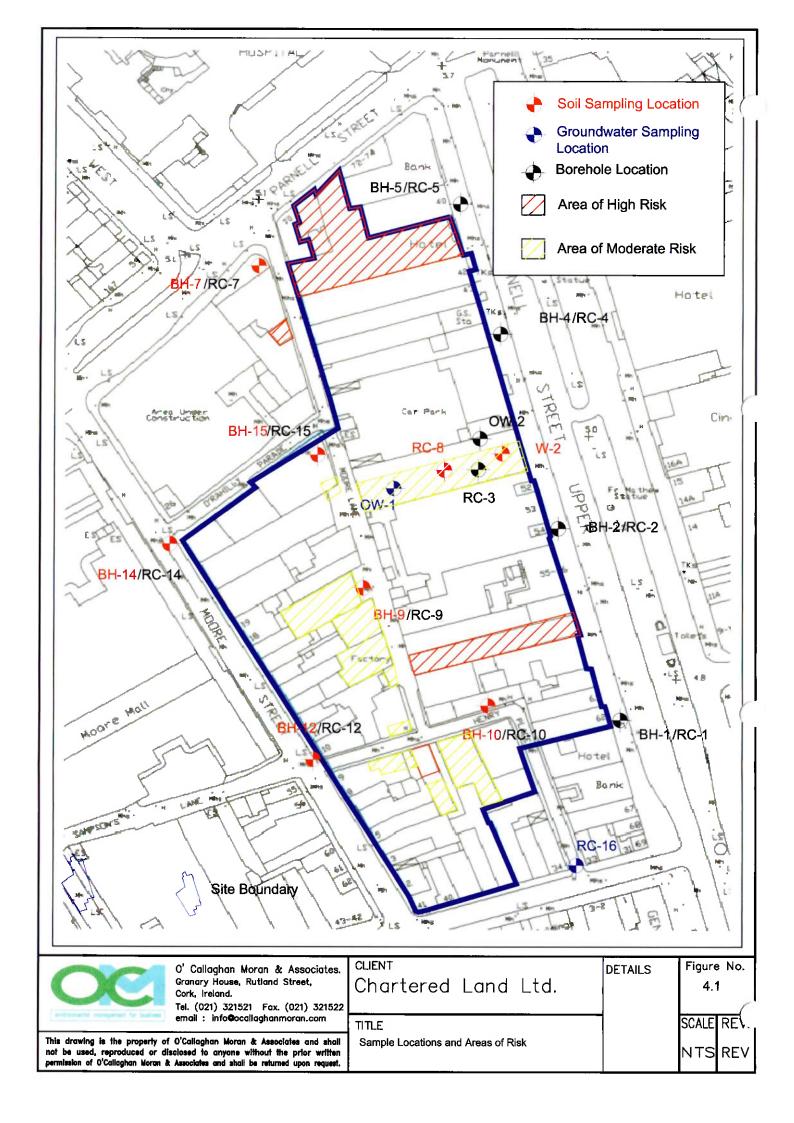
As none of the buildings identified in the 2006 assessment had been demolished, the boreholes had to be positioned in open areas and around the site perimeter and could not be located in all of the risk areas identified in the 2006 assessment. Figure 4.1 shows the location of the boreholes and the areas 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.



### 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, nonhazardous 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

	Sur	nmary of Soils Sa	mples	
Borehole Name	Sample Type	Sample Type	Sample Depth	Type of Subsoil
	Fill Material	Soil	0.5-1 m	
BH-7	Natural Ground	WAC	4-5 m	Gravel
	Natural Ground	WAC	12-13m	Gravel
ВН-9	Fill Material	Soil	0.4-0.8m	
Dn-9	Natural Ground	WAC	4-5m	Gravel
BH-10	Fill Material	Soil	1.7.2.5m	
	Fill Material	WAC	0.5-1m	
BH-12	Fill Material	WAC	3-4m	
DH-12	Natural Ground	WAC	4-5m	Clay
	Natural Ground	WAC	8-10m	Clay
	Fill Material	WAC	0.5-1m	
	Fill Material	WAC	1-2m	
BH-14	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	
KC-8	Fill Material	WAC	1-2m	
W-2	Fill Material	WAC	0.5-1m	
<b>VV</b> -∠	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

	Sample ID	BH-7	BH-9	BH-10	EPA Range	Dutch D	Dutch I	EU limits
Parameter	Sample Depth	0.5-1m	0.4-0.8m	1.7-2.5m	for Non-	Vehen D	Duncal	for Inert
	Units				polluted Soils	Valles	vaiues	landfill
Antimony	mg/kg	1.6	1.6	1.7	0.2-3	3	15	90.0
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	8.0	12	0.04
Chromium	mg/kg	11	14	14	5-250	100	380	0.5
Copper	mg/kg	16	28	30	2-100	36	190	2
Iron	mg/kg	8900	20000	25000	100005-00001			
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	006	
Zinc	mg/kg	89	98	94	10-200	140	720	4
TPH C6-C40	mg/kg	180	150	<50	NE	50*	*0005	500
BTEX	mg/kg	<0.2	<0.2	<0.2	NE	NE	100	9
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** 

	Sample I.D.	BH-12	BH-12	BH-14	BH-14	EU Limits for Inert	EU Limits for
Parameter	Depth (m) Unit	0.5-1m	3-4 m	0.5-1m	1-2m	Landfill	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	

<sup>\*</sup>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

	Sample I.D.	BH-14	BH-15	BH-15	BH-8	EU Limits for Inert	EU Limits for
Parameter	Depth (m) Unit	2-3m	0.5-1	1.0-2.0	0.5-1	Landfill	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	-

<sup>\*</sup>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

	Sample I.D.	BH-8	W-2	W-2	EU Limits for Inert	EU Limits for
Parameter	Depth (m)	1.0-2.0	0.5-1	1.0-2.0		Non-Hazardous
	Unit	1.0-2.0			Landfill	Landfill
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

	Sample I.D.	BH-7	BH-7	BH-9	BH-12	EU Limits for Inert	EU Limits for
. Parameter	Depth (m) Unit	4-5 m	13-14 m	4-5 m	4-5 m	Landfill	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	
ТРН	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	

<sup>\*</sup>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

	Sample I.D.	BH-12	BH-14	BH-14	BH-15	EU Limits for Inert	EU Limits for
Parameter	Depth (m) Unit	8-10m	3-4m	8-10m	12.0-13.0	Landfill	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	- 11
PCBs	mg/kg	< 0.01	< 0.01	<0.01	< 0.01	1	
ТРН	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	- 1

<sup>\*</sup>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 LD.	Units	Subso	il Wells	Bedroc	k Wells	IGV
Sample L.D.	Units	RC-16 Subsoil	OW-1 Subsoil	RC-16 Bedrock	OW-1 Bedrock	IGV
Antimony	mg/l	0.00048	0.00017	0.0023	0.00015	-
Arsenic	mg/I	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	
ТРН	mg/l	8	<0.1	<0.1	< 0.1	0.01
PAH Total (Sum of 16)	μg/i	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 (LI), which is moderately productive only in local zones. Aquifer vulnerability is considered to be moderate to low.

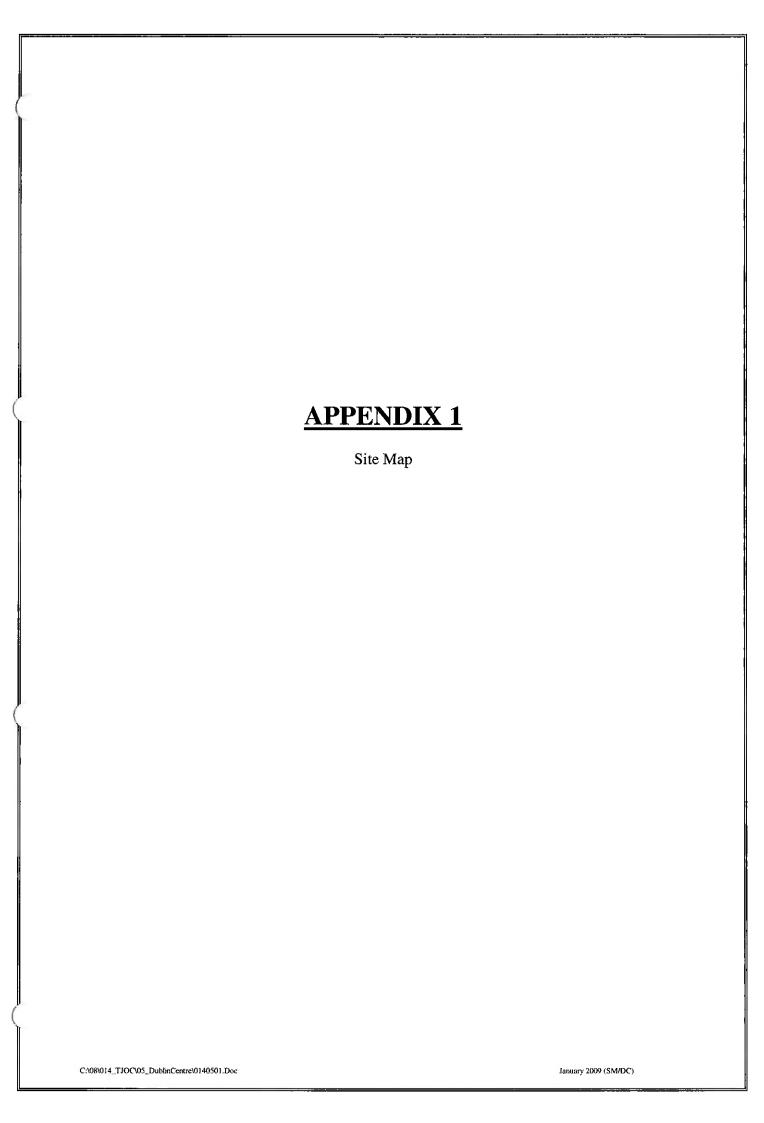
The investigation has established that the fill material and the underlying subsoils can generally be categorised as inert and suitable either for disposal at inert landfill or for use in land reclamation projects. There are localised zones in the fill such as at BH-12, RC-8 and W-2, where the contaminant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

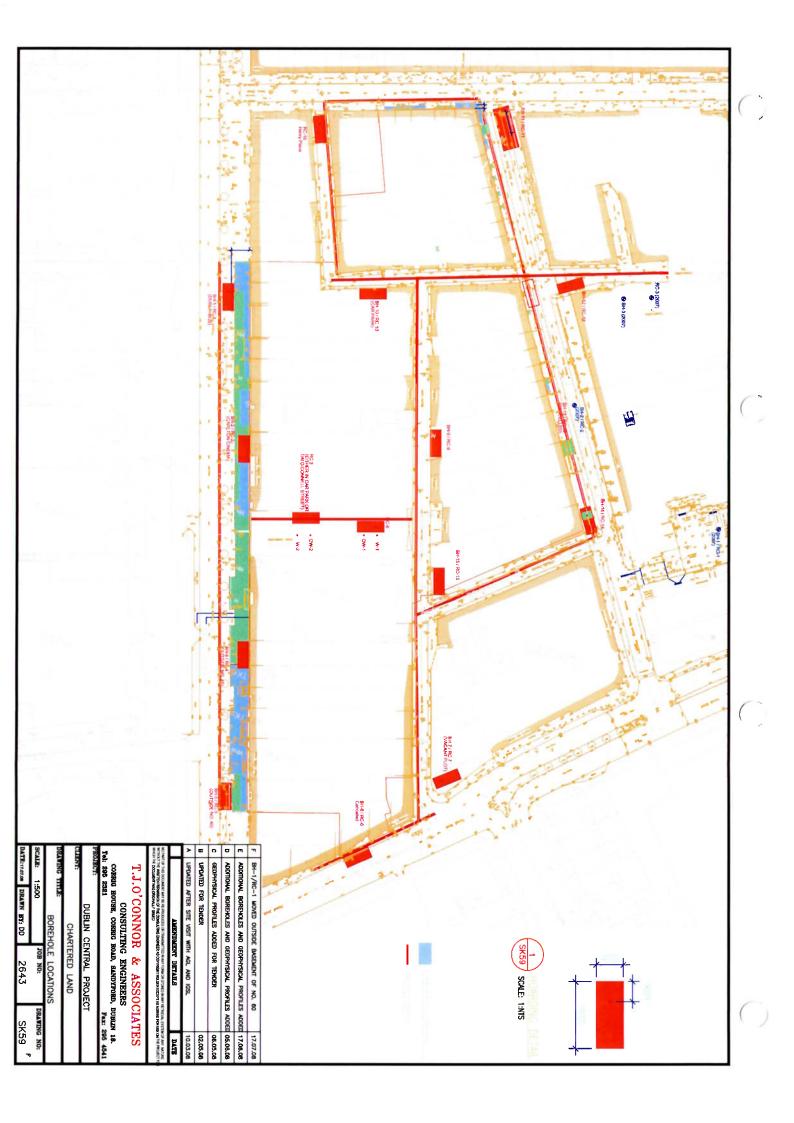
Elevated PAH levels were detected in the groundwater wells immediately to the south but not within the portion of the site where deep excavation will occur. It is possible therefore that these from an off-site location and not from within the development site. Low levels of PAH were detected in the subsoil 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.

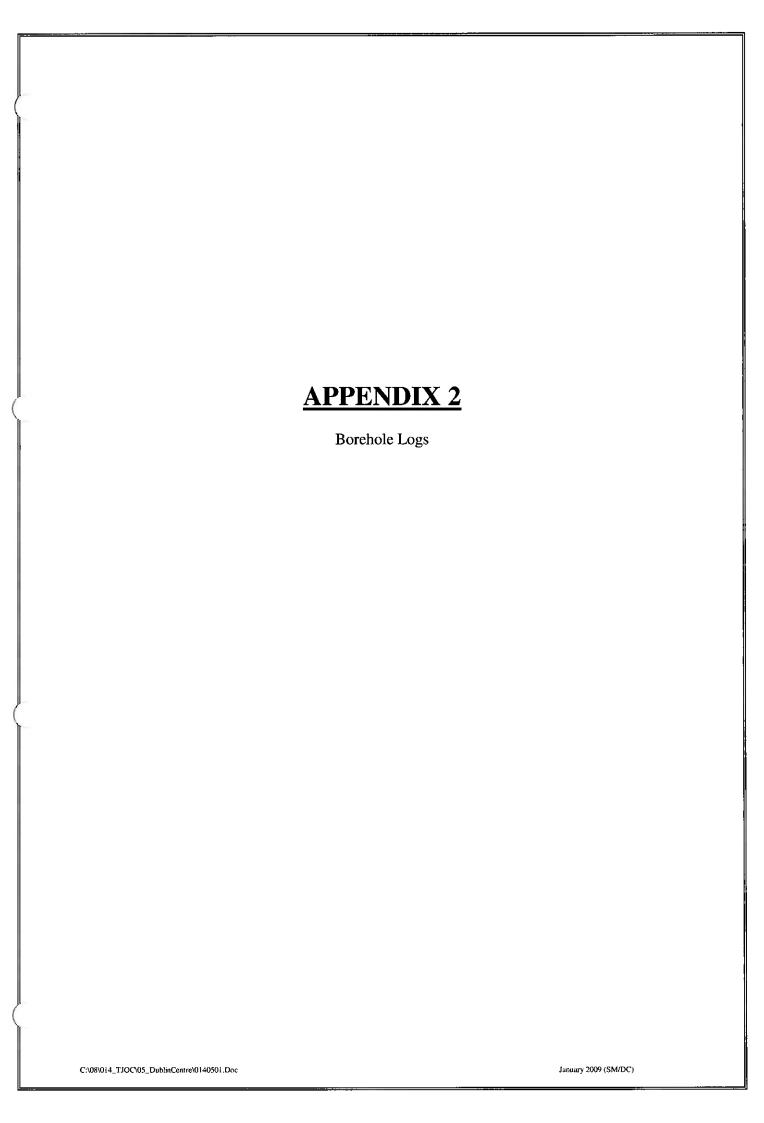
#### Recommendations 6.2

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.









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

# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

13696

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inda.			ם	escrip	tion			Legend	1	Denth (m)	Chair (mi)	Ref. Number	Sample Sam Type	Depth Depth		Recovery	Field Test Results	Standpipe
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												AF4960	В	2.70-2.			N = 63 (6, 5, 9, 13, 17, 24)	
	Dense many	grey sl	ightly clay	/ey/sil s fine	ty sand	y GRAVEL se and	. with			4.2	20	AF4961 AF4962	В	3.60-3. 4.50-4.			N = 100/225 mm (9, 20, 33, 38, 29)	
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# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

13696

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12							80.80 80.80			AF4969	В	12 00-12 00		N = 100/225 mm (11, 20, 26, 33, 41)	
13							00.0			AF4970	В	13.00-13.00		N = 100/90 mm (25, 44, 56)	
14							8000			AF4971	В	14.00-14.00		N = 100/185 mm (8, 11, 33, 48, 19)	
15							00000 00000 00000			AF4972	В	15.00-15.00		N = 100/150 mm (17, 27, 39, 61)	
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13	2.5   13 3.5   1 16   1	6	7	Hard Strata Bo Hard Strata Bo Boulder	oring oring		GROU Date	^	TER DE Hole Depth	Casing Depth	De W	oth to Co	ommen	nts	
NS	TALLATI						07-08- 08-08- 08-08-	-08	12.50 12.50 13.50	12.50 12.50 13.50	6	5.40 Sta	d of shift art of shift d of shift	t	
	Date T			p RZ Bas 15.00	e Ty 50mi	n SP	11-08- 11-08- 12-08- 12-08-	-08 -08 -08	13.50 16.00 16.00 16.00	13.50 16.00 16.00 16.00		5.20 Sta 4.80 En 5.20 Sta	art of shift d of shift art of shift d of shift	t	



BHLOG DCD 13696.GPJ IGSL.GDT 1/10/08

# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

13696

CO	NTRA	CT [	Dublin Ce	entral D	evelopn	nent - Draft								BORE		NO.	ВН9		-1
CO-ORDINATES RIG TYPE									Dando 150					SHEET DATE S	_	TED	Sheet 1 of 2 15/07/2008		
GROUND LEVEL (m AOD) BOREH								DLE DIAMETER (mm) 200									ED 23/07/2008		
1							BOREHO	IOLE DEPTH (m) 17.50						BORE	BY		J. McDonnell		
ENC	·							DEPTH (m) 17				50	_	PROCESSED BY			S. Letch		
-									_	<u> </u>	.  -		-	nples	_				ø
Deptn (m)				Descri	ption			Legend	Elevation	Denth (m)		Ref. Number	Sample Type	Depth (m)		Recovery	Field Test Results	-	Standpipe Details
7	MAD	E GRO	UND cor	D consisting of reinforced concrete.  D consisting of brown grey sandy															18
1	slight	ly grave	elly clay v	with so	me cobb	oles and red	I brick.			0.2	A	<b>∖F1908</b>	В	1.00-1.€	00		N = 7 (2, 2, 2, 1, 1, 3) N = 36		V175477547
	GRA\	/EL wit	h many d	cobbles	s. Grave	ey/silty sand I is fine to c	dy oarse	Daga LA GA		2.0	00 /	\F1909	В	2 10-2 1	0		(4, 6, 7, 2, 10, 1	n 🖔	
	and s	ubroun	ded to sı	ubangu	ılar of lin	nestone.	ŀ	2000			4	AF1910	В	2.50-2.5	60			X	1 8
3								00000000000000000000000000000000000000			A	\F1911	В	3.00-3.0	00		N = 39 (7, 9, 8, 10, 10, 1	1)	
								280			A	\F1912	В	4.00-4.0	00		N = 28 (2, 3, 6, 7, 8, 7)		
							<u>.</u>	5000			A	AF1913	В	5.00-5.0	ю		N = 34 (3, 4, 7, 7, 9, 11	, ,	
							5	2000			٨	\F1914	В	6.00-6.0	0		N = 27 (3, 3, 4, 8, 8, 7)		
							•	2000			۸	AF1915	В	7.00-7.0	ю		N = 77 (7, 18, 20, 25, 20,	12)	
							- 1 - 1 - 1	2000			А	AF1916	В	8.00-8.0	0		N = 69 (6, 12, 16, 20, 20,	13)	
							9	2000 2000 2000 2000 2000 2000 2000 200			A	NF1917	В	9 00-9.0	0		N = 18 (6, 6, 5, 5, 5, 3)		
IAI	RD ST	RATA	BORING	/CHIS	FLLING	i		0 1	R STR	IKE D	FTAI	ıs							LK
_	20 80	To (m)	Time		nments			Water	Ca	sing	Sea	aled	Rise		ime	Cor	nments		
16	2	16.5 17.5	(h) 1 2	Bould	ier			Strike 5.50		epth .50	N	lo	<u>To</u> 3.10		<u>min)</u> 5	_	Rapid		
- 17		17.3	4	Bould	iGI				$\perp$		ļ		-					_	
								GROU		TER E		ILS asing	Der	oth to					
							Date Depth			E	Depth \		epth to Comments						
STALLATION DETAILS							16-07-0	15-07-08 2.00 16-07-08 2.00		i	2.00		-	End of : Start of	shift				
Date Tip Depth RZ Top RZ Base Type						16-07-08 7.00 17-07-08 7.00				7.00		4.50 End of shift 4.50 Start of shift					1		
	07-08 IARKS	13.5 Hand du head te	ug inspectio	n pit exca	13.50 avated to 1	50mm \$ .20m. Falling ar 4th to 28th July	nd rising												(



# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

CO.	ORDI	NATES						RIG TY	DE .			Dando 1	-a	SHEET			Sheet 2 of 2	
		LEVEL	(m A	OD)					IOLE DIAM	ETER	(mm)	200		DATE C			15/07/2008 ED 23/07/2008	
_	ENT				ıl Develo	pm	ents Ltd	BOREH	OLE DEPT	TH (m)		17.50		BORED	BY		J. McDonne	11
	INEE		SL Co					CASING	DEPTH (	n)	-	17.50	- 1	PROCES		BY		
آ ج											=		San	nples	_			0
Depth (m)				De	scription				Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)	Recovery		Field Test Results	Standpipe
10	Verv	dense d	rev hr	OWn s	lightly c	ave	y/silty sa	ndv			-	AF1918		10.00-10.0	1			S
	GRA	VEL with	man	v cobi	oles. Gra	ivel	is fine to	coarse	80°40									
	(cont	subround inued)			_				2000									
11	No C	PT as g	avel b	olowin	g up ca	sing						AF1919	В	11.00-11.0	0		N = 41	
									2000					A SOURCE AND ADDRESS OF THE PARTY OF THE PAR			(11, 13, 11, 10, 10, 10	
									\$ \$ \$									
40									1 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3			AF 1920	В	12.00-12.0	0		N = 43	X
12									2000			WE 1950		12.00-120			(7, 5, 8, 8, 13, 14)	E
									2000									E
									9-00-								N = 78	I E
13									( S S S S S S S S S S S S S S S S S S S			AF1921	В	13.00-13.0	0		(6, 6, 10, 18, 25, 25)	I. E
-	Hard	dark hre	wa eli	ahtly	sandu a	rave	elly CLAY	' with	18 - 1 J		13.50	5						1
	occa	sional co	bbles	griuy	Januy y	.av	Jily OLAT	AAITII			13.30							W
14					11. 4				<del>2</del>		415	AF1922	В	14.00-14.0	0		N = 68 (6, 11, 15, 17, 19, 17)	$\otimes$
	Very some	dense g	rey br s. Gra	own s vel is	lightly s medium	and to	y GRAVE	L with	0 - R -		14.20	AF 1923		14.40-14.4		_		
)	\subro	ounded t	o suba	angula	ar of lime	sto	ne.	/			14.50	) Failed	υ	14.50-14.5	0% r 100 Ы			W.
15		dark bro sional co			sanuy g	dV	elly CLAY	WILLI				AF1924	В	15.00-15.0	0		N = 45/150 mm (20, 35, 20, 25)	
																	, , <del></del> /	
																		W
16	Very	dense g	rey br	own s	lightly s	and	y GRAVE	L with	20.80		15.90	AF1925	В	16.00-16.0	0			
	subro	unded t	suba	angula	ar of lime	esto	coarse an ne.	nd	80.80									
	Hard	black sli	ghtly s	sandy	gravell	CI	AY with		0 4		16.50							W
17		uction - p			ulder						17.00	AF1828 AF1829		16 80-16 8 17 10-17 1			N = 100 (8, 12, 20, 30, 30, 20)	
														17:10*17:1			, o, 12, 20, 30, 30, 20,	
	End	of Boreh	ole at	17.50	m						17.50							
18																		
19																		
HA	RD S1	TRATA I	ORIN	IG/CI	ISELL	NC			WATE	RSTE	IKE DE	TAILS	1					
		To (m)	Tim	ie ,	Commer				Water	Ca	sing	Sealed	Ris		me	Co	mments	
16	.2	16.5 17.5	(h 1 2	) E	Boulder				Strike	: D	epth	At	Тс	) (m	nin)			_
1	<b>'</b>	17.5	2	8	Boulder													
									GROU	NDWA		Casino						
									Date		Hole Depth	Casing Depth		pth to later	Comm	ent	S	
Nc.	ΓΔΙΙΑ	ATION E	ETAI	-					17-07- 18-07-	08 ]	13.00 13.00	13.00 13.00	-	460   5	nd of sl Start of s	shift		
	ate	Tip De	pth R	Z To	RZ Ba	_	Ту		18-07- 21-07-	08 ]	16.50 16.50	16.50 16.50		5.80   6	nd of sl tart of s	hift		
22-	07-08	13.5	)   1	12.00	13.5	0	50mr	n SP	1									
		1	1		1					ſ		E .	- 1	1				



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#### **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

13696

BOREHOLE NO. CONTRACT **BH10 Dublin Central Development - Draft** SHEET Sheet 1 of 2 **CO-ORDINATES RIG TYPE** Dando 150 DATE STARTED 30/07/2008 **BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD)** 200 DATE COMPLETED 13/08/2008 **BOREHOLE DEPTH (m)** 15.45 CLIENT **Dublin Central Developments Ltd BORED BY** J. McDonnell **ENGINEER** AGL Consulting Ltd CASING DEPTH (m) 15.45 **PROCESSED BY** S. Letch Samples Standpipe Details Ξ Ξ Elevation Ref. Number Recovery Field Test Depth ( -egend Description Depth ( Depth (m) Results MADE GROUND consisting of concrete. 0.10 MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick. AF 1830 В 1.00-1.00 N = 62 AF1831 В 2.00-2.00 (1, 1, 2, 1, 1, 2)N = 51 (8, 18, 16, 11, 17, 7) Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and -3 3.00 AF1832 8 3.00-3.00 Ø subrounded to subangular of limestone. N = 30(3, 5, 7, 7, 8, 8) AF1833 В 4.00-4.00 00 N = 50 (8, 8, 14, 14, 12, 10) AF 1834 ₿ 5.00-5.00 00 5.50 Dense grey slightly clayey/silty sandy GRAVEL with many cobbles. GRAVEL is fine to coarse and subrounded to subangular of limestone. N = 28AF1835 В 6.00-6.00 (4, 6, 6, 7, 7, 8) 6.80 Very stiff black slightly sandy gravelly CLAY with N = 56 (3, 15, 18, 12, 11, 15) 7.00-7.00 AF1836 В occasional cobbles 0 7.50 Very dense grey slightly clayey/silty sandy GRAVEL 80 with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. N = 100/225 mm AF1837 В 8 00-8 00 (15, 24, 25, 30, 45) N = 52 (7, 9, 14, 15, 13, 10) AF1838 В 9.00-9.00 HARD STRATA BORING/CHISELLING **WATER STRIKE DETAILS** Time Water Rise Casing Sealed Time From (m) To (m) Comments Comments Strike Depth (h) To (min) Hard Strata Boring Hard Strata Boring 8 8 2 8.00 8.00 Νo 6.50 20 Moderate 14.5 15.45 11 15.4 Boulder **GROUNDWATER DETAILS** Hole Casing Depth to Water Comments Date Depth Depth 30-07-08 08-08-08 End of shift 6.00 6.00 4.80 Start of shift INSTALLATION DETAILS 08-08-08 11-08-08 8.00 6.10 End of shift Start of shift Tip Depth RZ Top RZ Base Date 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

168

BH LOG DCD

#### **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

13696

BOREHOLE NO. CONTRACT **Dublin Central Development - Draft BH10** SHEET Sheet 2 of 2 **CO-ORDINATES RIG TYPE** Dando 150 **DATE STARTED** 30/07/2008 **BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD)** 200 DATE COMPLETED 13/08/2008 **BOREHOLE DEPTH (m)** 15.45 CLIENT Dublin Central Developments Ltd **BORED BY** J. McDonnell **ENGINEER** AGL Consulting Ltd **CASING DEPTH (m) PROCESSED BY** 15.45 S. Letch Samples Depth (m) Standpipe Details Ξ Recovery Elevation Ref. Number Sample Type Field Test Legend Description Depth ( Depth (m) Results - 10 AF1839 10.00-10.00 Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and 00°20° ਥ (9, 13, 16, 24, 19, 17 subrounded to subangular of limestone. (continued) ِ تَوَكَّمَ N = 100/160 mm (13, 39, 50, 40, 10) AF1840 В 11.00-11.00 N = 100/170 mm (12, 30, 40, 45, 15) 12 AF1841 В 12.00-12.00 N = 100/125 mm (12, 23, 62, 38) AF1842 13.00-13.00 13 \$ <u>\$</u> Hard black slightly sandy gravelly CLAY with 13.80 N = 100/230 mm (4, 10, 20, 35, 40, 5) AF1843 В 14.00-14.00 occasional cobbles. N = 100/75 mmAF1844 15 В 15.00-15.00 (12, 43, 100) Ò 15.40 15.45 Obstuction - possible boulder AF1845 В 15.45-15.45 End of Borehole at 15.45 m 16 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Rise Time Water Casing Sealed Time From (m) To (m) Comments Comments (h) Strike Depth (min) Hard Strata Boring Hard Strata Boring Boulder 11 14.5 15.45 IGSL.GDT 1/10/08 11 15.4 **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth 11.00 11.00 14.50 14.50 15.45 11.00 11.00 4.90 INSTALLATION DETAILS
Date Tip Depth RZ Top RZ Base 12-08-08 12-08-08 13-08-08 Start of shift End of shift 4.60 5.60 14 50 14.50 15.45 Type 4.50 5.60 Start of shift End of shift 13-08-08 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.

#### GEOTECHNICAL BORING RECORD

13696

BOREHOLE NO. **BH12** CONTRACT Dublin Central Development - Draft SHEET Sheet 1 of 2 **CO-ORDINATES RIG TYPE** Dando 2000 **DATE STARTED** 12/10/2008 **BOREHOLE DIAMETER (mm)** 200 DATE COMPLETED 16/10/2008 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 13.60 CLIENT Dublin Central Developments Ltd BORED BY J. McDonnell **ENGINEER** PROCESSED BY AGL Consulting Ltd CASING DEPTH (m) 13.60 S. Letch Samples Standpipe Details Depth (m) Ξ Elevation Sample Type Recovery Ref. Number regend Field Test Depth ( Description Depth (m) Results - 0 MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete. AF4857 В 1.00-1.00 - 1 (2, 2, 3, 3, 4, 4) AF4858 2 В 2.00-2.00 (2, 2, 2, 3, 3, 3) -3 N = 30 (4, 8, 10, 8, 6, 6) AF4859 В 3.00-3.00 Firm becoming stiff brown slightly sandy gravelly CLAY with occasional cobbles. 3.40 N = 17 (4, 3, 4, 4, 4, 5) AF4860 В 4.00-4.00 N = 34AF4861 В 5.00-5.00 5 (4, 6, 8, 8, 9, 9) N = 49 (6, 6, 9, 10, 12, 18) AF4862 В 6.00-6.00 6.00 Very stiff becoming hard black slightly sandy gravelly CLÁY with occasional cobbles N = 100/200 mm (14, 20, 35, 35, 30) AF4863 В 7.00-7.00 AF4864 В 8.00-8 00 N = 54 (6, 8, 12, 12, 14, 16) N = 55 (7, 8, 11, 14, 14, 16) AF4865 В 9.00-9.00 HARD STRATA BORING/CHISELLING **WATER STRIKE DETAILS** Water Sealed Rise Time Time Casing From (m) To (m) Comments Comments Strike (h) Depth To (min) 7.5 Boulder GROUNDWATER DETAILS Depth to Water Hole Casing Date Comments Depth Depth 12-10-08 1.20 1.20 7.00 7.00 1.20 1.20 7.00 7.00 End of shift 13-10-08 14-10-08 14-10-08 Start of shift End of shift INSTALLATION DETAILS
Date Tip Depth RZ Top RZ Base Type 6.70 Start of shift 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.

3696.GPJ IGSL.GDT 5/11/08

																REI	PORT NUMBER	ł
						G	EOTE	CHNICA	L BOR	ING I	RECO	RD					13696	
COI	NTRAC	T [	Dubli	n Cen	itral D	evelopr	nent - Dra	aft						BOREHO	LE N	<b>o</b> .	BH12	
CO-	ORDI	NATES						RIG TYP	 PE		:	Dando 20	<u> </u>	SHEET DATE OF	APT		Sheet 2 of 2	·
		LEVEL		AOD)					L OLE DIAM	ETER (n		200		DATE ST			12/10/2008 16/10/2008	
CLIE						evelopn	nents Ltd	BOREH	OLE DEPT	H (m)		13.60		BORED E	 3Y		J. McDonnell	 
ENG	INEE	₹ /	\GL	Consul	itting L	_td		CASING	DEPTH (r	n)	T .	13.60		PROCES	SEDI	BY	S. Letch	r
$\Xi$										 	Ē	<u>_</u>		nples	T - 2	_	·	<u>a</u>
Depth (m)						ription			Legend	Elevation	Depth (m)		Sample Type	1	Recovery		Field Test Results	Standpipe
10	Very CLAY	stiff bed with o	ccas	ng har ional d	rd blac cobble	ck slight es (cont	ly sandy ( inued)	gravelly				AF4866 AF4867	В	11.00-11.00			N = 100/50 mm (8, 42, 100) N = 100/90 mm (10, 38, 80, 20)	
12	occas	ional c unded	obble to su	es. Gra ibangu	avel is ular of	s fine to f limesto	coarse a		80 ° 80 ° 80 ° 80 ° 80 ° 80 ° 80 ° 80 °		11.50	AF4868	В	12.00-12.00		(9	N = 68 9, 11, 15, 16, 18, 19)	
13	cobbl						AY with o	occasional			12.50	AF4869	В	13.00-13.00			N = 100/150 mm (22, 35, 40, 60)	
14	End o	f Boreh	nole :	at 13.6	60 m						13.60							
15																		
16																		
17																		
18																		
19																		
HAI	RD ST	RATA	BOR	ING/C	CHISE	LLING			WATE	R STRI	KE DET	AILS			<u> </u>	_	<del></del>	
	$\overline{}$	To (m)		Time (h)		mments			Wate Strike	r Ca		Sealed At	Ris			Com	ments	
13.	.5	13.6		2	Boul	lder			11.50		.50	No	10.5	<del></del>	$\overline{}$	Мо	derate	
									GROU	NDWAT	ER DET	AILS						
									Dat	•	Hole Depth	Casing Depth	De V	pth to c	omm	ents		
		TIO:							15-10- 15-10-	08	12.50 12.50	12.50 12.50	1	1.50 E	nd of si			
	ate		epth	RZT		RZ Bas		Туре	16-10-	80	13.60	13.60	1		nd of s			
	10-08	13.6 Hand o		11.5	1	13.60		mm SP										

#### REPORT NUMBER **GEOTECHNICAL BORING RECORD** 13696 BOREHOLE NO. W2 CONTRACT **Dublin Central Development - Draft** SHEET Sheet 1 of 3 **CO-ORDINATES RIG TYPE** Dando 3000 DATE STARTED 25/09/2008 **BOREHOLE DIAMETER (mm)** DATE COMPLETED 10/10/2008 **GROUND LEVEL (m AOD)** BOREHOLE DEPTH (m) 21.40 J. Edwards / J. McDohnell CLIENT BORED BY Dublin Central Developments Ltd **ENGINEER** CASING DEPTH (m) AGL Consulting Ltd PROCESSED BY S. Letch Samples Standpipe Details Ξ Depth (m) Elevation Ref. Number Sample Type Recovery \_egend Field Test Depth ( Description Depth (m) Results - 0 MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete. AG3601 В 0.50-0.50 0.60 MADE GROUND consisting of concrete. MADE GROUND consisting of brown slightly sandy 0.90 AG3602 В 1.00-1.00 gravelly clay with some red brick and concrete. AG3603 2.00-2.00 2 В AG3604 3.00-3.00 3 AG3605 В 4.00-4.00 Grey slightly clayey/silty sandy GRAVEL with occasional 4 20 3 80 cobbles. Gravel is fine to coarse and subrounded to 30 subangular of limestone. 200 00000 AG3606 В 5.00-5.00 5 000 AG3607 В 6.00-6.00 6 6.50 Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to 20 subangular of limestone. 200 В AG3608 7.00-7.00 0000 000 AG3609 В 8.00-8.00 AG3610 В 9.00-9.00 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Sealed Rise Time Time Casing Comments From (m) To (m) Comments Strike (h) Depth At To (min) Made Ground Obstruction Made Ground Obstruction Made Ground Obstruction Moderate 4.30 Νo 20 4.80 4.80 2.2 3.2 4.9 5.3 5.8 2.1 3.1 0.75 Boulder GROUNDWATER DETAILS Boulder 6.5hrs Chiselling 3.5hrs Hard Strata Boring 7hrs Chiselling 3hrs Hard Strata Boring 7.5hrs Chiselling 2.5hrs Hard Strata Boring Casing Depth to Water 1 10 Hole Comments Date Depth Depth 10 10 2.00 2.00 6.00 25-09-08 2.00 2.00 6.00 6.00 8.00 8.00 9.00 9.00 End of shift 25-09-08 26-09-08 26-09-08 27-09-08 27-09-08 28-09-08 28-09-08 Start of shift End of shift INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base 5.50 5.40 5.00 4.20 4.80 4.50

6.00 8.00 8.00 9.00 9.00

Start of shift End of shift Start of shift End of shift

Start of shift

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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 retary rig advanced to rockhead and gravel falling in behind hammer

Type

29-09-08

# **GEOTECHNICAL BORING RECORD**

	NTRACT Dublin Central Development - Draft							BOREH SHEET	OLE NO	D. W2 Sheet 2 c	of 3
0:	-ORDINATES	RIG TYPE	E			Dando 30	00	DATE S	TARTE		
3R	OUND LEVEL (m AOD)	BOREHO	DLE DIAME	TER (m	m)			DATE C	OMPLE	TED 10/10/20	08
	IENT Dublin Central Developments Ltd GINEER AGL Consulting Ltd		DEPTH (m)			21.40	- 1	BORED PROCES			ds / J. McDo
2				اء	5			nples			Φ
Depth (m)	Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	1	_	Field Test Results	Standpipe Details
10	Grey slightly clayey/silty sandy GRAVEL with ma cobbles. Gravel is medium to coarse and subrou subangular of limestone. (continued)	inded to	0000			AG3611	В	10.00-10			
11	Grey slightly clayey/silty sandy GRAVEL with ma cobbles and bands of dark grey clay. Gravel is m to coarse and subrounded to subangular of limes Grey slightly clayey/silty sandy GRAVEL with ma	nedium /			11.20 11.40	AG3612	В	11.00-11	00		
12	cobbles. Gravel is medium to coarse and subrou subangular of limestone.	inded to	\$2.00 \$2.00			AG3613	В	12 00-12	00		
13			80 80 80 80			AG3614	В	13.00-13	00		
14						AG3615	В	14.00-14.	00		
15	Brown slightly sandy gravelly CLAY with occasio	nal	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		15.50	AG3616	В	15.00-15.	00		
16	cobbles  Black slightly sandy gravelly CLAY with occasion	nal		-	16.40	AG3617	В	16.00-16.	00		
17	cobbles  Re-set up rig after rotary rig advanced to rockhea gravel falling behind hammer so must be cased	ad -									
18											
19		i.									
 HA	ARD STRATA BORING/CHISELLING		WATER	RSTRIK	E DET	AILS	L	<u> </u>			
	m (m) To (m) Time Comments		Water Strike	Cas	ing	Sealed At	Ris		ime min)	Comments	
12	11         12.2         10         7hrs Chiselling 3hrs Hard Str           2.2         14         10         7hrs Chiselling 3hrs Hard Str           14         16         10         6hrs Chiselling 4hrs Hard Str	ata Boring	June	Del	7011	AL	10		,111)		
16 16	16         16.2         2         Hard Strata Boring           6.2         16.4         3         Boulder           6.4         19.5         8         1hr Chiselling 7hrs Hard Stra           9 5         21.4         8         2hrs Chiselling 6hrs Hard Str	ita Boring rata Boring	GROUN Date	l D	Hole epth	Casing Depth		ratei	Comme		
	TALLATION DETAILS Date Tip Depth RZ Top RZ Base Typ	oe	29-09-08 30-09-08 30-09-08 01-10-08 02-10-08	3 1 3 1 3 1	1.00 1.00 2.20 2.20 4.00 4.00	11.00 11.00 12.20 12.20 14.00 14.00	4	4.50 4.80 4.80 5.00	End of sh Start of s End of sh Start of s End of sh Start of s	huft sift huft sift	
ŒΝ	MARKS Hand dug inspection pit excavated to 1.20m. Water 3.0m to aid drilling Blowing gravels from 4.9m to 6 Casing size reduced from 300mm to 250mm did 14.0m bgl Casing left in borehole to allow rotary fo	m bgl. eter at	02-10-04 03-10-04 03-10-04 09-10-04 09-10-04	3 1 3 1 3 1 3 1 3 1	6.00 6.00 6.40 6.40 9.50 9.50	16.00 16.00 16.40 16.40 19.50 19.50	2	5.00 4.50 4.90 4.80	End of sh Start of s End of sh Start of s End of sh	ift hift lift hift	

#### REPORT NUMBER **GEOTECHNICAL BORING RECORD** 13696 BOREHOLE NO. W2 CONTRACT Dublin Central Development - Draft SHEET Sheet 3 of 3 **CO-ORDINATES RIG TYPE** Dando 3000 **DATE STARTED** 25/09/2008 **BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD)** DATE COMPLETED 10/10/2008 **BOREHOLE DEPTH (m)** 21.40 CLIENT **Dublin Central Developments Ltd BORED BY** J. Edwards / J. McDonnell **ENGINEER** AGL Consulting Ltd CASING DEPTH (m) PROCESSED BY S. Letch Samples Standpipe Details Ξ Depth (m) Elevation Ref. Number Sample Type Legend Recovery Field Test Depth ( Description Depth (m) Results 00000 20 20.00 Grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is medium to coarse and subrounded to subangular of limestone. - 21 non Obstuction - rockhead End of Borehole at 21.40 m 22 - 23 24 25 26 27 29 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Rise Time Time Sealed From (m) To (m) Comments Comments Strike (h) Depth To (min) **GROUNDWATER DETAILS** Depth to Water Hole Casing Date Comments Depth Depth 10-10-08 21.40 End of shift INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type

