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).

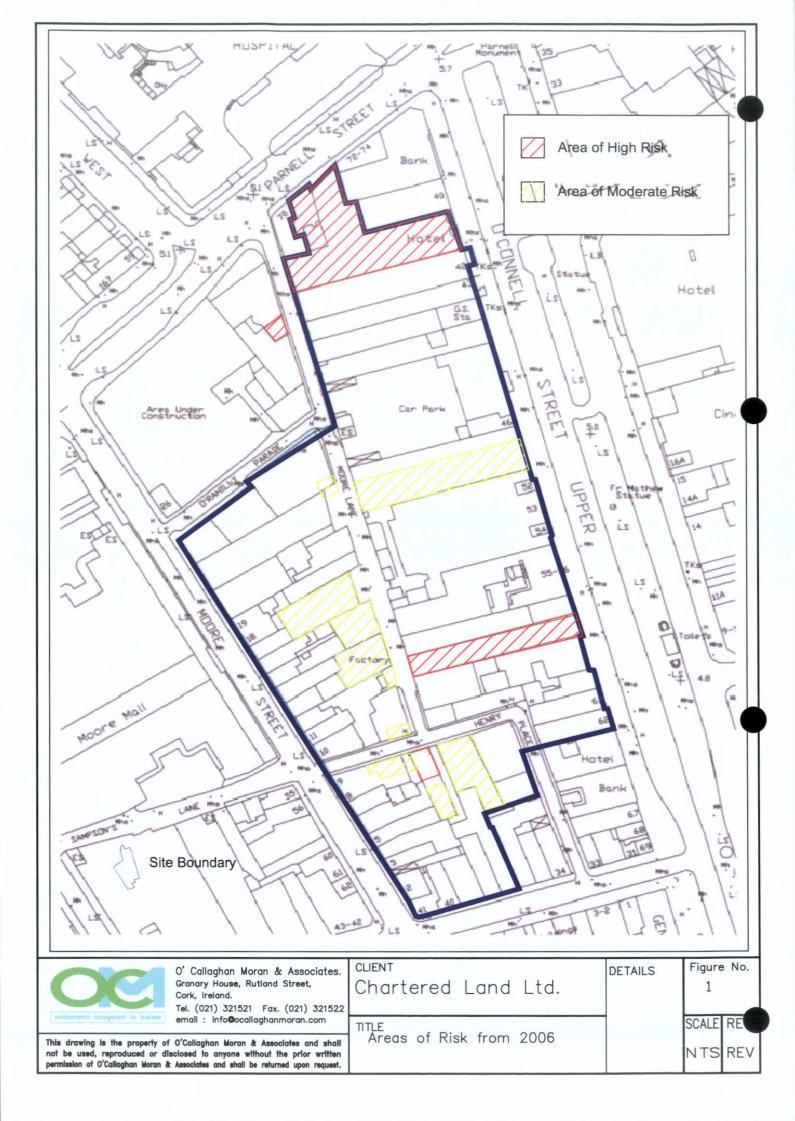
In 2008 a joint geotechnical and environmental site investigation was undertaken comprising the excavation of trial pits, the installation of boreholes in the subsoils and bedrock and the collection and testing of soil and groundwater samples. The geotechnical investigations were supervised by AGL while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