IGSL GDT 5/11/08

13696.GPJ

BH LOG DCD

IGSL

# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

COV	ITRA	CT [	Oublin	(Centr	ral Development - Draf	ft						BOREHO	LE NO.		
CO-	ORDI	NATES				RIG TYP	)F			Dando 20	.aa	SHEET		Sheet 1 of 2	
			-	יטטי			CE OLE DIAMET	FR (m		Dando 20 200		DATE ST. DATE CO			
		LEVEL				_	OLE DIAMIE I OLE DEPTH		•	12.00	H				
CLIE	ENT INEE				ral Developments Ltd ing Ltd			(111)				BORED B		J. McDonnel  S. Letch	I
_,,,,	MACC		IGL U	-U ISUIQ	iiig Liu	CASING	DEPTH (m)			12.00	Sam	PROCESS noles	OCU BY	S. Leton	T
Depth (m)								<u> </u>	(m)	-	7	, <del>-</del>	چ	Field Test	Standpipe
듄				D	escription		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)	Rесоvегу	Results	
ے							Le le	E e	മ്	8 3	Sa	<u> </u>	Re		Sta
0					sting of granite cobbleto	ock.			0.10	1					X
					sting of concrete. sting of brown slightly s	andv			0.20						
	grave	elly clay	with :	some r	red brick and concrete.					1					<b>X</b>
1								i		AF4832	ENV B	1.00-1.00 1.00-1.00		N = 18 (3, 3, 5, 5, 4, 4)	
										1					
2										AF4833	ENV B	2.00-2.00 2.00-2.00		N = 12 (2, 2, 3, 3, 3, 3)	
										AF4033	P	4.VU-2.UU			
															W
3											ENV	3.00-3.00		N ≈ 11	
	Stiff I	orown sl	ightly	sandy	y gravelly CLAY.		<u>•                                     </u>		3.20	AF4834	В	3.00-3.00		(2, 2, 2, 3, 3, 3)	
															$\otimes$
,							<u> </u>				ENV	4.00-4.00		N = 22	
4										AF4835	B	4.00-4.00		(3, 3, 5, 5, 6, 6)	<b>X</b>
							<u> </u>								
							e							N = 57	
5	Very	stiff bro	wn sli	ightly s	sandy very gravelly CL	AY.	<u>• · · · · · · · · · · · · · · · · · · ·</u>		5.00	AF4836	В	5.00-5.00		(8, 14, 16, 16, 15, 10)	<b>S</b>
6							<u> </u>			AF4837	В	6.00-6.00		N = 84 (14, 20, 20, 24, 20, 20	<b>※</b>
				P. 1.22	1 1111	A. 1 /PP 1			0.53	4					
					clayey/silty sandy GRA vel is fine to coarse and	۹V⊨L with d	0 ° 2 0		6.50						<b>&gt;&gt;</b>
					lar of limestone.		202			AF4838	В	7.00-7.00		N = 84 (9, 14, 15, 19, 20, 30)	<b>X</b>
							0000							(5, 11, 70, 10, 20, 00)	
							8000								<b>X</b>
8							8 5			AF4839	В	8.00-8.00		N = 100/225 mm	$\mathbb{K}$
-							\$0 \$0							(14, 21, 30, 30, 40)	
							12 12 12 12 12 12 12 12 12 12 12 12 12 1								<b>X</b>
							6 2 2 a			AE4040		0.00.000	}	N = 100/275 mm	
9							\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			AF4840	В	9.00-9.00		(12, 16, 20, 20, 32, 28	)  }}
							600 80								$\otimes$
							3-2-								W
		RATA	_,		HISELLING		WATER				ъ.				
	(m)	To (m)	t t	ime (h)	Comments		Water Strike		sing pth	Sealed At	Rise To			Comments	
8.	1	8.3		1	Boulder		6.60		60	No	5.00	) 5	5	Moderate	
							GROUNI		FR DET	-Δ11 Ο					
							Date		Hole	Casing	De	oth to C	ommer	nts	
							10-11-08		Depth 6.50	Depth 6.50	W	aler	nd of shift		
		ATION [	DETA	JLS -			11-11-08 12-11-08		6.50 9.70	6.50 9.70	5	.00 Si	tart of shift nd of shift	ft t	
	ate	I Ip D	epth	KZ I	op RZ Base T	уре	13-11-08		9.70	9.70			tart of shi		
							_								
₹EM	ARK	started	at 180	Othrs to	pit excavated to 1.20m. Night accommodate Moore Street	t traders. Shift									
					lue to T2 licence restrictions.										



#### **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

															_(
CONTRA			Centra	I Developme	ent - Draft	1					- 1	BOREHOL SHEET	LE NO.	BH14 Sheet 2 of 2	
CO-ORE			OD)			RIG TYP	E OLE DIAME	ETER (m		Dando 20 200		DATE STA			
CLIENT		_		l Developme	ents Ltd	BOREH	OLE DEPT	l (m)	,	12.00	Ì	BORED B	Y	J. McDonnel	ı
ENGINE	ER	AGL Co	onsultin	g Ltd		CASING	DEPTH (m	1)		12.00		PROCESS	ED BY	S. Letch	т
Œ								등	Œ	<u></u>	T -	nples	2	- First Tree	<u>pe</u>
Depth (m)			De	scription			Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe
							P C	ă	ă	₩ Ź AF4841	R N →	10.00-10.00		N = 82	S C
occ	asional	cobbles	s. Grave	layey/silty sa el is fine to c	oarse and	VEL with	\$0°40			74 4041		10.00-10.00		(9, 13, 16, 19, 22, 25)	
sub	rounde	i to sub	pangula	r of limeston	ie. (contin	ued)	0000								
11							8 20			AF4842	В	11 00-11.00		N = 100/225 mm (15, 19, 35, 31, 34)	
							0000							(10, 10, 00, 01, 01,	
							8000								
12 Enc	of Bore	ehole at	12.00	m			-// <del>04/</del> / a		12.00	1					777
13															
14															
15															
16															
17												}	,		(
															1
18															
19															
HARD S	TRATA	_		SELLING				R STRII				·		-	
rom (m)	-	(	n)	Comments			Water Strike			Sealed At	Ris: To			comments	
11.9	12	1	.25 E	Boulder									ø.		
							GROUN	NDWATI	ER DET	AILS					
							Date		Hole Depth	Casing Depth	De W	oth to Co	ommen	its	
NSTALL	ATION	DETAI	II S				13-11-0		12.00	12.00	T 5	5.50 En	d of shift		
Date	Tip	Depth	RZ Top	RZ Base	Ту	ре									
									:						(
REMARK	starte	ed at 1800	Ohrs to ac	t excavated to commodate M	oore Street t	traders. Shift									
	hours	s each day	y totalling	to T2 licence i 20 hours stan	ding 2 No. 6	Falting and 1									
	allow	rotary fol	llow on		. J . S. T. III DON										



# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

COI	NTRACT	Dublin Ce	entral Development - Dra	aft						BOREHO	LE NO		
	ORDINAT	ES		DIC TVD				Daniel 45		SHEET		Sheet 1 of 3	
			<b>5</b> )	RIG TYP		TCD /	\	Dando 15	۱,	DATE ST			
		/EL (m AO		BOREUS	DLE DIAME		•	200	-			TED 24/09/2008	
	ENT		entral Developments Ltd		LE DEPTH			21.20		BORED E		J. McDonne	Ш
ENG	SINEER	AGL Cons	sulting Ltd	CASING	DEPTH (m)	) 		21.20		PROCES	SED B	Y S. Letch	Т
<u>E</u>						ے	Ê		Sam	ipies	\ \	4	l g
<u>=</u>			Description		Pue	aţį	Depth (m)	la de	e Ple	Ę	)ver	Field Test Results	idp
Depth (				İ	Legend	Elevation	Dec	Ref. Number	Sample Type	Depth (m)	Recovery	resolis	Standpipe
0	MADE GI	ROUND cor	nsisting of tarmacadam.		××××	-t					-		W
	MADE GI	ROUND cor	nsisting of brown slightly me red brick, ash and co	sandy			0.20						
	gravelly C	my will SUI	no rea brien, asil aliu co	norote.	<b>*****</b>								
1					<b>*****</b>						1		
					<b>*****</b>			AF4821	В	1.20-1.20		N ≃ 4 (1, 1, 1, 1, 1, 1)	
					<b>*****</b>								
2					<b>*****</b>			AF4822	В	2.00-2.00		N=7	
					<b>*****</b>							(1, 2, 2, 2, 1, 2)	<b>&gt;</b>
					<b>*****</b>								$\mathbb{W}$
3					<b>*****</b>			AF4823	В	3.00-3.00		N = 17	
٠					<b>*****</b>	-		, ,020		2.20 3.00		(4, 4, 4, 3, 2, 8)	<b>&gt;&gt;</b>
-	Very dens	se grey sligh	htly clayey/silty sandy G	RAVEL		-	3.50	1					
	with occa	sional cobb	les. Gravel is fine to coa igular of limestone.	rse and	৪ <del>০</del> ছ			AF 100 :		4.00.1.00		N = 111	
4	SUSTOUTION	ou to subdii	igaiai oi illilesiolle.	[	0000			AF4824	В	4.00-4 00		(12, 16, 25, 30, 27, 29	<b>%</b>
				1	@ ~								
				  -	5 60	ĺ						N = 400/450	
5				}	80 #0			AF4825	В	5.00-5.00		N = 100/150 mm (35, 48, 52)	<b>X</b>
				ŀ									
					60 00 C								
6				ţ	10 A B			AF4826	В	6.00-6.00		N = 119 (15, 22, 30, 29, 27, 33	×
				ľ	2000 S								
				ŀ									
7				ţ	800			AF4827	В	7.00-7.00		N = 17 (4, 6, 4, 5, 4, 4)	$\mathbb{X}$
					4 - B =							( ,	
					5-2-3								<b>X</b>
8				ļ	00 80			AF4828	В	8.00-8.00		N = 56	
					0 <del>0</del> 0 =							(6, 9, 11, 16, 15, 14)	
				ľ	9-26-								
9				ļ	00 00 0			AF4829	В	9.00-9 00		N = 87	
				}	80 BO							(9, 11, 16, 25, 20, 26,	
													<b>X</b>
													W
		Time	G/CHISELLING		WATER Water	STRIKI Casin		TAILS Sealed	Rise	e Tin	ne [		
	n (m) To (	<sup>(T)</sup> (h)	Comments		Strike	Dept	ň	At	То	(mi	n) C	omments	
3. 3. 4.	9 4	0.5 0.5 1	Boulder Boulder Boulder		6.00	6.00	1	No	4.70	)   5	'   <b>'</b>	Moderate	
5.	8 6	0.5	Boulder Hard Strata Boring		GROUNI	WATE	R DE	TAILS					
14 16	.4 16. .7 18.	7 8 8	Hard Strata Boring Hard Strata Boring		Date	Ho	ole	Casing	Der	oth to C	ommen	nts	
18 2	5 21	6	Hard Strata Boring Boulder		15-09-08	3.	pth 50	Depth 3.50	7 77	- Er	nd of shift		
	TALLATIO	N DETAILS		уре	16-09-08 16-09-08	6.	50 00	3 50 6.00		- Er	art of shift nd of shift		
	701G 11L	, Deptil RZ	TOP ITE Dase	, pe	17-09-08	6.	00	6.00		- St	art of shift	ı	
					_								
	8 A D 1/ C		on pit excavated to 1.20m. Water		- I								



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

#### **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

ONTRACT	Dub	lin Cent	ral C	evelo	oment	- Draft							- 1	BORE	HOLE	NO.	BH15 Sheet 2 of 3	(
O-ORDINA ROUND LI		n AOD)					RIG TYI BOREH	PE OLE DIAI	MET	ER (m	ım)	Dando 15 200	50	DATE	STAF			
LIENT	Dub	lin Cent	ral [	,	oments	Liu		OLE DEP		(m)		21.20	Ī	BORE	D BY		J. McDonne	II
VGINEER	AGL	Consul	ting I	_td			CASING	DEPTH	(m)			21.20	_		ESSE	D BY	S. Letch	Т
										_	Ê	-	T	nples			]	l w
-		D	escr	iption				Legend		Elevation	Depth (m)	Ref. Number	Sample Type	Depth	Ê	Recovery	Field Test Results	Standpipe
Very de with occ subrour	asional	cobbles	s. Gr	avel is	fine to	coars	e and	000				AF4830	В	10.00-1	0.00		N = 54 (7, 10, 11, 11, 17, 15)	
1								000000				AF4831	В	11.00-1	1.00		N = 47 (3, 5, 9, 9, 14, 15)	
								00 B				AF4832	В	12.00-1	2.00		N = 69 (5, 7, 20, 15, 16, 18)	
								\$ 500 00 00 00 00 00 00 00 00 00 00 00 00				AF4833	В	13.00-1	3.00		N = 100/150 mm (3, 11, 26, 74)	
								80.00				AF4834	В	14.00-1	4.00			
Hard bla occasion			dy gr	avelly	CLAY	with		0 0			14.40	AF4835	U	14.50-1	4.50 19 150	% rec ) blows		
												AF4836	В	15.50-1	5.50		N = 100/240 mm (11, 15, 20, 25, 45, 10	
												AF4837	В	16.50-1	6.50		N = 100 (10, 15, 19, 24, 30, 27	
												AF4838	В	17.50-1	7.50		N = 100/150 mm (20, 29, 40, 60)	
								0 0				AF4839	В	18.50-1	8.50		N = 100/210 mm (12, 26, 34, 37, 29)	
								0 0				AF4840	В	19.50-1	9.50		N = 100/180 mm (12, 30, 36, 44, 20)	
ARD STR		RING/O						WAT		STRIK Casir		TAILS Sealed	Rise	<u>. T</u>	Time	_		
	(m)	(h) 0.5	Cor	nment	s			Strik		Dept		At	To		(min)	Co	omments	
3.9 4.8	4 5 6	0.5 1 0.5	Boul Boul Boul	der der										_				
11 1  4.4 1	4.4 3.7	8 8	Hard Hard	Strata B Strata B	oring					H	ole	ETAILS Casing	Det	oth to	Com	man	to .	
18.5	3.5 21 1.2	8 6 2		Strata B Strata B der				Dat 17-09	-08	11	pth .00	Depth 11.00	W	ater 5.50	End of	f shift		
Date T	ALLATION DETAILS							18-09 18-09 19-09 19-09 22-09 22-09 23-09	1-08 1-08 1-08 1-08 1-08	11 14 14 16 16	.00 1.40 1.40 1.70 1.70 1.50	11.00 14.40 14.40 16.70 16.70 18.50	5 5 6 6	5.50 5.80 5.80 5.40 5.10 5.50 5.40	Start of End of Start of End of Start of End of Start of	of shift f shift of shift f shift of shift f shift		



# **GEOTECHNICAL BORING RECORD**

REPORT NUMBER

1	GSL															13090	
CO	NTRACT	Dubl	in Centra	l Developr	nent - Dra	ft						- 1	BOREH	OLE I	NO.	BH15	
	-ORDINA	TEC											SHEET			Sheet 3 of 3	
	OUND LI		AOD)			RIG TYP		WETE	R (m		Dando 15 200		DATE S			15/09/2008 ED 24/09/2008	
	IENT			l Developr	monte I td	BOREHO			-	•	21.20		BORED			J. McDonnel	
	GINEER		Consultir		nems Liu	CASING			•		21.20		PROCES		BY	S. Letch	'
_												San	nples		]		
Depth (m)			Des	scription			Legend		Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)	Bocovery	vecovery	Field Test Results	Standpipe Details
20	TIGIG DI	ack sligh nal cobb	tly sandy les <i>(cont</i>	gravelly C inued)	LAY with						AF4841	В	20.50-20.5	0		N = 100/175 mm (13, 29, 35, 42, 23)	
21	End of E	Borehole	at 21.20	m			<del>()-</del>		2	21.20	-		:				<b>X</b> /A
22																	
23																	
24								•									
25						:											
26																	
27																	
28																	
29																	
HA	ARD STR	АТА ВО	RING/CI	IISELLING	3				TRIKI	E DET	AILS			!			<u> </u>
		(m)	(n)	Comments			Wate Strik		Casin Depti		Sealed At	Ris To		me nin)	Co	mments	
3	3.9 4.8	3.8 4 5 6	0.5 E	oulder oulder oulder oulder				ŀ									
1	11   1	4.4 6.7	8 F	lard Strata Bo lard Strata Bo	ring ring				/ATE		FAILS Casing	De	nth to				
14 14 2	6.7 1 8.5 21 2	8 5 21 1.2	8 H 6 H 2 E	ring		23-09		De	pth 20	Depth 21.20	V	atei	Comm End of s		S		
	TALLAT Date T	ON DET	RZ Top	RZ Base	Ту	ре											
REI	MARKS 5	and dug in: 5m to aid d	spection pit drilling.	excavated to	1.20m. Water	added from	_										



REPORT NUMBER

CONT	TRA	СТ		ublir	Central [	Developm	ent - Dra	aft					DRILL SHEE	HOLE N	0	OW		
0-0	RDI	NA	ΓES(	_)						LEVEL (m) METER (mm)			DATE	STARTI COMPL		15/09	et 1 of 4 9/2008 9/2008	-
CLIEI ENGII		R			Central E	-	ents Ltd.		NCLINATE	ON		-90 Polymer G	DRILL	ED BY ED BY			nnium ahony	
Downhole Depth (m)	Core Kun Deptn (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa (mi	ture cing m)	Legend	Non-intact zones (shaded)		description	Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)	
0									made gr	on Pit - d by driller as round consistin I and cobbles.	g 1.20					ACTITACITA RCITICACITA RCITICACITA		
3									HOLE D Observe madegre	TRIX OPEN DRILLING: Ed by driller as ound consisting wood and clay	1					XXIIIXXIIIXXIIIXXIIIXXIII XXIIIXXIIIXX		
5 6 6 8 8									HOLE D	TRIX OPEN PRILLING: d by driller as of gravel	4.20					XVII KVII KVII KVII KVII KVII KVII KVII		(
9 REMA Hand			pectio	on pit	to 1.2m.		000			INSTALLATI Headworks.	ON REM	ARKS				X(1)X(1)X(1)X(1)X(1)X(1)X(1)X(1)X(1)X(1)	_	
									ž.	GROUNDWA	TER DE	TAILS	<del></del>					
										Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents			
NSTA	\LL/	ATIC	ON D	ETA	ILS			_		-22								(
Da 16-09	ate 9-08	Т	ip De	epth 0	RZ Top 10.50	RZ Base 13.50	50r	Type nm S	SP SP									
16-09			33.0		27.00	33.00	50r	nm S	SP.									



REPORT NUMBER

_	_																
COI	NTR	ACT	D	ublin	Central Develo	pme	nt - Dra	ft					DRILLI SHEET	HOLE NO	)	OW Shee	<b>1</b> et 2 of 4
CO-	-ORI	DINA.	TES(	_)				C	ORE DIAM	.EVEL (m) METER (mm)			DATE	STARTE COMPLE		15/09	9/2008
	ENT SINE	ER			Central Develo	•	nts Ltd.		ICLINATION LUSH	ON		-90 Polymer G	DRILLI LOGG				nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	00	Legend	Non-intact zones (shaded)	Strata	description	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
11									HOLE D		i						
- 13 - 14							000000000000000000000000000000000000000		HOLE D	TRIX OPEN RILLING: d by driller as of clay and	13.20						
17									HOLE D	TRIX OPEN PRILLING: Id by driller as of clay	16.20						
REM Han							<u>-</u>				19.20						
REN	ARI				A- 4.2-					INSTALLA	TION REM	ARKS					
Han	a du	g ins	pection	on pit	to 1.2m.					Headworks.							
										GROUNDW	ATER DE	ΓAILS					
											Hole	Casing	Depth to Water	Comme	ents		
										Date	Depth	Depth	Water				
/S	TALI	_ATI	ON D	ETA	ILS					Date	Depth	Depth	Water				
NS.	TALI	1		epth	ILS RZ Top RZ B 10.50 13.5			Гуре nm S		Date	Depth	Depth	Water				



REPORT NUMBER

		ACT	TES(		Central [	Developm	ent - Dra	G		LEVEL (m)				SHE DAT	E START	ED	15/09	et 3 of 4 9/2008	,
CLI	ENT			ublin	Central D	Developme	ents Ltd.		ORE DIA	METER (mn ON	n)		-90		E COMPI	LETED		9/2008 nnium	
EN	SINE	ER	Α	GL C	onsulting l	Engineers		F	LUSH				Polymer G		GED BY		A. M	ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (mi	cing m) <sup>0</sup> 500	Legend	Non-infact zones (shaded)	Strata	a description		Depth (m)	Dis	continuitie	es	Elevation	Standpipe Details	SPT (N Value)	
22 23							011180808		HOLE I Observe returns gravel (c SYMME HOLE I Observe returns cobbles SYMME HOLE I Observe returns rock OPEN H DRILLIN	ETRIX OPEN DRILLING: ed by driller a of weathered HOLE NG: No record d by driller a	as d wery,	20.70 21.50 22.00							
226 227 28 REM Han																			
RE	//ARI	KS					Щ			INSTALL	ATION!	DEM	VDK6				<u> </u> :		
Han			pectio	on pit	to 1.2m.					Headworks		KENI	СИЛМ						
										GROUND		R DF1	TAILS						
										Date	Н	ole	Casing	Depth t Water	Comn	nents			
										2016	De	epth	Depth	water	33/11/1				(
INS			ON D																1
16-	Date 09-0		13.5	0	RZ Top 10.50	RZ Base 13.50		ype nn S	Р										
16-	09-0		33.0	o	27.00	33.00		nm S				_							



REPORT NUMBER

_	<u>_</u>	_																
CO	NTR	ACT	D	ublin	Central [	Developme	ent - Dra	aft						DRILLI SHEET	HOLE N	0	OW Shee	<b>1</b> t 4 of 4
СО	-ORI	DINA	TES(	_)						LEVEL (m) METER (mm	)				STARTE COMPLI		15/09	9/2008
	ENT GINE					Developme Engineers	ents Ltd	. In	ICLINATION LUSH		,		-90 Polymer G	DRILL	ED BY		Mille	nnium
			_^	GLU	Johnsteiling	Ligitieers			LUSH				Polymer G	LOGG	ED R.		A. Ma	ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa	m) <sup>0</sup> 500	Legend	Non-intact zones (shaded)	Strata	a description		Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
31									OPEN I DRILLIN observe returns (continu	NG: No recoved by driller as of rock.	ery,							
32									End of (	Corehole at 3	3	3.00						
34									(111)									
35																		
36																		
37	1																	
38					- - -													
REI Har															ı			
RE	VIAR	KS							L	INSTALLA	TION F	REM.	ARKS					
Har	nd du	g ins	pectio	on pit	to 1.2m.					Headworks								
										GROUNDY	VATER	DE	TAILS					
										Date	Ho Dep		Casing Depth	Depth to Water	Comm	ents		
1510	·		Ob: =									Ī						
INS	TAL Date		ON D Γip De			RZ Base		Туре										
16	-09-0	8	13.5	0	10.50	13.50	50	mm S	P									
10-	-09-0	· O	33.0	υ	27.00	33.00	50:	mm S	1-		1							



REPORT NUMBER

C	ONTR	ACT	D	Oublin	Central E	Developme	ent - Dr	aft							ILLHOLE N EET	10	RC(	)8 et 1 of 33	
C	O-OR	DINA	TES(	[_)				_ 0	ORE DIA	LEVEL (m) METER (mn	1)		102	DA	TE START		13/0	9/2008	
	LIENT NGINE				Central D				NCLINATI LUSH	ON			90 Polymer G		ILLED BY GGED BY			nnium ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spar (mi	cing m) o <sub>soo</sub>	Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	continuit	ies	Elevation	Standpipe Details	SPT (N Value)	
GSL RC NEWLOG 1M PER PG 13686.GPJ 14/1/08   H   H   H   H   H   H   H   H   H									made gr	d by driller as round consis I, sand, brick	ting						KUIRUITKUITKUIKUITKUITKUITKUITKUITKUITKUITKU		
E RE	MAR				14- 4 0					INSTALLA	ATION	REM/	ARKS						
G 13696 □ Ta	ına au	ig ins	pection	on pil	t to 1.2m.					Headworks									
PERP										GROUNDV Date	Н	ole	Casing	Depth Wate	to Comm	ents			
MEOG 18										Date	De	epth	Depth	vvate	7 301111				
SAI LES	STAL Date		Tip D	epth	RZ Top	RZ Base		Туре							į				
14 12 14	1-09-0 1-09-0	8(	13.0 32.5	00	6.00 26.50	13.00 32.50	50	mm S mm S	SP										



REPORT NUMBER

CON	ITR/	ACT	Ε	Dublir	Central I	Developme	ent - Dra	aft						DRI SHE		OLE N	10	RC0	)8 t 2 of 33
CO-	ORE	INA	TES(	_)				C	ROUND I	LEVEL (m)						TARTI	ED		9/2008
								C	ORE DIA	METER (mn	1)	1	02			OMPL			9/2008
CLIE	NT			Dublir	Central I	Developme	ents Ltd	II	NCLINATIO	ON		_	90	DRI	LLE	D BY		Miller	nium
	INE	ER				Engineers	<del></del>	- 1	LUSH			F	Polymer G			D BY			ahony
	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa	300	Legend	Non-intact zones (shaded)		scription		Depth (m)	Dis	continuiti	es		Elevation	Standpipe Details	SPT (N Value)
1	The state of the s								made gr of grave and timb	d by driller acound consist, sand, brick- per. (continue)  TRIX OPEN  BRILLING: d by driller acound gravelly cle	ting (ed)	1.20						\$\$!!#\$!#\$!#\$!#\$!#\$!#\$!#\$!#\$!#\$##\$\$!#\$\$!	
	ARI	_					a.		*	INSTALLA	TION	REM/	ARKS						
and	d du	g ins	pecti	on pi	t to 1.2m.					Headworks	S.								
										GROUND	VATE	R DET	AILS						98
										Date		ole	Casing	Depth t Water	to	Comm	ents		7.0
		A TT 1	Ob. 5	, jeni tape ac							De	epth	Depth	vvatei			-		
-				ETA		D7 Desc		T. 200 -											
	<u>ate</u> 09-0		Гір D 13.0		RZ Top 6.00	RZ Base 13.00		Type nm S						ŀ					
4-0	9-0	8	32.5		26.50	32.50	50	nm S	SP.										



REPORT NUMBER

СО	NTR	ACT		ublin	Central I	Developme	ent - Dra	aft						DRIL	LHOLE N	Ю	RC		-
														SHE	ET		Shee	t 3 of 33	
CO	-ORI	DINA	TES(	_)						LEVEL (m)					E START			9/2008	
								_		METER (mm	1)		102	DAT	E COMPL	ETED.	14/09	9/2008	
	ENT					Developme	ents Ltd.		NCLINATION	ON			90		LED BY			nnium	
-	SINE	ER	A	GL C	Consulting	Engineers		F	LUSH			F	Polymer G	el LOG	GED BY		A. Ma	ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	continuitie	s	Elevation	Standpipe Details	SPT (N Value)	
2									SYMME HOLE D Observer	TRIX OPEN RILLING: ed by driller a of gravelly cla bles (continue)  TRIX OPEN RILLING: ed by driller a of gravelly cla	s gy ued)	2.70					KOTTKOTTKOTTKOTTKOTTKOTTKOTTKOTTKOTTKOT		
RE	ΛAR	KS					1-1			INSTALLA	TION	REMA	ARKS				NININ	<u> </u>	
Har	d du	g ins	pection	on pit	t to 1.2m.					Headworks	5.								
										GROUNDY	VATE	R DET	AILS						
										Date		lole	Casing	Depth to Water	Comm	ente			
										Date	D <sub>1</sub>	epth	Depth	Water	John				/
INS	TAL	LATI	ON D	ETA	ILS														(
	Date				RZ Top	RZ Base		Туре											
14-	09-0	8	13.0	0	6.00	13.00	50r	nm S											
14-	09-0	8	32.5	0	26.50	32.50	50r	nm S	SP 9		l								



REPORT NUMBER

1	@ & 																	13	090
СО	NTR	ACT		ublir	Central	Developme	ent - Dra	ıft								OLE N	0	RC	
	ODI	SINE A	TES(						2POHNO	LEVEL (m)					EET				et 4 of 33
CO	-UKI	A <b>K</b> IIIC	i ES(	_,				- 1		METER (mn	n)		102			TARTE OMPLI			9/2008 9/2008
CLI	ENT			) ublin	Central I	Developme	onte I td	┥	NCLINATI		•,		-90			D BY			nnium
	SINE					Engineers	onto Eta.		LUSH				Polymer G			D BY			ahony
<sup>∞</sup> Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa			Non-intact zones (shaded)	SYMME HOLE I	ETRIX OPEN DRILLING: ed by driller a of gravelly cl	s	Depth (m)	Dis	scontinuit	es		Elevation	SZZZZZZZ Standpipe Details	SPT (N Value)
																		KUIKUIIKUIIKUIIKUIIKUIIKUIIKUIIKUIIKUII	
	ARI d du		pectio	n pi	t to 1.2m.		<del></del>			INSTALLA		REMA	ARKS						_
		ə 13		Pi	1,2111.					Headworks	i.								
									1	GROUNDY	VATE	R DET	AILS						
										Date	Н	ole	Casing	Depth Wate	to	Comme	ents		
										Date	D€	pth	Depth	<u>Wate</u>	+		-:110		-
NS'	TALL	ATIO	ON D	ETA	ils														
_	Date				RZ Top	RZ Base	1	уре											
	09-0	8	13.0	0	6.00	13.00	50n	nm S	P										
14-	09-0	o	32.5	υ	26.50	32.50	50n	nm S	7		l			I	1				



REPORT NUMBER

CC	NTR.	ACT	D	ublin	Central D	evelopme	ent - Dra	aft						DRILLI	HOLE N	0	RC0 Shee	1 <b>8</b> t 5 of 33	
CC	-ORI	OINA <sup>-</sup>	TES(	_)						.EVEL (m) METER (mm)	)	102		DATES	STARTE		13/09	)/2008 )/2008	
	IENT GINE				Central D onsulting E		ents Ltd	'	LUSH	ON		-90 Polymer	Gel	DRILLE			Miller A. Ma	nnium ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mr	n)	Legend	Non-intact zones (shaded)	De:	scription	Depth (m)	C	Discon	ntinuities		Elevation	Standpipe Details	SPT (N Value)	
4									HOLE D Observe returns o (continue	TRIX OPEN PRILLING:	4.20						KUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTI		
	MAR		nectio	on nii	t to 1.2m.					INSTALLA		MARKS							
''a	iru ut	ig iiis	Pecul	on pii	CO LEID					Headworks									
										GROUNDY			_ 1 .						
										Date	Hole Depth	Casin Depti		Depth to Water	Comm	ents	<del>.</del>		
												1	- 1						
I IN	TAI	ΙΔΤΙ	ON P	FΤΛ	II S							+							(
IN	STAL Date					RZ Base		Туре											



REPORT NUMBER

1000	フ																
CONTR	ACT	Du	ıblin	Central D	)evelopm	ent - Dr	aft							LHOLE N	10	RC	
CO-OR				Central D	)evelonm	ents I td	_ <		LEVEL (m) METER (mn	n)		102 -90	DAT	ET E START E COMPL LED BY		13/0: 14/0:	et 6 of 33 9/2008 9/2008 nnium
ENGINE				onsulting E			.	LUSH			-	Polymer G		GED BY			ahony
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mr	cing m) o <sub>509</sub>	Legend	Non-infact zones (shaded)	De	escription		Depth (m)	Dis	scontinuitie	es	Elevation	Standpipe Details	SPT (N Value)
5								HOLE D	ETRIX OPEN DRILLING: ad by driller a of gravel. red)							KUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTIKUTI	
REMAR Hand du		pection	n pit	to 1.2m.					INSTALLA		REM	ARKS					
	,o	,	. P-12						Headwork	S.							
									GROUND	,							
									Date		ole epth	Casing Depth	Depth to Water	Comm	nents		
NSTAL					D7 Dc -	1	T										
Date 14-09-0		Fip De <sub>l</sub> 13.00		6.00	RZ Base 13.00		Type mm S										
14-09-0		32.50		26.50	32,50		mm S										



REPORT NUMBER

CC	NTR	ACT	С	ublin	Central E	Developme	ent - Dra	aft						DRILI SHEE	LHOLE N	0	RCC	18 t 7 of 33	
cc	-ORI	DINA	TES(	_)						LEVEL (m) WETER (mi	n)	1	102	DATE	STARTI		13/09	9/2008	
	IENT GINE				Central E		ents Ltd		NCLINATIO	NC			90 Polymer G		ED BY			nnium ahony	
Downhole Depth (m)		T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spai (mi	cture cing m)	Legend	Non-intact zones (shaded)		scription		Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)	
6 RE Hat I 14 14 14 14 14 14 14 14 14 14 14 14 14									HOLE D	TRIX OPEI RILLING: d by driller : of gravel. ed)									
RE	MAR				14- 1 2		101		1	INSTALL	ATION	REM	ARKS				ri ri ri		
nai	na au	ıy ıns	hecu	on pi	t to 1.2m.					Headwork	S.								
										GROUND	_	R DET	Casing	Denth to	T_				
										Date		epth	_Depth_	Depth to Water	Comm	nents			_
INS	TAL	LATI	ON E	ETA	ILS														(
1/	Date -09-0		Гір D 13.0		RZ Top 6.00	RZ Base 13.00		Type mm S											
14	-09-0		32.5	50	26.50	32.50		mm S											



REPORT NUMBER

100	86	الح			OLOTI		1101	AL OOI	NE LOG	IXECOI	\D				13	696
CON	TRA	CT	D	ublin	Central Developm	ent - Dra	aft 					DRILL	HOLE N	o O	RC0	) <b>8</b> et 8 of 33
CO-(	ORD	INA <sup>*</sup>	TES(	_)				CORE DIAI	LEVEL (m) METER (mm		102	DATE	STARTE COMPL		13/09	9/2008 9/2008
CLIE ENG		ΕR			Central Developm onsulting Engineers		. 1	NCLINATION TUSH	ON		-90 Polymer G	DRILL el LOGG				nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 <sup>250</sup> 500	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
7								HOLE D	TRIX OPEN PRILLING: ed by driller as of gravel. ed)	5						
REM Hand			pectic	n pit	to 1.2m.				INSTALLA Headworks		ARKS					
									GROUNDY	VATER DE	TAILS					157
								,	Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
			ON D													
14-0 14-0		В	13.0 32.5	0	RZ Top RZ Base 6.00 13.00 26.50 32.50	50	Type nm :	SP								



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	NTR	ACT		Oublin	Central [	Developm	ent - Dra	aft							ILLHOLE N EET	10	RC(	<b>)8</b> et 9 of 33	
cc	-ORI	DINA	TES(	_)						LEVEL (m) METER (mr	n)	1	02	DA	TE START		13/0	9/2008 9/2008	
	IENT GINE					Developme Engineers	ents Ltd		NCLINATI FLUSH	ON			90 Polymer G		ILLED BY GGED BY			nnium ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa	cture cing m)	Legend	Non-intact zones (shaded)		scription		Depth (m)		continuit	1125	Elevation	Standpipe Details	SPT (N Value)	
8 RE Hail									HOLE D	TRIX OPEN PRILLING: ad by driller a of gravel. ed)									
RE	MAR		necti	on nit	to 1.2m.		001			INSTALL		REMA	ARKS	77.			ran r	<b>L</b>	
5	iu uu	9 1113	heerii	ou bii	. ,					Headwork		D DE-	All C						
										GROUND' Date	H	ole	Casing	Depth Wate	to Comn	nents			
										Date	↓ De	pth_	<u>Depth</u>	Wate	r John	ionio	<u></u>		
INS	TAL				ILS RZ Top	RZ Base		Туре	r										,
14 14	-09-0 -09-0	8	13.0 32.5	0	6.00 26.50	13.00 32.50	50	mm S	SP.			_							



REPORT NUMBER

	<b>'</b>																
CONTRAC	T E	Dublir	Central	Developm	ent - Dra	aft								IOLE N	o	RC	
CO-ORDIN			n Central I	Developm	ents Ltd	C		LEVEL (m) METER (mn	1)		102 -90	D,	ATE (	STARTE COMPLI ED BY		13/09 14/09	et 10 of 33 9/2008 9/2008 nnium
ENGINEER				Engineers		- 1	LUSH				Polymer G			DBY	v		ahony
Downhole Depth (m)  Core Run Depth (m)	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)		escription		Depth (m)	Dis	scontinu	ities		Elevation	Standpipe Details	SPT (N Value)
9							HOLE D		is								
REMARKS Hand dug ir	spection	on ni	t to 1.2m					INSTALLA		REMA	ARKS						
iana aug II	, apoul	on þi	. IV 1.ZIII.					Headworks	š.								
								GROUNDY	VATE	R DET	AILS						
								Date		ole epth	Casing Depth	Depth Wat	n to	Comme	ents		
										APILL	Dehiii	* val	-				
NSTALLAT				r <del>-</del>													
Date 14-09-08	Tip De 13.0		RZ Top 6.00	RZ Base 13.00		Type mm S	:D										
14-09-08	32.5		26.50	32.50	50i 50i	mm S mm S	SP			i							



REPORT NUMBER

co	NTR	ACT	D	ublin	Central D	evelopm	ent - Dr	aft						20000		OLE N	0	RC		
								Τ,	POSIND I	ENTEL (ma)					EET				t 11 of 3	3
co	-ORE	ANIC	TES(	_)						LEVEL (m)			102		_	TARTE			9/2008 9/2008	
_								┥.		METER (mr	nj			DA	IIE C	OMPLI				
	ENT				Central D			'	CLINATIO	ON			90		ILLE				nnium	
0	SINE	ER	A	GLC	onsulting E	:ngineers		F	LUSH			,	Polymer G	el LO	GGE	DBY		A. Ma	ahony	_
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mn	ing n)	Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuit	ties		Elevation	Standpipe Details	SPT (N Value)	
10									HOLE D											
		V.C.					000			INCTALL	ATION	DEM	ADVC							_
DE	AAD	NO.	pectio	on pit	t to 1.2m.					Headwork Headwork		LYCIAN	HANO.		**					
	MAR Id du	g ins								, JUGGAVOIN										
		g ins																		
		g ins								GROUND	WATER	R DET	TAILS							
		g ins								GROUND Date	Но	ole	Casing	Depth	to	Comm	ents			
		g insp										ole		Depth Wate	to er	Comm	ents			(
Har	id du		ON D	ETA	ILS						Но	ole	Casing	Depth Wate	to er	Comm	ents			(
Har	id du	LATIC	ON D			RZ Base 13.00		Type mm (			Но	ole	Casing	Depth Wate	to er	Comm	ents			



REPORT NUMBER

$\vdash$	_	_														<u> </u>		
CO	NTR.	ACT		ublin	n Central I	Developm	ent - Dr	aft ———						DRILL SHEE	HOLE NO	0	RC0 Shee	<b>)8</b> t 12 of 33
СО	-ORI	DINA	TES(	_)				c	ORE DIA	LEVEL (m) METER (mm	1)		102	DATE	STARTE		13/09	9/2008 9/2008
	IENT GINE					Developm Engineers	ents Ltd	.	NCLINATIO LUSH	ON			90 Polymer G		ED BY ED BY			nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
11:							000000000000000000000000000000000000000		SYMME HOLE D	TRIX OPEN RILLING: d by driller a of gravel. ed)  TRIX OPEN RILLING: d by driller a of gravelly cla	s	11.70						
_	MAR				11. 10		- magni el			INSTALLA	TION	REMA	ARKS					
nan	ıa dü	y INS	peciio	וום וזכ	t to 1.2m.					Headworks	ì.							
										GROUNDV	VATE	R DET	AILS					
										Date		lole epth	Casing Depth	Depth to Water	Comme	ents		
										Ī			_ =					
	TALI Date		ON D			RZ Base		Tuna										
14-	-09-0	8	13.0	0	6.00	13.00	50	Type nm S	iP									
	-09-0		32.5		26.50	32.50	50	nm S	P									



REPORT NUMBER

со	NTR	ACT	Đ	ublin	Central [	Developme	ent - Dra	aft								IOLE N	0	RCC		
		_						Τ,	SPOUND	F)(F) ()					HEET	-			t 13 of 33	<u> </u>
co	-ORI	DINA	TES(	_)						LEVEL (m)	- \		100			STARTE			9/2008	
								_		METER (mn	n)		102	D/	AIE	COMPL	FIED	14/08	9/2008	
	ENT					Developme	ents Ltd	.	NCLINATIO	ON			90			D BY			nnium	
	SINE	ER	A	GL C	onsulting	Engineers	1	JF	LUSH				Polymer G	el LC	OGGE	D BY		A. Ma	ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa (m	cing m) o <sub>500</sub>	Legend	Non-intact zones (shaded)		scription		Depth (m)	Dis	continu	ities		Elevation	Standpipe Details	SPT (N Value)	
12									HOLE D	TRIX OPEN RILLING: ed by driller a of gravelly cl ed)	as									
RE	MAR	KS						,	L	INSTALL	ATION	I REM	ARKS					ŀ¤·II·		
			pecti	on pi	t to 1.2m.					Headwork										
										GROUND	WATE	R DE	AILS			,				
										Date		lole	Casing	Dept Wat	n to	Comm	ents			
											De	epth	Depth	vva	.cr					-
INS	TAL	LATI	ON E	ETA	ILS															(
	Date	1	Tip D	epth	RZ Top	RZ Base		Туре												
	-09-0	8(	13.0	00	6.00	13.00	50	mm S	SP											
14	-09-0	ן טע	32.5	U	26.50	32.50	50	mm S	SP		1									



REPORT NUMBER

10	<u> </u>																10	
co	NTR	ACT	D	ublin	Central E	Developme	nt - Dra	aft						DR	LLHOLE	10	RCC	18
$\vdash$								$\overline{}$						SHI	ET		Shee	t 14 of 33
CO	-ORI	DINA.	TES(	_)						LEVEL (m) METER (mm	1)	1	102	I	TE START			9/2008 9/2008
CLI	ENT			ublin	Central F	evelopme	nts I td	┥	NCLINATIO		,		90		LLED BY			nnium
	GINE				onsulting I		THO ENG.		LUSH			F	Polymer G		GED BY			ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (mi	cing m) o <sub>soo</sub>	pueden	Non-intact zones (shaded)	SYMME	scription TRIX OPEN		Depth (m)	Dis	continuiti	es	Elevation	Standpipe Details	SPT (N Value)
									Observe		ay.							
_	MAR		neati	n ni	to 1 2m					INSTALLA		REM/	ARKS					<u> </u>
ı mar	ıa dü	y insi	pection	on pit	to 1.2m.					Headworks	<b>S</b> .							
										GROUND	VATE	R DET	TAILS					
										Date		ole epth	Casing Depth	Depth Wate	io Comn	nents		
											1	4 <del>-111</del>	DEMI	***				
		LATIC																
	Date -09-0		ip De 13.0		RZ Top			Type nm S										
14	-09-0 -09-0	8	32.5	ŏ	6.00 26.50	13.00 32.50	50i	nm s nm s	SP SP									