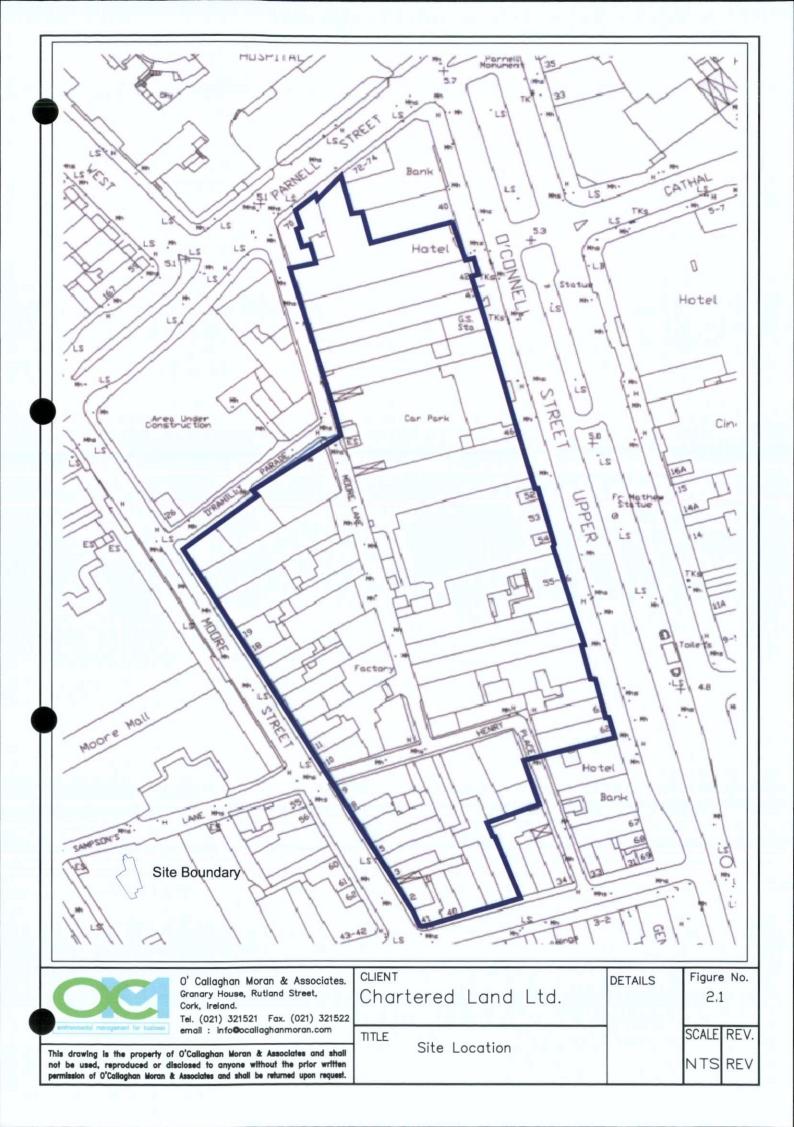


Table 2.1 Name and Address of Occupiers within the subject area

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)		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
	Supermarket (Closed)	Hairdressers
10 Moore Street	Rong Xing	Chinese Supermarket
11 Moore Street	Home Store	Hardware/Homeware shop
12 Moore Street	Oceanic Superstore	Asian Food Shop
13 Moore Street	Pat's Household	Homeware shop
14 Moore Street	Charity Hair Studio	Hairdressers
15 Moore Street	Larmints Paylink	Money Transfer shop
16 Moore Street	Plunketts	Closed
17 Moore Street	Mobile Phone Centre	Phone / electronic shop
18 Moore Street	Crystal Superstores	Afro-Caribbean shop
19 Moore Street	American Design Wears	Basketball & sports shop
20 Moore Street	Unknown	Chinese Restaurant &
	35 5 C C C C C C C C C C C C C C C C C C	Hairdressers upstairs
21 Moore Street	Madina Asian Food Co.	Asian Food Market
22 Moore Street	China House	Restaurant
23 Moore Street	Vacant	Possibly offices upstairs
1 – 2 O'Rahilly Parade	Dublin City Council	Waste management equipment storage
3 – 8 O'Rahilly Parade	Dublin City Council	Storage Containers for the Moore St. Traders

O'Connell Street Upper

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

Parnell Street

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

Henry Street

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

Henry Place

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

Moore Street

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

Moore Lane

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

O'Rahilly Parade

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

2.3 Services

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

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

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

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

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

3. PHYSICAL SETTING

3.1 Geology

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

3.1.1 Bedrock

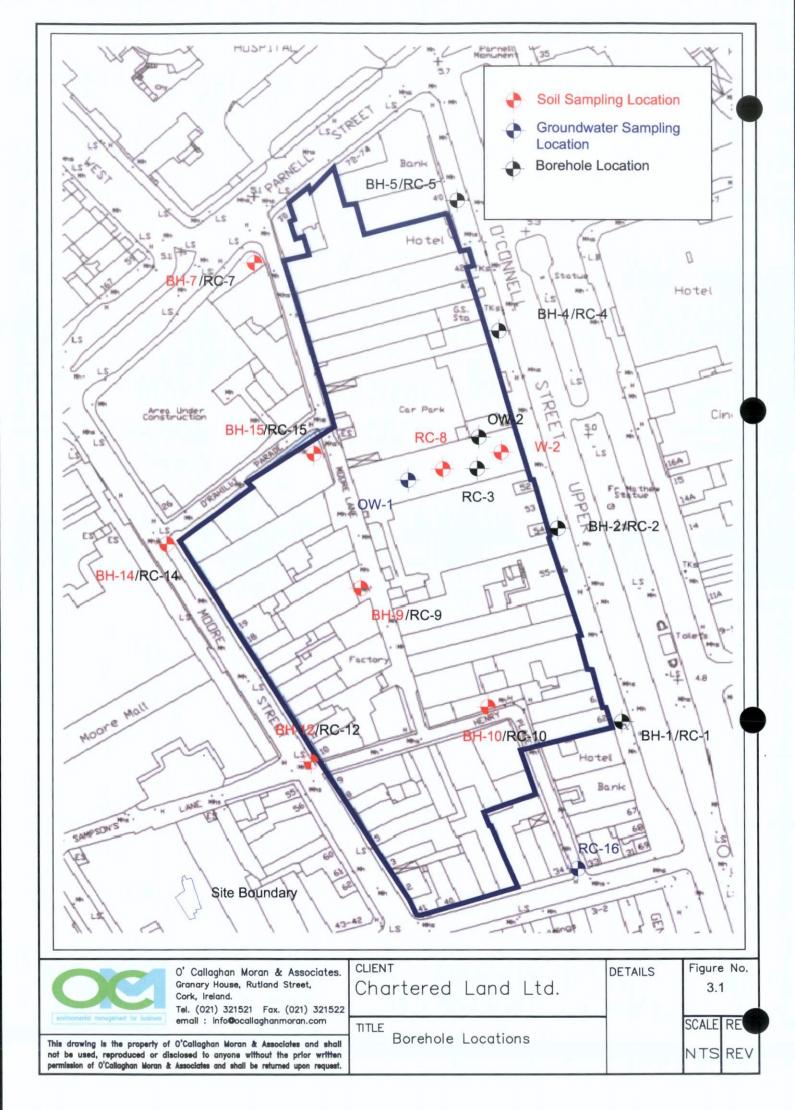
The GSI bedrock "Geology of Kildare – Wicklow", Map 1994 states that the subject area is underlain by dark grey to black limestones and shales of the Calp Limestones. Calp units typically consist of dark grey, fine grained, graded limestone with interbedded black, poorly fossiliferous shales. The limestone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