REPORT NUMBER

CO	NTR	ACT		ublin	Central Developi	nent - Dra	ıft						DRILL SHEE	.HOLE N	Ю	RC(	<b>)8</b> et 15 of 33	
cc	-ORI	DINA	TES(	_)					LEVEL (m) METER (mn	n)		102	DATE	STARTI		13/0	9/2008 9/2008	
	IENT GINE				Central Developr			NCLINATH LUSH	ON			-90 Polymer G		ED BY			nnium ahony	
Downhole Depth (m)		T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)		escription		Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)	
165L RC NEWCG 1M PER PG 13686 GPJ 165L GDT 11/1/08  188   Har   Language   La								HOLE D	TRIX OPEN PRILLING:  ed by driller a  of gravelly cl  ed)	as								
REI	MAR nd du		pectio	on pit	to 1.2m.				INSTALL		REM	ARKS			•	12// (		
1308		ا ۱۰۰۰۰		·- F.					Headwork: GROUND!		ם חבי	TAII Q						
									Date	Н	ole	Casing	Depth to Water	Comm	ents			
										⊥ D∈	epth	Depth	vvater	2271111				(
INS	TALI Date				ILS RZ Top RZ Bas	e	Гуре	P										
14 2 14	-09-0 -09-0	8	13.0 32.5	0	6.00 13.00 26.50 32.50	50r	nm S	iP iP										



REPORT NUMBER

	<u></u>		L																
co	NTR	ACT	D	ublir	Central [	Developm	ent - Dra	ıft						- 1	DRILLI SHEET	HOLE N	0	RC0 Shee	<b>)8</b> et 16 of 33
со	-ORI	DINA	TES(	_)				c	ORE DIA	LEVEL (m) METER (mm	1)		02		DATE :	STARTE		13/09	9/2008 9/2008
	IENT GINE				Central D		ents Ltd.		NCLINATH LUSH	ON			90 Polymer G		DRILLE LOGGE				nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa	m) <sup>0</sup> 500	Legend	Non-intact zones (shaded)		scription		Depth (m)	Dis	contir	nuities		Elevation	Standpipe Details	SPT (N Value)
15	15.00								HOLE D	TRIX OPEN PRILLING:  d by driller a  of gravelly cla  ed)	s say.	16.00						KIKIKI KATIKATIKATIKATIKATIKATIKATIKATIKATIKATI	
	WAR		D0041		tto 1 2					INSTALLA			ARKS					لا نهما	
нar	ia đu	y INS	pection	on bi	t to 1.2m.					Headworks	S.								
										GROUND	, <del>-</del>		AILS	,					
										Date		ole epth	Casing Depth	De W	pth to later	Comme	ents		
11.10			) h: =																
	TALI Date	ATI	ON D			RZ Base		Гуре											
14	-09-0	8	13.0	0	6.00	13.00	50r	nm S	P										
14	-09-0	8	32.5	0	26.50	32.50	50r	nm S	SP .	l	l .	- 11				İ			



REPORT NUMBER

		ACT DINA			Central D	evelopme	ent - Dra	(		LEVEL (m) METER (mn	n)	1	102	SHI	LLHOLE EET TE STAF TE COM	RTED	13/0	08 et 17 of 33 9/2008 9/2008	3
	ENT SINE				Central D		ents Ltd.	H	NCLINATIO		•	-	90 Polymer G	DR	LLED B	Y	Mille	nnium ahony	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mn	ure ing n)	Legend	Non-intact zones (shaded)	De	scription		Depth (m)		continuiti		Elevation	Standpipe Details	SPT (N Value)	
16	16 00	100	0	O					gravelly predomi	wn sandy CLAY (grav nantly fine, to sub-round								N = 100 mm (10, 15 60, 10)	. 30.
	MARI d du		pectio	on pit	to 1.2m.					INSTALL/ Headwork		REM/	ARKS						
										GROUND	WATE	R DET	AILS						
										Date	Н	ole epth	Casing Depth	Depth Water	to Con	nments	<u>-</u>		
_	T <b>ALL</b>	_ATIC				RZ Base		Гуре					_ = = = = = = = = = = = = = = = = = = =		l l				(
14-	09-0 09-0	8	13.0 32.5	0	6.00 26.50	13.00 32.50	50r	nm S nm S	SP										



REPORT NUMBER

	$\overline{}$	_																
CO	NTR	ACT	C	ublir	Central I	Developm	ent - Dra	aft						DRILI SHEE	.HOLE N	0	RC0 Shee	<b>)8</b> t 18 of 33
co	-ORI	DINA	TES(	_)						LEVEL (m)				DATE	STARTE		13/09	9/2008
									ORE DIAI	METER (mn	1)		102 90	_	COMPLI	ETED		9/2008
	ENT SINE					Developm Engineers	ents Ltd		LUSH	ON			ਰਹ Polymer G		ED BY			nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	cture icing im)	Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	scontinuities		Elevation	Standpipe Details	SPT (N Value)
17	17.00	100	0	0					gravelly predomi angular	wn sandy CLAY (gravi nantly fine, to sub-round illy rounded)	led	17.05						N = 55/31 mm (25, 45, 55)
	ARI			200						INSTALLA	TION	REMA	RKS				10/23 19	
nan	u du	y ins	pection	on pr	t to 1.2m.					Headworks	<b>5</b> .							
										GROUND	VATE	R DET	AILS					
										Date	Н	ole	Casing	Depth to Water	Comme	ents		
											De	epth	Depth	vvater				
INS	TALL		ON D															
	Date				RZ Top	RZ Base		Гуре	n									
	09-0 09-0		13.0 32.5	ŏ	6.00 26.50	13.00 32.50	50r 50r	nm S nm S	ir iP									



REPORT NUMBER

	ORE		TES(		Central Developme	ent - Dra	G		LEVEL (m) METER (mm	)	,	102	SHEE*	HOLE N T STARTE COMPL	ĒD	13/09	08 t 19 of 33 0/2008 0/2008
	ENT	ER			Central Developme onsulting Engineers	ents Ltd.		NCLINATION	ON			90 Polymer Ge		ED BY			nnium ahony
	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 <sup>250</sup> 500	Legend	Non-intact zones (shaded)		scription		Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
	[8.50 <sup>°</sup>	100	0	0				gravelly predomi angular	wn sandy CLAY (grave nantly fine, to sub-round ally rounded) ed)								N = 50/20 mm (25, 50, 50)
	ARI d du		pecti	on pit	to 1.2m.				Headworks		REM	ARKS					
									GROUNDV		R DE1	TAILS	-				
									Date	Н	ole opth	Casing Depth	Depth to Water	Comm	ents		
14-	TALI Date 09-0 09-0	8		0	RZ Top RZ Base 6.00 13.00 26.50 32.50	50	Type nm S	SP.			<del>, r. s.</del> i	- XXII					(



REPORT NUMBER

1	_	7																
CON	TRA	ACT	C	ublin	Central I	Developm	ent - Dra	aft						1	LLHOLE N	Ю	RC(	
CO-C		INA.			Central	Developme	ente I tri	C		LEVEL (m) METER (mm	1)	10		DA <sup>-</sup>	EE! FE START! FE COMPL LLED BY		13/09 14/09	et 20 of 33 9/2008 9/2008 nnium
ENGI		ER				Engineers	JING EN	.	LUSH			Р	olymer Ge		GED BY	,		ahony
	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)		scription	Depth (m)		Disa	continuiti	es	Elevation	Standpipe Details	SPT (N Value)
19		100	0	0					gravelly predomi angular	wn sandy CLAY (grave nantly fine, to sub-round illy rounded) ed)								
							× × × × × × × × × × × × × × × × × × ×		Firm (19 green br	9.4-19.6) to s own SiLT								
19	.90	100	0	0			×			htly gravelly own CLAY	19.9							
REMA			ectiv	an nii	t to 1.2m.					INSTALLA		IΑ	RKS					
iai IU	uuţ	y 1113	Jeout	on pil	LIU LÆIII.					Headworks	5.							
										GROUNDY	VATER DE	ΕTΑ	AILS					
										Date	Hole Depth		Casing Depth	Depth t Water	O Comm	ents		
NSTA						D7 Bass		Tvoo										
14-09	ate 9-08		13.0		6.00	RZ Base 13.00	50r	Type nm S	SP SP									
14-09			32.5	ō	26.50	32.50	50r	nm S	SP									



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co	NTR	ACT	С	ublin	Central E	Developme	ent - Draf	ft					DRILI SHEE	HOLE N	Ю	RC(	08 et 21 of 33
co	-ORG	DINA	TES(	_)				G	ROUND LEVEL (m)					START	ED		9/2008
								c	ORE DIAMETER (mr	1)	1	02	DATE	COMPL	ETED	14/0	9/2008
	ENT					Developme	ents Ltd.		ICLINATION			90		ED BY			nnium
	GINE	ER	A	GL C	onsulting l	Engineers		F	LUSH		F	Polymer G	el LOGO	SED BY	Т	A. M	ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (m: 0 25	cing m) <sup>0</sup> 500	Legend	Non-intact zones (shaded)	Description		Depth (m)	Dis	continuities	ì	Elevation	Standpipe Details	SPT (N Value)
20	20.00	100	31	26					Mottled brown black clayey, very gravelly SAND (medium grained) with local cobbles. Gravel is predominantly coars and rounded to sub-angular.		20.80	and plar	nuities are nar and clay i. Dips are	/			N = 39/30 mm (25, 61, 39
REI	VIAR	KS			•				INSTALL	OITA	I REMA	ARKS				K//J N	<b>d</b>
lar	nd du	g ins	pecti	on pi	t to 1.2m.				Headwork	s.							
									0501111								
									GROUND	_							
									Date		lole epth	Casing Depth	Depth to Water	Comm	nents		
VS	TAL	LATIC															
	Date					RZ Base		уре									
	-09-0 -09-0		13.0 32.5	10	6.00 26.50	13.00 32.50		nm S nm S									



REPORT NUMBER

(nes	BL	1		0_0	-01114					_				136	396
ONTE	RACT	D	ublin	Central Developm	ent - Drat	ft				/U <u>-</u>	DRILL	HOLE N	0	RC0	8 t 22 of 33
O-OR	DINA	TES(	_)					LEVEL (m) METER (mm	)	102	DATE	STARTE			/2008
LIEN NGINI				Central Development	ents Ltd.	IN	CLINATI .USH			-90 Polymer G	DRILL	ED BY		Miller A. Ma	
_	T - 7			g Engineers			.0011			olymer G	CI LOGG	, GU 01			inorry
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
21.5					bed black ARC LIM sligt mod Pyrithro calco (corr		strong, t bedded, black, fin ARGILL LIMEST slightly a moderat Pyrite di througho calcite v (continu	out. Local eining.	m to d.	Disconti and plar	nuities are s nar and clay d. Dips are . (continued d. (continued	smooth			
							SHALE.	alcareous Fresh to and locally		and insig	·10° with ha pient clay sr s throughou	neared			
EMAF		3		INSTALLA	TION REM	ARKS				IV/I N					
and d	ug ins	spection pit to 1.2m.					Headworks								
								GROUNDY	VATER DET	TAILS					
								Date	Hole	Casing	Depth to Water	Comm	ents		
									Depth	Depth	vvalei	375300000			
	I ATM	ח אס	FTAII	ıs					Deptin	Depth	vvalei				
<b>ISTAL</b> Date				LS RZ Top   RZ Base		уре			Deptil	Depth	vvalei				



REPORT NUMBER

	NTR				Central Developme	nt - Dra	_					SHEE				23 of 33	
CO	-ORI	DINA.	TES(	_)					LEVEL (m) METER (mm)		102		STARTI			/2008 /2008	
	ENT SINE				Central Developme	nts Ltd	.   11	NCLINATION			90 Polymer Ge	DRILL	ED BY		Millen A. Ma	nium	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)	
22	22.00	100	Đ	0				Pyrite di Incipient commor Moderat moderat black, ca SHALE. slightly a moderat Pyrite di Incipient	ely strong to ely weak, thinly to laminated, alcareous Fresh to and locally ely weathered.		and plan smeared are sub- and insin	nuities are : ar, and clay throughou 10° with ha bient clay si throughou ed)	/ t. Dips iirline neared		<u>KIKIKI KITETI KITEKITEKITEKITEKITEKITEKITEKITEKITEKITE</u>		(
	22.80	100	0	0					LINOTAL ATI								
	MAR Id du		pectio	on pit	t to 1.2m.				Headworks.	ON REM	ARKS						
										TED DES							
									GROUNDWA <sup>*</sup>	Hole	Casing	Depth to Water	Comm				
									Date	Depth	Depth	Water	Comm	ients			- 1
		ATIO															(
	Date -09-0	18	Tip Do 13.0		RZ Top RZ Base 6.00 13.00		Type mm \$										
	-09-0		32.5	ő	26.50 32.50	50i	mm S	SP									



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	<u>_</u>	_											42-	76				
CC	NTR	ACT	D	ublin	Central [	Developm	ent - Dra	aft						DRILL	HOLE N	0	RC(	<b>)8</b> et 24 of 33
cc	)-ORI	OINA'	TES(	_)						LEVEL (m) METER (mm	)	1	02	DATE	STARTE		13/09	9/2008 9/2008
	IENT					Developme Engineers	ents Ltd	.	ICLINATIO LUSH	ON			90 Polymer G		ED BY ED BY			nnium ahony
Downhole Depth (m)	1	T.C.R.%	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
23	23.10								moderati bedded black, ca SHALE. slightly a moderati Pyrite di Incipient	tely strong to tely weak, this to laminated, alcareous Fresh to and locally tely weathere spersed. It fractures in (continued,	d.	22.46	and plan smeared are sub- and insi	nuities are s nar, and clay d throughout -10° with hai pient clay sn s throughout ed)	t. Dips irline neared			
		100	57	50		5-	40		thin to m grey to d grained LIMEST slightly a moderat Pyrite di	out. Local	, ed, ∌ to	23.46	and plan	nuities are s har. Dips are with local si racture.	e			
RE	MAR	KS								INSTALLA	TION	REMA	ARKS					
_			pectio	on pit	to 1.2m.					Headworks								
										GROUNDY	VATE	R DET	AILS					
										Date		ole pth	Casing Depth	Depth to Water	Comm	ents		
INF	STALI	<u>Α</u> ΤΙ4	ח אכ	FTAI	ı s			- 100										
	Date	٦	ip De		RZ Top	RZ Base		Туре										
	-09-0 -09-0	8	13.0 32.5	0	6.00 26.50	13.00 32.50	50	mm S										



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co-	ORE	)NA	TES(	_)					LEVEL (m) METER (mm)	1	102		STARTE COMPLI		13/09/ 14/09/		
	ENT	ER			Central Developme	ents Ltd	.	NCLINATI LUSH	ON		90 Polymer G		ED BY		Millen A. Ma		
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)	De	scription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)	
24								thin to m grey to d grained LIMEST slightly a moderat Pyrite di	out. Local eining.	24.07	and plan		e		SCHOOL SC		(
								moderat bedded black, ca SHALE. slightly a moderat Pyrite di Incipient commor Strong tr	fractures	24.49	and plar smeared sub-10° fracture: Disconti and plar smeared	nuities are s nar and clay d. Dips are with sub ve	e mooth				
	4.60	100	0	0				bedded, black, fir ARGILL LIMEST slightly a moderat Pyrite dia	dark grey to ne grained ACEOUS ONE. Fresh to ind locally ely weathered. spersed out. Local	24.80							(
2	4.80							moderati bedded in black, ca SHALE. slightly a moderati Pyrite dis	fractures		and plar	nuities are s nar and clay d. Dips are	mooth				
	IARI I dug		ectio	n pit	to 1.2m.				INSTALLATION Headworks.	REMA	ARKS						
									GROUNDWATE	R DET	AILS	_					
									Date H	lole epth	Casing Depth	Depth to Water	Comme	ents			
	ate	Т		ETAI epth	LS RZ Top RZ Base		Туре			-WII	υσμιι	770001					(



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Core Run Depth (m) LC.R.%	<b>ES( _ )</b> Dublir	n Central Development of Consulting Engineers  Fracture Spacing (mm)	ents Ltd.	G C IN		LEVEL (m) METER (mm) ON		102 - <del>9</del> 0	DATE	HOLE NO STARTE COMPLE	:D	13/09	26 of 33 /2008 /2008
Core Run Depth (m)  T.C.R.%  Banana  A.C.R.%	Dublin AGL C	Fracture Spacing (mm)		C IN F	ORE DIAI	METER (mm)			DATE	STARTE		13/09	/2008 /2008
Core Run Depth (m) T.C.R.%	AGL C	Fracture Spacing (mm)		F		ON		- <del>9</del> 0					
1	S.C.R.% R.Q.D.%	Spacing (mm)		shaded)				Polymer G		ED BY ED BY		Millen A. Ma	
25		0 250 500	Legend	Non-infact zones (shaded)		scription	Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)
					moderat bedded black, ca SHALE. slightly a moderat Pyrite di Incipient	tely strong to tely weak, thin to laminated, alcareous Fresh to and locally tely weathered spersed. t fractures n. (continued)	i.	and plan smeared sub-10°.	nuities are s iar and clay I. Dips are (continued				
					strong, t bedded, black, fir ARGILL LIMEST slightly a moderat Pyrite di	out. Local	n to	Disconting and plan	nuities are s ar and clay I. Dips are	mooth			
100 7	75 45					g							
					thin to m grey to d grained LIMEST slightly a moderat Pyrite di	out. Local	to	Disconting and plan	nuities are s ar and clay l. Dips are	mooth			
REMARKS			Щ			INSTALLAT	TION REM	ARKS					
Hand dug inspe	ection pi	it to 1.2m.				Headworks.							
						GROUNDW	ATER DE Hole	TAILS Casing	Death 4				
						Date	Depth	Depth	Depth to Water	Comme	ents		
NSTALLATION													
	Depth 3.00	RZ Top RZ Base 6.00 13.00		ype nm S	iP								



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CON			ΓES(		Central Developme	.n Di		GROUND LEVEL	(m)			SHEE				27 of 33	
-04	UKU	MNA	E5(	_,				ORE DIAMETER		1	02		STARTE		13/09 14/09		
CLIE	ENT			ublin	Central Developme	nts Ltd		NCLINATION	, ,		90	DRILL	ED BY		Millen	nium	_
	INE	R			onsulting Engineers			LUSH		F	Polymer Ge		ED BY		A. Ma		
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Descriptio	no	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)	
26										26.11	and plans smeared sub-10°.	uities are s ar and clay Dips are (continued	)				
								Moderately stromoderately we bedded to lamin black, calcareo SHALE. Fresh slightly and loc moderately we Pyrite disperse-	ak, thinly nated, us i to ally athered. d.		to slightly	uities are s rough and Dips are su					(
2	6.30				ľ			Incipient fractu common.  Strong to mode strong, thin to r bedded, dark g black, fine grain	erately medium rey to ned	26.32	and plans	uities are s ar and sligh Dips are with iron ox	itly clay				
		100	30	0				ARGÍLLACEOI LIMESTONE. slightly and loc moderately wer Pyrite disperse throughout. Lo calcite veining.	US Fresh to ally athered. d			ub-vertical					
2	6.60																(
	ARK			· · ·	to 1 2n-	•		INST	ALLATIO	REM/	RKS						
and	a aug	ınsı	ectic	n pit	to 1.2m.			Head	works.								
								GRO	UNDWATI	R DET	AILS						
								Da		lole epth	Casing Depth	Depth to Water	Comm	ents			
										,	-,-						(
	ALL			eth oth	LS RZ Top RZ Base		Туре										
	alc		13.0		TOP INC Dase		mm S		1	1			1				



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			Central Developme		111					SHEE	HOLE N	U	RC0 Sheet	8 : 28 of 33
CO-ORDINATI	ES(	_)				GROUND LEVEL CORE DIAMETE			102	DATE	STARTE COMPLI		13/09 14/09	/2008
CLIENT ENGINEER			Central Developmensulting Engineers	nts Ltd.		LUSH			90 Polymer G		ED BY ED BY		Millen A. Ma	
	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Descripti	on	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
100	61	7				Strong to mode strong, thin to bedded, dark of black, fine grain ARGILLACEO LIMESTONE. slightly and look moderately we have been been been been been been been be	medium grey to ined US Fresh to cally athered. cocal ong to eak, thinly nated, ous athered. ded.	27.52	and plar smeared sub-10° stained fracture.	nuities are s ar and sligh d. Dips are with iron ox sub-vertical (continued) d. Dips are and clay d. Dips are	itly clay ide			
REMARKS Hand dug inspe	ection	n pit to	o 1.2m.		- 4		TALLATION	REMA	ARKS					
							UNDWATE	R DET	AILS					
							ate H	ole epth	Casing Depth	Depth to Water	Comme	ents		
INSTALLATIO			S Z Top   RZ Base		Type		De	april I	Deptil	. 10101				



REPORT NUMBER

CO-ORDINATES(_)  CILENT   Dublin Central Developments Ltd   NGLINATION   Polymer Gal   NGLINATION   NGLINATIO	_	_																		_(
COURDINATES(_)  CROUND LEVEL (m)  CORE DIAMETER (mn)  Dublin Central Developments List  NCLINATION  FLUSH  Description  Fracture  Spacing  (mn)  Description  Description  Description  Description  Description  Discontinuities are smooth and planer and days maked lincylent fractures common. (continued)  Strong to very strong, thin to medium bedded, producting was shared. Player are sub-10°. (continued)  Strong to very strong, thin to medium bedded, producting was shared. Player are sub-10°. (continued)  Strong to very strong. thin to medium bedded, producting was shared. Player are sub-10°. (continued)  REMARKS  Hend dug inspection pt to 1.2m.  PARTALLATION DETAILS  OA Description  Discontinuities are smooth and planer and days maked black, calcuratous shared. Player are sub-10°. (continued)  Strong to very strong, thin to medium bedded, producting was shared. Player are sub-10°. (continued)  Strong to very strong. thin to medium bedded, producting was shared. Player are sub-10°. (continued)  REMARKS  Hend dug inspection pt to 1.2m.  PARTALLATION DETAILS  DATE:  OA DATE:  OA DETAILS  DATE:  OA DETAILS  DATE:  OA DETAILS  DATE:  OA DETAILS  DATE:  OA DETAILS  DATE:  OA DETAILS  DATE:  OA DETAI	co	NTR	ACT	С	ublir	Central I	Developme	ent - Dra	aft						1		10		<b>)8</b> t 29 of 33	3
CLIENT ENGINEER  AGU Consulting Engineers  FLUSH  Polymer Gel  Discontinuities  Facture Spacing (nm)  Description  Description  Discontinuities are smooth and planar and clay smaller black, Calarrous  Signify and locally moderately weak thing to moderately weak thing the moderately weak thing to	СО	-ORI	AMIC	TES(	_)								,	ınz	1			13/09	9/2008	
FLUSH  Folymer Get  LOGGED BY  A Main  Fracture Specing (mm)  By  By  By  By  By  By  By  By  By  B	CLI	ENT			ublin	Central [	Develonme	ante I td				.,				-				
Moderately strong to moderately weak, thinly bedded to animatised, similar of planar and clary smalled Disease as sub-10". (continued)  28.40  Strong to very strong, thin to medium bedded, grey to dark grey, fine planar delay weathered. Pyrife dispersed. Incipient fractures common, (continued)  Strong to very strong, thin to medium bedded, grey to dark grey, fine planar delay sub-10". (provided of the provided delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay sub-10".  Strong to very strong, thin to medium bedded, grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine planar delay grey to dark grey, fine grey to dark grey, fine planar delay grey to dark grey to dark grey, fine planar delay grey to dark								ilio Liu	.				F	olymer G						
moderately weak, thirty bedded to laminated, black, calcareous SHALE, Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common, (continued)  28.40  Strong to very strong, thin to medium backled, grey to dark grey, fine grained SILICEOUS LINESTONE Fresh to slightly and locally provided deductions and planar. Dips are sub-10*.  INSTALLATION REMARKS  Headworks.  INSTALLATION REMARKS  Headworks.  GROUNDWATER DETAILS  Date Hole Casing Depth to Comments  Water Comments				S.C.R.%	R.Q.D.%	Spa (m	icing im)	Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuities	3	Elevation	Standpipe Details	SPT (N Value)	
REMARKS  Hand dug inspection pit to 1.2m.  Headworks.  GROUNDWATER DETAILS  Date Hole Casing Depth to Water Comments  INSTALLATION DETAILS			100	58	0					moderate bedded of black, or SHALE. Slightly a moderate Pyrite di Incipient common strong to or grained LIMEST slightly a moderate Pyrite di	ely weak, thi to laminated, alcareous Fresh to and locally ely weathere spersed. If fractures and continued dark grey, fins SILICEOUS ONE. Fresh ely weathere spersed ely weathere spersed the spersed dark grey, fins siliceous one coult weathere spersed to laminate dark grey, fins siliceous one coult weathere spersed to laminate dark grey, fins siliceous one coult weathere spersed to laminate dark grey, fins siliceous one coult weather spersed to laminate dark grey, fins siliceous one coult weather spersed to laminate dark grey strong the coult weather spersed to laminate dark grey strong the coult weather spersed to laminate dark grey strong the coult weather spersed to laminate dark grey strong the coult was a supplied to laminate dark grey strong the could be	nly  d.  ded, ed, et	28.42	and plar smeared sub-10°	nar and clay d. Dips are continue nuities are nar. Dips a	d d)				
INSTALLATION DETAILS  Depth Depth Water Comments			KS			t to 1.2m.	76				Headworks	i.			_					
INSTALLATION DETAILS												_		Casing	Depth to	Comm	nonte			
											Date				Water	Comm	ients			
	NS.	TAL	LATI	ON D	ETA	ILS														(
		Date	-			RZ Top	RZ Base		Туре											
14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP			8	13.0	0	6.00	13.00	50	mm S	P										



REPORT NUMBER

_		ACT DINA			Central Developme	ent - Dra	-	GROUND I	LEVEL (m)			SHEET	HOLE NO			8 t 30 of 33 b/2008
	ENT	ER			Central Developme	ents Ltd.		ORE DIAI NCLINATION	METER (mm) ON	-	102 -90 Polymer G	DRILL		TED	14/09 Miller A. Ma	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	8.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)		scription	Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)
29										29.17	and plar sub-10°	nuities are s nar. Dips are . (continued)	•			
								moderat bedded black, ca SHALE.	lely strong to tely weak, thinly to laminated, alcareous Fresh to and locally		Disconti and plar smeared sub-10°					
								moderate Pyrite dia Incipient commor Strong to the grey to degrained	ely weathered. spersed. t fractures to very strong, nedium bedded, dark grey, fine SILICEOUS		and plar smeared sub-10°	nuities are s nar and clay d. Dips are	mooth			
2	9.50				Γ			slightly a moderat Pyrite di throught Strong to strong, to bedded,		29.40	Disconti to slightl	nuities are s y rough and d. Non-intac	clay			
								ARGILL LIMEST slightly a	ACEOUS ONE. Fresh to and locally ely weathered. spersed		and sligi Dips are	nuities are s ntly undulose sub-10°.				
		100	27	27				thin to m grey to d grained LIMEST slightly a			Disconti and plar sub-10°	nuities are s nar. Dips are with undulo ical fracture.	e se			
	IARI								INSTALLATI	ON REM	ARKS				l· . H·	
and	a du	g insį	pection	on pit	to 1.2m.				Headworks.							
									GROUNDWA	TER DET	Casing	Denth to	_			
									Date	Depth	Depth	Depth to Water	Comme	ents		
1ST	ΓALL			ETA												
	Date 09-0		ip Do		RZ Top RZ Base 6.00 13.00		Type nm S									



REPORT NUMBER

13696

**DRILLHOLE NO** CONTRACT **Dublin Central Development - Draft RC08** SHEET Sheet 31 of 33 GROUND LEVEL (m) CO-ORDINATES(\_) **DATE STARTED** 13/09/2008 **CORE DIAMETER (mm)** 102 DATE COMPLETED 14/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony Ξ Non-intact zones (shaded) Details Downhole Depth Core Run Depth SPT (N Value) Fracture Spacing Discontinuities Description Standpipe Ξ S.C.R.% % T.C.R.% (mm) Elevation ROD Depth ( 250 500 30 Strong to very strong, Discontinuities are smooth thin to medium bedded, and planar. Dips are sub-10° with undulose grey to dark grey, fine grained SILIČEOUS sub-vertical fracture. LIMESTONE. Fresh to (continued) 30.10 slightly and locally moderately weathered. Pyrite dispersed throughout. (continued) 30.26 Moderately strong to Discontinuities are smooth moderately weak, thinly and planar with local clay gravel infill (30.32-30.34m, 30.47-30.48m). Dips are bedded to laminated, black, calcareous SHALE. Fresh to sub-10°. slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. 30.51 Strong to moderately strong, thin to medium Discontinuities are smooth and planar, slightly clay 100 76 58 bedded, dark grey to smeared. Dips are black, fine grained ARGILLACEOUS sub-10°. LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. 11/11/08 GDT 30.95 GSL REMARKS **INSTALLATION REMARKS** Hand dug inspection pit to 1.2m. Headworks. OG 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type RC 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

COI	NTR/	ACT	C	ublin	Central Developme	ent - Dr	aft					DRILL	HOLE N	0	RC0	32 of 33
00-	ORE	OINA.	TES(	_)	, i			GROUND L	LEVEL (m) METER (mm)		102	DATE	STARTE COMPLI		13/09/ 14/09/	2008
	ENT	ER			Central Developme	ents Ltd		NCLINATIO FLUSH	ON		90 Polymer G		ED BY		Millen A. Mai	
1	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)		scription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
31 3	31.00	100	17	0				thin to m grey to d grained ! LIMEST' slightly a moderate Pyrite dis througho Strong to strong, ti bedded, black, fin ARGILL/ LIMEST' slightly a	out. (continued of moderately hin to medium dark grey to be grained ACEOUS ONE. Fresh to mid locally bely weathered spersed	31.19	Disconti and plar sub-10°	nuities are s ly rough and d. Non-intad nuities are s nar. Dips an with undulo ical calcite v	d clay			
	70							thin to m grey to d grained s LIMEST' slightly a moderate Pyrite dis througho Strong to strong, the bedded, black, fin ARGILL' LIMEST' slightly a moderate	out.  moderately moderately min to medium dark grey to grained ACEOUS ONE. Fresh to nd locally ely weathered.	0 31.42	and plan sub-10°	nuities are s nar, Dips an with undulo ical calcite v	e se			
	11.70							Pyrite dis througho calcite ve Strong to thin to m grey to d grained S LIMESTO slightly a moderate Pyrite dis	spersed out. Local eining. o very strong, edium bedded ark grey, fine SILICEOUS ONE. Fresh to nd locally ely weathered. spersed out. Local eining.	31.72						
	IAR d du		pectio	on pit	to 1.2m.		-	-	INSTALLAT Headworks.	ION REMA	ARKS					
									GROUNDW/	TED DET	'All ©					
									Date	Hole	Casing	Depth to Water	Comme	- mt-		
С	r <b>ALL</b> Date	1	ON D	epth	ILS  RZ Top RZ Base 6.00 13.00		Type mm S		Date	Depth	Depth	Water	Somme	31169		



REPORT NUMBER

CO-ORDI				Central Developm	ent - Dra	-	GROUND LEVEL (m)				SH	IEE1	HOLE N START		13/09	t 33 of 33 9/2008	_
CLIENT ENGINEE	R			Central Development		.   1	ORE DIAMETER (mn NCLINATION LUSH	1)	-	102 90 Polymer Ge	DF	RILL	COMPL ED BY ED BY	ETED	Miller	9/2008 nnium ahony	
Š Š	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description		Depth (m)	Dis	continui	ties		Elevation	Standpipe Details	SPT (N Value)	
32.50	100	50	50				Strong to moderately strong, thin to mediu bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh slightly and locally moderately weathere Pyrite dispersed throughout. Local calcite veining. (continued) Strong to very strong thin to medium bedd grey to dark grey, fin grained SILICEOUS LIMESTONE. Fresh slightly and locally moderately weathere Pyrite dispersed throughout. Local calcite veining. Strong to moderately strong, thin to mediu bedded, dark grey to black, fine grained ARGILLACEOUS LIMESTONE. Fresh slightly and locally moderately weathere Pyrite dispersed throughout. Local calcite veining. End of Corehole at 3 (m)	m to d.	32.35	Discontinus de la continua del continua del continua de la continu	nuities a nuities a nur. Dipp with sub ein fract nse 32.3	s are ued are s s are o-ve ure. 34m	mooth				((
REMARK							INSTALL	TION	REMA	ARKS							_
Hand dug	insp	ectio	n pit	to 1,2m.			Headworks	<b>5</b> ,									
							GROUND				Donéh	to	1				_
							Date		ole pth	Casing Depth	Depth Wate	to er	Comm	ents			12
NSTALL/				LS RZ Top RZ Base		Туре	3										(



	68					GEOT	ECHN	IIC	AL CO	RE LOG	REC	OF	RD				13	696
CC	NTR	ACT	D	ublin	Central	Developm	ent - Dra	aft						DRILLI SHEET	HOLE N	0	RC1	1 <b>6</b> t 1 of 15
CC	)-ORI	DINA	TES(	_)						LEVEL (m) METER (mm	1)		102	DATE	STARTE COMPL			1/2008
	IENT GINE				Central onsulting	Developm Ltd	ents Ltd		INCLINATION FLUSH	ON			90 Polymer G	DRILLI el LOGG				/2008 nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	cture acing nm) 50 500	Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
1							9-21-0-21-0-21-0-21-0-21-0-21-0-21-0-21-		HOLE D Observe returns o brick, bla	cobbles	s te, ay	1.20						
18/	MARI 11/08	- 6¾	hrs U	nload	l sludge	tanks, load	d & erect	t fer	ncing, dig	INSTALLA	TION I	REMA	ARKS					-
loca	ection.	nı pit	(wide	nea (	uue to pil	pe) and m	we equi	ρme	ent ONTO	GROUNDV	VATER	DET	AILS					
									;	Date	Но	le	Casing Depth	Depth to Water	Commi	ents		
											Dep	AD	Depin	* * arei				
<u> </u>	TALI Date		ON D			RZ Base		Гуре	9				į					
19	-11-0 -11-0	8	8.00 25.0	)	4.50 20.00	8.00 25.00	50n 50n	nm	SP									



l©	\$	リ					-0111	•••	AL OO!	\L L00						13	696	
CON	TRA	CT	D	ublin	Central I	Developmo	ent - Dra	aft					DRILL	HOLE N	0	RC	<b>16</b> et 2 of 15	
0-0	ORD	INA	TES(	_)					GROUND I	LEVEL (m) METER (mn	n)	102	DATE	STARTE		18/1	1/2008	
LIE NGI	NT NEE	R			Central I	Developme Ltd	ents Ltd		INCLINATION FLUSH	ON		-90 Polymer G		ED BY			1/2008 ennium lahony	
Downnoie Deptin (III)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	cture acing am)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Dis	scontinuities		Elevation	Standpipe Details	SPT (N Value)	
							19 019 P 9		HOLE D	TRIX OPEN PRILLING: d by driller a of clayey cobbles ed)								
									HOLE D Observe	TRIX OPEN RILLING: ad by driller a of gravelly cl	is						N = 4 (20, 5, 1, 1)	1, 1,
	ARK						9		1	INSTALL	ATION REM	MARKS				KA K	A	
ре	ction	6%l pit	hrs U (wide	nload ned	d sludge due to pip	tanks, load oe) and mo	d & erec ove equ	ct fei iipm	ncing, dig ent onto									
atio	on.									GROUND	WATER DE	TAILS	g	(in				
										Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents			
	ate		ON D			RZ Base		Тур	e									
9-1	1-08	3	8.00	)	4.50	8.00	50	mm	SP									
-1	1-08	3	25.0	0	20.00	25.00	50	mm	SP		1			1				



	38	(ا				GEOTI	ECHN	IIC.	AL CO	RE LOG	RE	COF	RD				13	696
		ACT	TES(		Central	Developm	ent - Dra	-Т	GROUND	LEVEL (m)				SHEE	HOLE N			16 et 3 of 15 1/2008
CLI		ER			Central Consulting	Developme Ltd	ents Ltd		CORE DIA NCLINATI FLUSH	METER (mn ON	n)	-	102 ·90 Polymer G	DRILL	COMPLI ED BY ED BY	ETED		1/2008 nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	cture acing im) 50 500	Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
4									HOLE I		is ayy							N = 22 (1, 12, 8, 6 1, 7) N = 45 (1, 4, 7, 9, 12, 17)
REM 18/1	1/08	- 6³⁄4l	nrs U	nload	d sludge	tanks, load	& erect	fen	cing, dig	INSTALLA	TION	REMA	ARKS					
nspe ocat		ıı prtı	wide	ned	uue to pip	oe) and mo	ve equi	pme	nt onto	GROUND	NATE	B DET	P HA					
										Date	Н	ole	Casing	Depth to Water	Comme			
										Date	De	pth	Depth	Water	Comme	ants.		
NST	ALL		ON D															
	ate   1-0		ip De 8.00		RZ Top 4.50			ype										
	11-0		25.00	o	4.50 20.00	8.00 25.00		nm t nm t										



100	38	y			`				, 12 40.				_				130	696
СО	NTR.	ACT	L D	ublin	Central D	Developme	ent - Dra	aft						DR	ILLHOLE N	10	RC1	16
-								-т						— SH	EET		Shee	t 4 of 15
co	-ORI	OINA'	TES(	_)				- 1	GROUND L	LEVEL (m) VIETER (mm	1)		102		TE START			1/2008
CLI	ENT	-	D	ublin	Central D	Developme	ents Ltd		INCLINATION	ON		-	90	DR	ILLED BY		19/11 Miller	1/2008 nnium
$\vdash$	SINE	ER	A	GL C	onsulting I	Ltd	1		FLUSH			F	Polymer G	el LO	GGED BY	1	A. Ma	ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (m)	cing m) <sub>500</sub>	Legend	Non-intact zones (shaded)		scription		Depth (m)	Dis	continuit	ies	Elevation	Standpipe Details	SPT (N Value)
7	MAD	we.							HOLE D		s	<b>DEM</b>	<b>VDIK</b>					N = 41 (1, 2, 2, 4, 15, 20)
	VIAR		bea I I	nloo	i cludac i	anks, load	l 9 oroc	t for	noina dia	INSTALLA	MOITA	I REM	ARKS					
insp	ectic	n pit	(wide	ned	due to pip	e) and mo	ove equ	ipm	ent onto									
IOCE	ation.									GROUND	VATE	R DET	TAILS	·				
										Date		lole epth	Casing Depth	Depth Wate	to Comm	nents		
												zpsi i	Debili	, , , an				
<u> </u>			ON D															
	<u>Date</u> -11-0		Fip De 8.00		RZ Top 4.50	RZ Base 8.00		Тур	e	-								
	-11-C		25.0	ó	20.00	25.00			SP									



	38	L)			O	EOTE	CHN	IC/	AL COF	RE LOG	RE	COR	D				130	696
COI	NTR.	ACT	D	ublin	Central D	evelopme	nt - Dra	ft							HOLE N	0	RC1	
CO-	ORE	DINA.	TES(	_)					GROUND L	.EVEL (m) METER (mm	)		102	1	STARTE		18/11	t 5 of 15 1/2008
	ENT				Central Donsulting L		nts Ltd	- 1	NCLINATIO FLUSH	ON			90 Polymer Ge	DRILLI LOGG				1/2008 nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fraci Spac (mr o <sup>250</sup>	n) 500	Legend	Non-intact zones (shaded)		scription		Depth (m)	Dise	continuities		Elevation	Standpipe Details	SPT (N Value)
9									HOLE D		s	10.00						N = 46 (2, 4, 8, 10, 12, 16)
18/1	<b>1/08</b>	3- 63/4	hrs L	Jnloa	d sludge t	anks, load	& erec	t fen	ncing, dig	INSTALLA	ATION	REM	ARKS			_		
insp	ection.	on pit	(wide	ened	due to pip	e) and mo	ve equi	pme	ent onto	OBOL::::		n	rau o					
										GROUND	,	R DE	Casing	Depth to	T_C====	onto		
										Date		epth	Depth	Depth to Water	Comm	ents		
NS	TAL	LATI	ON E	ETA	JLS										ļ			
	Date		Tip D 8.0		RZ Top			Type nm :										
	-11-0 -11-0		25.0	۷. ا	4.50	8.00		nm :							[			



100	80					GLOTI	_0111	*10	AL CO	NE LOG	KEC	Or	(D				13	696
CO	NTR	ACT	D	ublin	Central	Developme	ent - Dr	aft						DRILL	HOLE N	0	RC1	
CC	-ORI	DINA	TES/	١				$\neg$	GROUND	LEVEL (m)				SHEE	START			t 6 of 15 1/2008
			,	-′						METER (mn	1)		102		COMPL			
1	IENT					Developme	ents Ltd		INCLINATI	ON			90		ED BY		19/11 Miller	72008 mium
	GINE	ER	A	GL C	onsulting	Ltd		- 1	FLUSH	Test Control of the C			Polymer G	el LOGG	ED BY		A. Ma	ahony
5 Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	cture cing m) 500	Legend	Non-intact zones (shaded)		escription		Depth (m)	Dis	scontinuities		Elevation	Standpipe Details	SPT (N Value)
-	10.40	87	0	0					Dark bro	GRAVEL d and coarse own, firm, sa CLAY. Grav ed and medi	ndy rel	0.20						N = 50 (2, 3, 3, 11, 17, 19)
		100	0	0					gravelly (medium Dark bro slightly s CLAY.	own, slightly (fine) SAND in to fine) own, firm to s andy, gravel Gravel is fine , sub-angula nded.	stiff, ly	).85 11.10						
REI	11.90°	KS	pre III	please	d plustee &					INSTALLA		1.90 Ema	ARKS		,			
insp	ectio	-6¾l n pit	nrs U (wide	nload ned d	i sludge t due to pip	anks, load e) and mo	& erec	t fen pme	cing, dig ent onto									
loca	ition.									GROUNDY	VATER	DET	AILS					
										Date	Hole Dept		Casing Depth	Depth to Water	Comme	ents		
													очрит					
_	-	ATK				D7 P		T										
19-	Date -11-0	8	8.00		4.50	RZ Base 8.00	501	Type nm (	SP									
	-11-0		25.0	0	20.00	25.00		nm s										



_	NTR	ACT OINA			Central Development	t - Draf	_	GROUND LEVEL (m)			SHEE	HOLE NO			6 17 of 15 /2008
CLI	ENT		D	ublin	Central Development	ts Ltd	IP	ORE DIAMETER (mm) NCLINATION	-	102 -90 Polymer Ge	DATE	COMPLE ED BY		19/11 Millen A. Ma	/2008 nium
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Description	Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)
12	12.30	100	0	0		0 0		Dark brown, firm to sti slightly sandy, gravelly CLAY with occasional cobbles. Gravel is fine to coarse, sub-angular to sub-rounded. Loss recovery 0.2m. (continued)							
					3	  		Very clayey (brown/black) gravelly cobbles of argillaceous LIMESTONE (probable moderate to highly weathered bedrock).	•						
13		100	41	9				Moderately strong to moderately weak, think bedded to laminated, black, calcareous SHALE. Fresh to slightly weathered with incipient fractures.		and plana and sligh	uities are s ar. Clay sm tły iron oxid 13.51m-13 sub-10°.	eared le			
	3.90 IARI	cs						Strong to locally moderately strong, thin to medium bedded, gre to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to slightly weathered.	y 5	to slightly planar. In 13.7m-13 clay smea 13.9m-14 sub-10°.	uities are s rough and on oxide str 3.9m. Hear ared 1.02m. Dip	ained vily			
nsp					d sludge tanks, load & due to pipe) and move				TER DET	'All S					
								Date	Hole Depth	Casing Depth	Depth to Water	Comme	nts		
NS:	ΓALL	ATIO	ON D	ETAI	LS		_								



100	98								AL 00.	L LOO							130	696
cc	NTR	ACT	D	ublin	Central D	evelopme	nt - Dra	aft						DRIL	LHOLE N	0	RC1	<b>6</b> t 8 of 15
co	-ORI	OINA'	res(	_)					GROUND I	LEVEL (m) METER (mm	1)	1	102	!	E STARTE E COMPL		18/11	/2008
	IENT GINE	ER			Central De	-	nts Ltd		INCLINATION FLUSH	ON			90 Polymer G		LED BY GED BY			72008 Inium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%		Fract Spac (mn <sub>0</sub> 250	ing 1) 500	Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuitie	s	Elevation	Standpipe Details	SPT (N Value)
-									moderate bedded black, can shake stightly wincipient strong to the grained bedden to grained	lety strong to tely weak, thi to laminated, alcareous Fresh to weathered wi t fractures. o very strong ledium beddedark grey, fin- SILICEOUS	nly th ed, e	14.28 14.48	and plan smeared with vari Disconti	nuities are lar and he I. Dips are able fracti nuities are lar. Dips a	avily clay sub-10° ires. smooth			
		100	43	29					Moderat moderat bedded	ONE. Fresh tely strong to tely weak, thi to laminated, alcareous Fresh	nly	14.90	and plan 14.48m- sub-10°	nuities are lar. Clay s 14.71m.	meared			
15									strong, to bedded, grained ARGILL LIMEST locally so weather Strong, bedded, grey, fin	ed. thin to mediu grey to dark e grained	m ne to	15.01	Disconting and plan 15.01m. Sub-10° Disconting to slightly planar. If	nuities are are. Clay so Dips are nuities are so Dips	smooth ab-10°.			
	15.40								Slightly v Pyrite le Moderat moderat bedded black, ca	ONE. Fresh weathered. Inse 15.25m. tely strong to tely weak, this to laminated, alcareous.	nly	15.84	sub-10°.					
- 2														nuities are nar. Dips				
	MAR 11/08		hrs U	nload	i sludge ta	anks, load	& erec	t fe	ncing, dig	INSTALLA	ATION	I REM	ARKS					
insp					due to pipe													
										GROUND	_	R DET	Casing	Denth to	2   0-			
										Date		epth	Depth	Depth t Water	Comm	ents		
INS	TAL	LATIC	DN D	ETAI	LS					1								
10	Date		8.00	-	RZ Top 4.50	RZ Base 8.00		Тур	sP									
	-11-0		25.0		20.00	25.00			SP									



O	NTR.	ACT	Ē	ublin	Central Developm	ent - Dra	ft					DRILL SHEE	HOLE N	o	RC10	<b>6</b> 9 of 15
co-	-ORI	DINA.	TES(	_)					LEVEL (m) METER (mm)	į	102		STARTI COMPL		18/11/	
	ENT	ER			Central Developm onsulting Ltd	ents Ltd		LUSH	ON		-90 Polymer Ge		ED BY ED BY		19/11/ Milleni A. Mal	
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)	De	escription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
16	17.10	100	94	82				strong, t bedded, grained ARGILL LIMEST locally s	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh to lightly ed. (continued)		and plan	nuities are s ar. Dips an (continued	е			
		100	100	100				to mediu to dark of grained LIMEST argillace Slightly	ely strong, thin um bedded, grey grey, fine SILICEOUS ONE with ous zones. weathered with ical calcite vein out.		Disconting to slightly planar. If with subfracture if	nuities are s y rough and bips are sub vertical cal throughout.	l >-10° cite			
18/1 nspe	ectio	- 6%			d sludge tanks, load due to pipe) and m				INSTALLATIO	N REM	ARKS					
ocal	tion.								GROUNDWA	ER DET	TAILS .					
										Hole Depth	Casing Depth	Depth to Water	Comm	ents		
	TA: -	A T/			1.0		_									
	Date				LS RZ Top RZ Base	7	уре									
C		٦ 8		0		50n	ype nm S			Proie Depth	Depth Depth	Depth to Water	Comm	ents		



REPORT NUMBER

( See P																,,,,
CONTRACT	r c	ublin	Central D	Developme	ent - Dra	aft						DRILL	HOLE N	D	RC1	<b>6</b> 10 of 15
CO-ORDINA	ATES(	_)						LEVEL (m) METER (mm	1)	1	02	DATE	STARTE COMPLE			/2008
LIENT NGINEER			Central D	evelopme _td	ents Ltd		NCLINATIO	ON			90 Polymer G		ED BY	·	19/11 Millen A. Ma	72008 Inium Ihony
Lownhole Depth (m) Core Run Depth (m) T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (mi	cing m) 500	Legend	Non-infact zones (shaded)	De	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
18.20	100	91					to mediu to dark g grained LIMEST argillace Slightly v sub-verti	o locally ely strong, it im bedded, g grey, fine SILICEOUS ONE with ous zones, weathered w ical calcite v out. (continual	jrey ith ein		to slight planar. I with sub	nuities are s ly rough and Dips are sub o-vertical cal throughout.	l -10° cite			
9 19.00 100	43	33					strong, ti bedded, grained ARGILL LIMEST siliceous locally sl	ed. Pyrite le	m ne y	18.92	and plan sub-10°	nuities are s nar. Dips an with sub-ve s 19.14m-19	e rtical			
19.80							moderate bedded to black, ca SHALE. slightly w	ely strong to ely weak, thi to laminated, alcareous Fresh to loo veathered. fractures	nly	19.68 19.80	and plar sub-10° Disconti to slight	nuities are s har. Dips are nuities are s y rough and Dips are sub	mooth			
<b>EMARKS</b> 3/11/08- 63	Shre II	nloso	l sludge to	anks load	& erec	t for	cina dia	INSTALL	TION	REMA	ARKS					
spection pi cation.																
Janui I.								GROUNDY	VATE	R DET	AILS					
								Date		ole epth	Casing Depth	Depth to Water	Comme	ents		
ČTALLAT	ION T	E7 * ·	10													
Date				RZ Base		Туре										
9-11-08	8.00	)	4.50	8.00	50r	nm s	SP									
9-11-08	25.0		20.00	25.00		nm S										



/na	38 	<b>y</b>													136	
CO	NTR	ACT	D	ublin	Central Developme	ent - Dra	aft					DRILL SHEE	.HOLE NO	)	RC16 Sheet	5 11 of 15
СО	-ORI	DINA:	TES(	_)					LEVEL (m) METER (mm)		102	DATE	STARTE COMPLE		18/11/	
CLI	ENT		D	ublin	Central Developme	ents Ltd	11	NCLINATIO	ON		-90	DRILL	ED BY		19/11/ Millenr	2008 nium
	GINE				onsulting Ltd			LUSH			Polymer C		ED BY		A. Mat	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	. Di	scontinuities		Elevation	Standpipe Details	SPT (N Value)
20					61	0 1		thin to rr grey to c grained LIMEST argillace	o very strong, nedium bedde dark grey, fine SILICEOUS ONE, locally ous zones. continued)	d,	to sligh planar. (contin	linuities are : tty rough and Dips are sul ued)	d l			
		100	59	57				strong, t bedded, grained ARGILL		n e to	Discon and pla sub-10 fracture	tinuities are : nar. Dips ar ° with sub-ve es 20.7m-20	ertical			
21					ľ			thin to m grey to d grained: LIMEST	o very strong, ledium bedde dark grey, fine SILICEOUS ONE. Fresh. nse 20.93 &		Discont to sligh planar. with su 20.88m	tinuities are stay rough and Dips are sul b-vertical france.	d o-10° cture			
	21.20	36						moderat bedded, calcareo Fresh to	us SHALE. locally slightled with inciple	y	and pla infilled Dips ar	tinuities are s nar. Black d 21.2m-21.24 e sub-10°.	ay Im.			
								Strong to strong, the bedded, grained ARGILL	o moderately hin to mediun dark grey, fin ACEOUS ONE. Fresh lightly	e	and pla sub-10 fracture 21.76m	tinuities are : nar. Dips ai of with sub-ve es 21.51-21. n-21.92m an n-22.69m-cla	re ertical 68m, d			
18/1	<b>MAR</b> I	- 63/4	hrs U	Inload	d sludge tanks, loac	l & erec	ct fend	cing, dig	INSTALLA	TION REI	MARKS					
	ectio ation.	n pit	(wide	ened (	due to pipe) and mo	ve equ	ipme	nt onto	GROUNDW	ATER D	ETAILS					
										Hole	Casing	Depth to Water	Commo	ante		
									Date	Depth	Depth	Water	Comme	สเเร		
INS	TALI	LATI	ON D	ETA	ILS											
	Date				RZ Top RZ Base		Туре									
	-11-0	0	8.00	0	4.50 8.00 20.00 25.00		mm S mm S					1				



O	SL	/			GLOII	_0111	110	AL COI	VE LOG	IXL.	COI					136	896	
CONT	RAC	Т	Dublir	Central	Developm	ent - Dra	eft .							DRILLHOLE NO			6 12 of 15	
:0-0	RDIN	ATES	S(_)					GROUND LEVEL (m) CORE DIAMETER (mm) 102					DATE	DATE STARTED DATE COMPLETE		18/11		
LIEN	NT NEER			Central I	Developmo Ltd	ents Ltd		NCLINATION	ON			90 Polymer G		DRILLED BY LOGGED BY			19/11/2008 Millennium A. Mahony	
Core Run Denth (m)	Cole Null Deput (iii)	S.C.R.%	R.Q.D.%	Spa (m	cture icing im)	Legend	Non-intact zones (shaded)	De	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)	
2	10	0 55	47					strong, t bedded, grained ARGILL LIMEST locally s	o moderately hin to mediu dark grey, fil ACEOUS ONE. Fresh lightly ed. (continue	m ne ito <i>ed)</i>	22.70	and plar sub-10° fractures 21.76m- 22.45m-	nuities are : nar. Dips ai with sub-ve s 21.51-21. 21.92m an -22.69m-cla d. (continue	e ertical 68m, d				
22.	90	0 100	) 87					thin to m grey to d grained		i, ed, e	22.70	to slightl	nuities are : y rough and Dips are sul	i				
23.	50							strong, to bedded, grained ARGILL LIMEST locally si	ed. Pyrite lei	m ne to	23.50	and plan	nuities are : ar. Clay sr 3.58m. Dig	neared				
EMA	RKS					-			INSTALLA	TION		ARKS						
8/11/ spec	08- 6 tion p				tanks, load be) and mo													
catio	al.								GROUNDY	VATE	R DET	AILS						
									Date		ole epth	Casing Depth	Depth to Water	Comm	ents			
		ne.	DE															
		Tip			RZ Base		Tyma							-				
<u>Da</u> 19-11		8.0		4.50	8.00		Type nm :											
19-11		25.		20.00	25.00		nm :											



0	68		13696											896				
CC	NTR	ACT	D	ublin	Central D	Developme	ent - Dra	aft						DRILLI	HOLE NO	)	RC1	<b>6</b> : 13 of 15
cc	)-ORI	DINA'	TES(	_)						LEVEL (m)  DATE STAR  METER (mm)  102  DATE COM				STARTE	ED 18/11/2008			
	IENT				Central E	Developme Ltd	ents Ltd		INCLINATION FLUSH				-90 DRILLED BY Polymer Gel LOGGED BY			19/11/2008 Millennium A. Mahony		
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spa (m <sub>0</sub> 25	cing m) <sub>500</sub>	Legend	Non-infact zones (shaded)	De	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
24		100	91	73					moderat bedded black, ca SHALE. (continu Strong to strong, ti bedded, grained ARGILL LIMEST locally sl weather	ed) moderately hin to mediur dark grey, fir ACEOUS ONE. Fresh	m ne to	24.21	and plar sub-10°	nuities are s lar. Dips are lar. (continued) nuities are si lar. Dips are	mooth			
25	24.90		100	95					thin to m grey to d grained	o very strong ledium bedde lark grey, fine SILICEOUS ONE. Fresh	ed. e	25.21	to slightl	nuities are s y rough and Dips are sub	0.0000000			
RE	MAR								1	INSTALLA			RKS				MILIA	
ins	18/11/08- 6¾hrs Unload sludge tanks, load & erect fencing, dig inspection pit (widened due to pipe) and move equipment onto																	
loc	ocation.								GROUNDY	VATER	R DET	AILS						
								Date	Ho Dep	177	Casing Depth	Depth to Water	Comme	ents				
											Det	VII.	Берит	7700				
IN	INSTALLATION DETAILS																	
≥	Date 0-11-0		ip De 8.00		RZ Top 4.50	RZ Base 8.00		Type mm :										
	)-11-C		25.0		20.00	25.00		mm :										

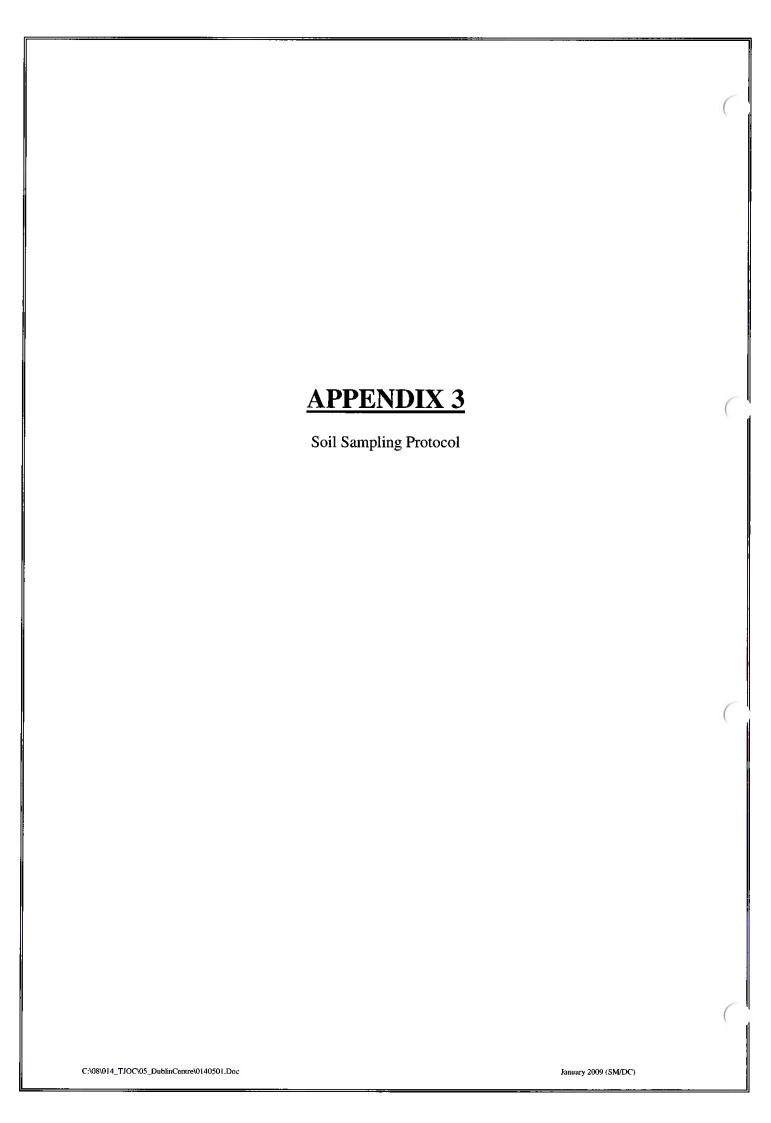


REPORT NUMBER

	3	IJ																131	96	
ON	ITR/	ACT	D	ublin	Central [	Developm	ent - Dra	ıft				,			RILLI HEE1	HOLE N	o	RC1	<b>6</b> t 14 of 15	
CO-ORDINATES(_)									GROUND LEVEL (m) CORE DIAMETER (mm) 102					D	DATE STARTED DATE COMPLETI			18/11/2008		
CLIENT Dublin Central Developments Ltd ENGINEER AGL Consulting Ltd								ſ	INCLINATION -90 FLUSH Polymer Gel						DRILLED BY LOGGED BY			19/11/2008 Millennium A. Mahony		
DOMINOC	Core Run Depth (m)	T.C.R.%	S.C.R.%		Frac Spa (m <sub>0</sub> 250	cing m) o <sub>500</sub>	Legend	Non-intact zones (shaded)	De	escription		Depth (m)	Dis	scontinu	uities		Elevation	Standpipe Details	SPT (N Value)	
6									strong, to bedded, grained ARGILL LIMEST Strong to the grey to congrained	o moderately thin to mediu dark grey, fi  ACEOUS 'ONE. Frest o very strong dedurk grey, fin SILICEOUS 'ONE. Frest	m ne 1. , ed, e	26.22	Disconti and plar sub-10° Disconti to slight planar. I	nar. Dip	are s	mooth				
2	6.50								Moderat moderat bedded, calcared Fresh Strong to strong, to bedded, grained ARGILL LIMEST interbed limeston	tely strong to	nly m ne	26.50 26.56	Disconti and plan sub-10° Disconti and plan sub-10°	nar. Dip nuities nar. Dig	s are are s	mooth				
		100	97	87					moderat bedded, calcared Fresh Strong to strong, t bedded, grained ARGILL	ely strong to ely weak, thi black, ous SHALE. o moderately hin to mediu dark grey, fil ACEOUS ONE. Fresh	nly m ne	<u>27.25</u> 27.44	Disconti and plan sub-10° Disconti and plan sub-10°	nar. Dip inuities nar. Dip	s are	mooth				
									Strong to thin to m grey to d grained	o very strong nedium beddd dark grey, fin SILICEOUS ONE. Fresh	ed, e	27.78	Disconti to slight planar. I	ly rough	ı and					
/1		63/4				anks, load			ncing, dig ent onto	INSTALLA	MON	REM/	AKKS							
	ion.						• • •			GROUNDY			AILS	ī						
										Date		ole :pth	Casing Depth	Dept Wat	h to ter	Comm	ents			
3T	ALL	ATIC	ON D	ETAI	LS							!								
9-1	ate	8	ip De 8.00	,	4.50	RZ Base 8.00	50n		SP											
9-1	11-0	8	25.0		20.00	25.00	50mm SP				L					1				



COI	NTR/	ACT	SHEET											P RC16 Sheet 15 of 15				
CORE DIA													DATE STARTED DATE COMPLETED			18/11/2008 D		
CEIEI41 Dubilit Central Developments Eta								NCLINATK FLUSH	ON		90 Polymer Ge		DRILLED BY LOGGED BY			19/11/2008 Millennium A. Mahony		
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Puegend	Non-intact zones (shaded)	De	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)		
28	28.10							strong, t bedded, grained ARGILL	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh.	28.10	and plan sub-10°.	nuities are s ar. Dips are						
								moderat bedded, calcared Fresh	tely strong to tely weak, thinly black, ous SHALE.	28.70	Discontir and plan sub-10°.	nuities are s ar. Dips are						
29		100	86	74				thin to m grey to d grained	overy stong, redium bedded, dark grey, fine SILICEOUS ONE. Fresh.		to slightly	y rough and pips are sub						
							K	strong, t bedded, grained ARGILL		29.25		nuities are s ar. Dips are						
	29.80					Ħ		End of C	Corehole at 29.8	29.80								
8/1		- 6¾			d sludge tanks, load				INSTALLATIO	REMA	ARKS							
	ectio tion.	n pit	(WICE	ened	due to pipe) and m	ove equi	pme	ent onto	GROUNDWAT	ER DET	rails							
									Date	Hole epth	Casing Depth	Depth to Water	Comme	ents				
N6.	TA!!	ATH	NI C	ETA	II C		_											
	Date				RZ Top RZ Base		Гуре											





#### 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.

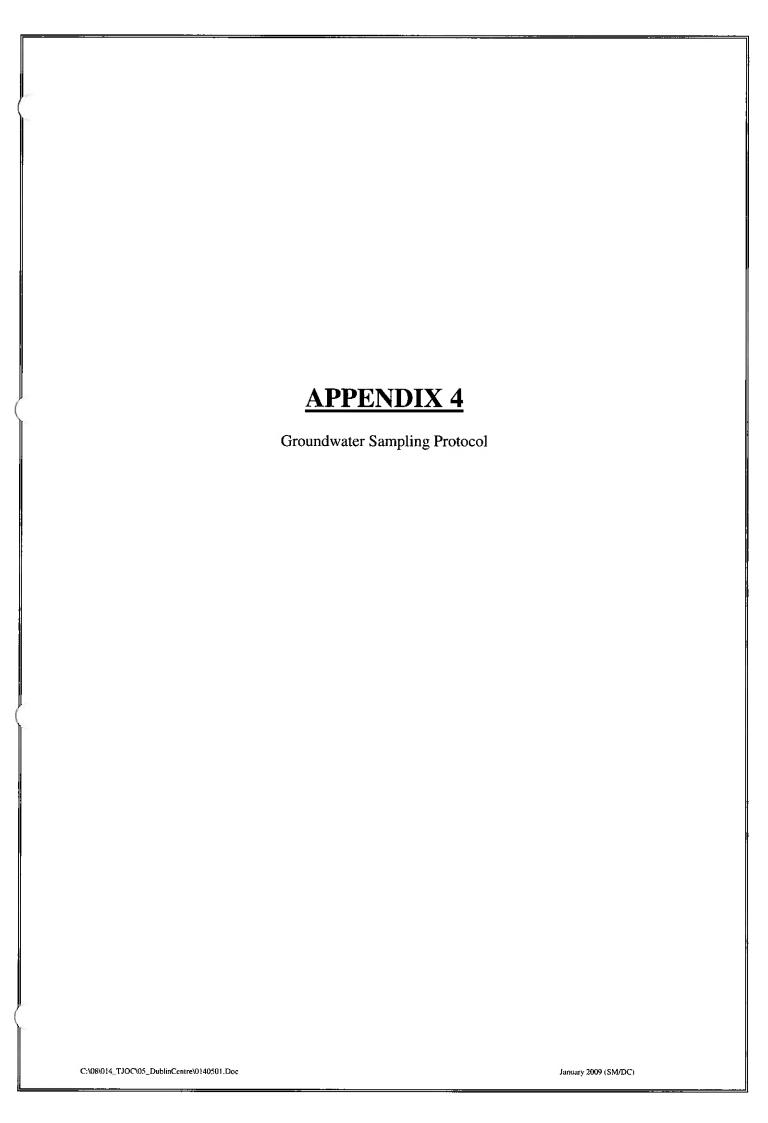
#### 3.0 FIELD QA/QC SAMPLES

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.





#### 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.
- 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

- 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°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 <u>Collection of Water Samples</u>

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.

C:\SOP\Gwater.Doc

- 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<sub>3</sub> 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<sub>3</sub> 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

January 2009 (SM/DC)

C:\08\014\_TJOC\05\_DublinCentre\0140501.Doc



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: X. Ellis

Name: L. Ellis

Title: Team Leader

STL Midlands

Tel: +44 (0)24 7658 4800

Rayner House, 80 Lockhurst Lane, Coventry, CV6 5PZ Fax: +44 (0)24 7658 4848

www.stl-ltd.com

Severn Trent Laboratories Limited

Registered in England & Wales Registration No. 2148934 Registered Office: 2297 Coventry Road, Birmingham B26









## Report Summary





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: X. 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.





MID/538002/2008

Issue

Laboratory Number: 10715372

Sample 1 of 3

Sample Source: O Callaghan Moran & Assoc. Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

Report Number:

BH7 0.50m-1.00m

Sample Date:

Sample Received 11 August 2008 Analysis Complete: 14 August 2008

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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 Miđ	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	1	<50	mg/kg	Y Mid	317
TPH >C20 - C40		180	mg/kg	Y Mid	317
TPH >C6 - C40, Total	1	180	mg/kg	Y Mid	317
naphthalene		0.80	mg/kg	Y Mid	307
acenaphthylene		<0.10	mg/kg	Y Mid	307
acenaphthene	- 1	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
penzo(a)anthracene		1.7	mg/kg	Y Mid	307
chrysene		1.6	mg/kg	Y Mid	307
penzo(b)fluoranthene		1.4	mg/kg	Y Miđ	307
oenzo(k)fluoranthene		0.70	mg/kg	Y Mid	307
penzo(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
ndeno(1,2,3-c,d)pyrene		0.83	mg/kg	Y Miđ	307
PAH, Total of 16 EPA		23	mg/kg	Y Mid	307
benzene		<0.10	mg/kg	Y Mid	327







Report Number: MID/538002/2008 Issue

Laboratory Number: 10715372

Sample 1 of 3

O Callaghan Moran & Assoc. Sample Source: 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 327
toluene	<0.10	mg/kg	Y Mid	
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





Report Number:

MID/538002/2008

Laboratory Number: 10715373

Issue

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

Outplied and outplied to the state of the st					
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	
ron 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	
ΓPH >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	
ſPH >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	
scenaphthene	<0.10	mg/kg	Y Mid	307	
luorene	<0.10	mg/kg	Y Mid	307	
phenanthrene	0.62	mg/kg	Y Mid	307	
anthracene	0.13	mg/kg	Y Mid	307	
luoranthene	0.63	mg/kg	Y Mid	307	
pyrene	0.51	mg/kg	Y Mid	307	
penzo(a)anthracene	0.27	mg/kg	Y Mid	307	
chrysene	0.26	mg/kg	Y Mid	307	
penzo(b)fluoranthene	0.25	mg/kg	Y Mid	307	
penzo(k)fluoranthene	0.13	mg/kg	Y Mid	307	
enzo(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	
ndeno(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	
penzene	<0.10	mg/kg	Y Mid	327	





Report Number: MID/538002/2008 Issue

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 = STŁ Bridgend, Cov = STL Coventry, Mid = STŁ Midlands, Rea = STL Reading, Run = STŁ Runcorn.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample liftered. I/S=Insufficient sample





Report Number: MID/538002/2008 Issue

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

Sample Date.	Sample Received	11 August 200	o Allalysis Co	mpiete.	I# At	igust 2006
Test Description		Result	Units	Accred	itation	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)anthraceле		<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





Report Number:

MID/538002/2008

Issue

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: X. Ellas

Name: L. Ellis

Date: 14 August 2008

Title:

Team Leader



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: X. Ellis

Name: L. Ellis

Title: Team Leader

STL Coventry

Tel: +44 (0)24 7642 1213

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

Fax: +44 (0)24 7685 6575

www.stl-ltd.com

Severn Trent Laboratories Limited

Registered in England & Wales Registration No. 2148934 Registered Office: 2297 Coventry Road, Birmingham B26









# Report Summary





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

Date of Issue:

19 November 2008

Report Number: COV/558587/2008 Issue

Job Description: **Donal Crean** 

Job Location: 08-014-05

**Number of Samples** 31 October 2008 Job Received:

included in this report 16

Number of Test Results Analysis Commenced: 31 October 2008

included in this report 400

Name: L. Ellis Date: 19 November 2008

Signed: X. Ellas 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.





COV/558587/2008 Report Number:

Laboratory Number: 10888346

Issue

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	Accred	litation	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
ndeno(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
penzene	<0.10	mg/kg	Y	Mid	327
oluene	<0.10	mg/kg	Y	Mid	327
ethylbenzene	<0.10	mg/kg	Y	Mid	327
n&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 fillered. I/S=Insufficient sample







Report Number: COV/558587/2008 Issue

Sample 2 of 16 Laboratory Number: 10888347

O Callaghan Moran & Assoc. Sample Source: Sample Point Description: O Callaghan Moran & Assoc.

Sample Description: BH15 0.5-1.00m

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

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, Res = STL Reading, Run = STL Runcorn.

For Microbiological determinends 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. //S=Insufficient sample





Report Number:

COV/558587/2008

Laboratory Number: 10888348

Issue

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

Cample Date.	Sample Received	31 October 200	A Malysis CO	mpiete.	13 1401	Veriliber 2000
Test Description	THE REAL PROPERTY.	Result	Units	Accred	ditation	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	1	86	mg/kg	Y	Mid	317
Naphthalene		0.16	mg/kg	N.	Mid	307
Acenaphthylene		<0.10	mg/kg	N	Mid	307
Acenaphthene	1	<0.10	mg/kg	N	Mid	307
Fluorene		<0.10	mg/kg	N N	Mid	307
Phenanthrene		0.42	mg/kg	N N	Mid	307
Anthracene		<0.10	mg/kg	N	Mid	307
Fluoranthene		0.14	mg/kg	N	Mid	307
Pyrene	1	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	Υ	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 > 3ub-contracted.

Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Res = STL Reading, Run = STL Runcom.

For Microbiological determinands 0 or NO=Not Detected, For Legionella NO=Not Detected in volume of sample filtered. I/S=insufficient sample





Report Number: COV/558587/2008 Issue

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	Test Description Result		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 Oíls, >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		
ndeno(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		
penzene	<0.10	mg/kg	Y Mid	327		
oluene	<0.10	mg/kg	Y Mid	327		
ethylbenzene	<0.10	mg/kg	Y Mid	327		
n&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 /

No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted.

Analysed at: Bri = STt. Bridgend, Cov = STt. Coventry, Mid = STt. Midlands, Rea = STt. Reading, Run = STt. Runcorn.

For Microbiological determinands 0 or ND=Not Detected, For Legionetta ND=Not Detected in volume of sample filtered. I/S=Insufficient sample





Report Number:

COV/558587/2008

Laboratory Number: 10888350

Issue

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

Campie Date.	pie neceived 31 Octobel 20	700 Allalysis Co	mpiete.	13 140	rember 2000
Test Description	Result	Units	Accred	ditation	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	l 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 N	Mid	307
Benzo(b)fluoranthene	14	mg/kg	N 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 Runcom.
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample





Report Number:

COV/558587/2008

Issue

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
luoranthene	87	mg/kg	N Mid	307
<sup>o</sup> yrene	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
ndeno(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
penzene	<0.10	mg/kg	Y Mid	327
oluene	<0.10	mg/kg	Y Mid	327
ethylbenzene	<0.10	mg/kg	Y Mid	327
n&p-Xylene	<0.20	mg/kg	Y Mid	327
-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, Mtd = STL Midlands, Rea = STL Reading, Run = STL Runcorn.

For Microbiological determinands 0 or ND=Not Detected, For Laglonella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample





Report Number: COV/558587/2008

Issue

Sample 7 of 16

Sample Source:

Laboratory Number: 10888352

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	ption 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, Mild = 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





Report Number: COV/558587/2008

Issue

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
ndeno(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
oluene	<0.10	mg/kg	Y Mid	327
ethylbenzene	<0.10	mg/kg	Y Mid	327
n&p-Xylene	<0.20	mg/kg	Y Mid	327
o-xylene	<0.10	mg/kg	Y Mid	327
Ory 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 Midlends, 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





Report Number:

COV/558587/2008

Laboratory Number: 10888354

Issue

Sample 9

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	Accred	ditation	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/i	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	Miđ	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/i	Y	Mid	53F
Phenol Index	<0.050	mg/i	N	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as Cl	7.1	mg/f	Y	Miđ	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 Midtends, 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





Report Number: COV/558587/2008

Issue

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	Accre	ditation	Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/i	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/i	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/i	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/li	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, Mild = STL Midtands, 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





Report Number: COV/558587/2008

Laboratory Number: 10888356

Issue 1

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/i	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 CI	<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





Report Number: COV/558587/2008

Issue

Laboratory Number: 10888357

Sample 12 of 16

Sample Point Description: O Callaghan Moran & Assoc.

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 Leachate BSEN 10:1 extract	Result	Units	Accred	ditation	Method
	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/i	N	Mid	25C
Barium, Soluble	0.017	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/1	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	Mìd	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/!	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/i	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 Legionalla ND=Not Detected in volume of sample filtered. I/S=Insufficient sample





Report Number:

COV/558587/2008

Laboratory Number: 10888358

issue 1

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	Accre	ditation	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/I	Y	Mid	53F
Copper, Soluble	34	ug/i	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/i	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 al: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcom.
For Microbiological determinands 0 or ND=Not Detected, For Legioneilla ND=Not Detected in volume of sample filtered. I/S=insufficient sample







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	Accre	ditation	Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/t	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	53 <b>₽</b>
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	53 <b>F</b>
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: 84 = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.

For Microbiological determinands 0 or ND=Not Detected, For Legionetta ND=Not Detected in volume of sample filtered. I/S=Insufficient sample





Report Number:

COV/558587/2008

Laboratory Number: 10888360

Issue

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	Accre	ditation	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/i	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







Report Number:

COV/558587/2008

Issue

Sample 16 of 16

Laboratory Number: 10888361

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	Accre	ditation	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/i	Y	Mid	53F
Copper, Solubie	<100	ug/I	Y	Mid	53F
Lead, Soluble	<100	ug/i	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	53 <b>F</b>
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 Covenity, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcom.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. I/S=Insufficient sample

Name: L. Ellis

Date: 19 November 2008

Signed: X. Ellas

Title:

Team Leader



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

STL Coventry

Tel: +44 (0)24 7642 1213

STL Business Centre, Torrington Avenue,

Fax: +44 (0)24 7685 6575

Coventry, CV4 9GU www.stl-ltd.com

1314 0807 1229







# Report Summary





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.

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COV/569308/2008 Report Number:

issue

Sample 1 of 22

Laboratory Number: 10956741 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
oluene	<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
Ory 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 enalysed 1g is approximately equivalent to 1ml.

I/S=Insufficient sample





COV/569308/2008 Report Number:

Issue

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: 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





Report Number:

COV/569308/2008

Issue

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	Υ		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







Report Number:

COV/569308/2008

Issue

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
ndeno(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
penzene	<0.10	mg/kg	Y Mid	327
oluene	<0.10	mg/kg	Y Mid	327
ethylbenzene	<0.10	mg/kg	Y Mid	327
n&p-Xylene	<0.20	mg/kg	Y Mid	327
p-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: Brit = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rag = STL Raading, 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 squivalent to 1ml. I/S=Insufficient sample





Report Number: COV/569308/2008 Issue

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 Miđ	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





Report Number: COV/569308/2008 Issue

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
ndeno(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
penzene	<0.10	mg/kg	Y Mid	327
oluene	<0.10	mg/kg	Y Mid	327
othylbenzene	<0.10	mg/kg	Y Mid	327
n&p-Xylene	<0.20	mg/kg	Y Mid	327
o-xylene	<0.10	mg/kg	Y Mid	327
Ory 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: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcora.

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





Report Number: COV/569308/2008

Issue

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	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 Codas: 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





Report Number:

COV/569308/2008

Issue

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	Υ		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





Report Number: COV/569308/2008

39308/2008 Issue

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
ndeno(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
penzene	<0.10	mg/kg	Y Mid	327
oluene	<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
Ory 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: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn,

For Microbiological determinands 0 or NO=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



Issue





Number: **COV/569308/2008** 

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

Report Number:

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
ndeno(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
n&p-Xylene	<0.20	mg/kg	Y Mid	327
o-xylene	<0.10	mg/kg	Y Mid	327
Ory 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 1mil
I/S=Insufficient sample





Report Number: COV/569308/2008

Sample 11 of 22 Laboratory Number: 10956751

O Callaghan Moran & Assoc. Sample Source: Sample Point Description: O Callaghan Moran & Assoc.

Sample Description: BH9 4.00m-5.00m

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

Issue

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	<0.10	% ratio	N i	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 I	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	Miđ	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: Bir = 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 Laglonella volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample





Report Number:

COV/569308/2008

Issue

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 Leachate BSEN 10:1 extract	Result	Units	Accreditation		Method
	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	53 <b>F</b>
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/I	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





Report Number: COV/569308/2008

Issue

Laboratory Number: 10956753

Sample 13 of 22

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

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

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: 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





Report Number: COV/569308/2008 issue

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	Accreditati	on 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/i	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. Refating to Legionella volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample





Report Number:

COV/569308/2008

Issue

Sample 15 of 22

Sample Source:

O Callaghan Moran & Assoc.

Laboratory Number: 10956755

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 Leachate BSEN 10:1 extract	Result	Units	Accreditation	n Method
	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/i	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 CI	<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=Inaufficient sample







1314 0897 1229

Report Number: COV/569308/2008 Issue

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 Leachate BSEN 10:1 extract	Result	Units	Accre	ditation	Method
	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/t	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





Report Number: COV/569308/2008

Laboratory Number: 10956757

Issue

Sample 17 of 22

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

Sample Description:

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description Leachate BSEN 10:1 extract	Result	Units	Accred	ditation	Method EN12457-3 10:1
	Y		N	Mid	
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.012	mg/i	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
Phenoi Index	<0.050	mg/t	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	Mìd	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: 8n = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn,

For Microbiological determinands 0 or NO=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





Report Number: COV/569308/2008 Issue

Laboratory Number: 10956758

Sample 18 of 22

Sample Source: O Callaghan Moran & Assoc. Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

Sample Date:

BH14 1.00m-2.00m 10:1

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description Leachate BSEN 10:1 extract	Result	Units	Accreditation		Method
	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/i	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, Ree = 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





Report Number:

COV/569308/2008

Laboratory Number: 10956759

Issue

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	Accreditatio	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. IfS=Insufficient sample







Report Number: COV/569308/2008

Laboratory Number: 10956760

issue 1

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	Accre	ditation	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	Υ	Miđ	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
Phenoi Index	<0.050	mg/l	N.	Mid	32A
Sulphate as SO4	<11	mg/l	Y	Mid	60
Chloride as CI	<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





Report Number: COV/569308/2008

Laboratory Number: 10956761

Issue

Sample 21 of 22

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

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accre	ditation	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/i	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/t	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 Legionalia ND=Not Detected in volume of sample filtered. Relating to Legionalia volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample





Report Number:

COV/569308/2008

issue

Sample 22 of 22

Laboratory Number: 10956762 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	Accredit	ation	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	tig/l	Y	Mid	56
Calcium, Soluble	10	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/l	Y	Mid	53F
Copper, Soluble	<10	ug/i	Y	Mid	53F
Lead, Soluble	<10	ug/l	Υ	Mid	53F
Mercury, Soluble	0.78	ug/l	Υ	Mid	56
Molybdenum, Soluble	0.0056	mg/l	N H	Mid	68
Nickel, Soluble	<10	ug/l	Y 1	Mid	53F
Selenium, Soluble	<6.0	ug/l	N i	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 CI	<2.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N I	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: 8ti = STL Bridgend, Cov = STL Covenity, 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 t/S=Insufficient sample

Name: G. Smith

Date: 24 December 2008

Signed:

Title:

Inorg and License Chem Manager



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: Jusa Clay

Name: S. Clancy

Title: Organic Chemistry Manager

STL Coventry

Tel: +44 (0)24 7642 1213

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

Fax: +44 (0)24 7685 6575

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## Report Summary





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

Name: S. Clancy

Analysis Commenced: 03 December 2008

Date: 19 December 2008

Signed: Ausa Clay

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.

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Report Number: COV/566856/2008

Issue Laboratory Number: 10940877 Sample 1

Sample Source: O Callaghan Moran & Associates Sample Point Description: O Callaghan Moran & Associates

Sample Description:

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/i	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/t	Y MID	331
Phenanthrene	7.6	ug/i	Y MID	331
Anthracene	1.1	ug/l	Y MID	331
Fluoranthene	5.6	ug/I	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





COV/566856/2008 Report Number:

Issue

Laboratory Number: 10940877

of 4 Sample 1

O Callaghan Moran & Associates Sample Source: 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/i	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 Midends, Rea = STL Reading, Run = STL Runcom.

For Microbiological determinands 0 or NO=Not Detected, For Legionetta ND=Not Detected in volume of sample filtered. Retaining to Legionetta volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample





Report Number: COV/566856/2008

Laboratory Number: 10940878

Issue

Sample 2

O Callaghan Moran & Associates Sample Source: Sample Point Description: O Callaghan Moran & Associates

Sample Description:

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/i	Y MID	56
Potassium, Soluble	7.6	mg/l	Y MID	53F
Sodium, Soluble	680	mg/l	Y MID	53F
Гin, 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 CI	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
FPH >C10 - C20	<100	ug/l	Y MID	318
ГРН >C20 - C40	<100	ug/t	Y MID	318
ГРН >C6 - C40, Total	<100	ug/i	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/i	Y MID	331
Phenanthrene	0.046	ug/I	Y MID	331
Anthracene	<0.010	ug/I	Y MID	331
Fluoranthene	<0.010	ug/l	Y MID	331
Pyrene 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





Report Number: COV/566856/2008 issue

Laboratory Number: 10940878

Sample 2

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/i	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 Runcom.

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





Report Number:

COV/566856/2008

Laboratory Number: 10940879

Issue

Sample 3

Sample Source:

O Callaghan Moran & Associates Sample Point Description: O Callaghan Moran & Associates

Sample Description:

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
ron, Soluble	0.045	mg/I	Y MID	56
Lead, Soluble	<0.00050	mg/l	Y MID	56
Magnesium, Soluble	8.8	mg/t	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
Γin, Soluble	<0.010	mg/l	N MID	68
Zinc, Soluble	<0.0050	mg/l	Y MID	56
Sulphate as SO4	0.15	g/i	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/i	Y MID	318
TPH >C20 - C40	<100	ug/l	DIM Y	318
ΓPH >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/i	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





Report Number:

COV/566856/2008

Issue

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/i	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 Runcom.

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. t/S=Insufficient sample





Report Number:

COV/566856/2008

Laboratory Number: 10940880

Issue 1

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/i	Y MID	56
Hardness, Calcium as CaCO3	360	mg/l	N MIĐ	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 CI	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







Report Number:

COV/566856/2008

Issue

Laboratory Number: 10940880

Sample 4 of 4

Sample Source:

O Callaghan Moran & Associates

Sample Point Description: O Callaghan Moran & Associates

Sample Description:

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/i	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

Name:

S. Clancy

Date: 19 December 2008

Signed: Ausa Clay

Title:

**Organic Chemistry Manager** 



#### **ANALYST COMMENTS FOR REPORT**

COV/566856/2008

1 issue

Date of Issue: 19 December 2008

Sample No **Analyst Comments** 10940877 10940878 10940879 10940880

Signed: Jusa Clay

Name: S. Clancy

Date: 19 December 2008

**Organic Chemistry Manager** 



#### DETERMINAND COMMENTS FOR REPORT COV/566856/2008

ISSUE 1

Date of Issue: 19 December 2008

Sample No	Description		Determinand	Comments			
	<u></u>			Name:	S. Clancy	Date:	19 December 2008
Signed	: Ausa	lay		Title:	Organic Chemistry Manager		