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

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

3.1.2 Subsoils/Quaternary Geology

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



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 Aguifer Classification and Vulnerability

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

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

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

3.2.2 Hydrogeological Risk Assessment

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

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

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

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

4. SITE INVESTIGATION

4.1 Sample Locations

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

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

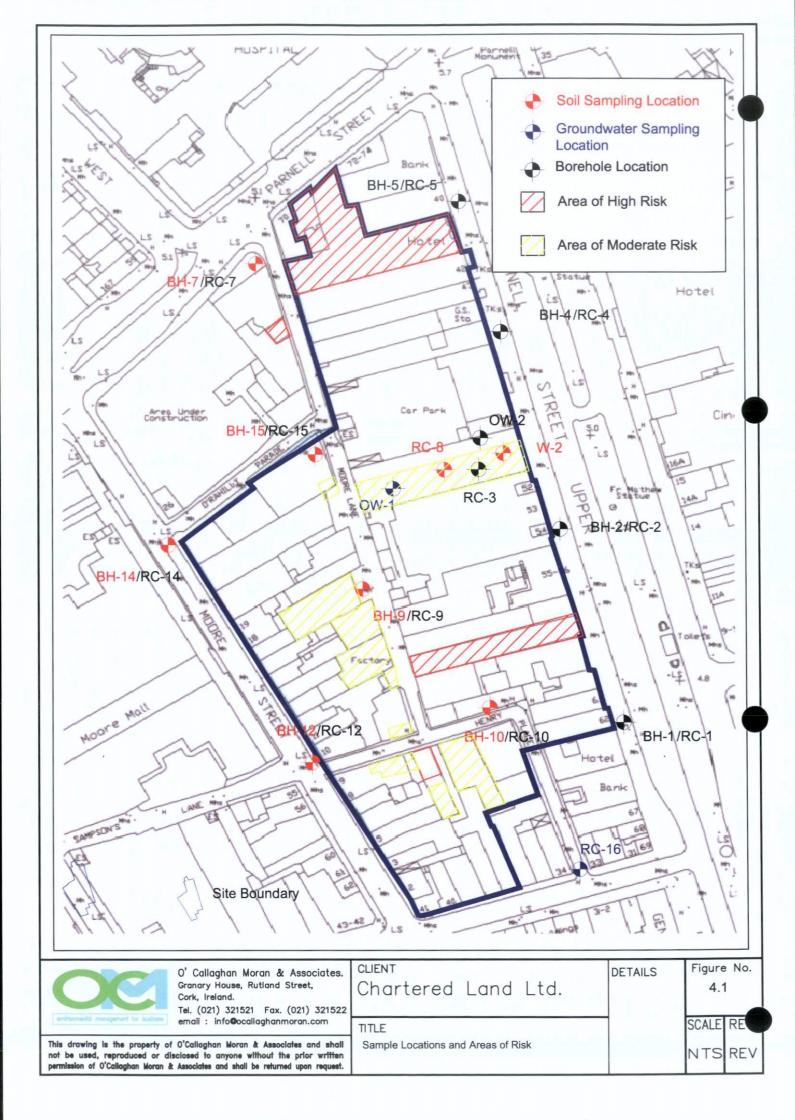
As none of the buildings identified in the 2006 assessment had been demolished, the boreholes had to be positioned in open areas and around the site perimeter and could not be located in all of the risk areas identified in the 2006 assessment. Figure 4.1 shows the location of the boreholes and the areas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

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

4.2 Borehole Installation

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

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



4.3 Soil

4.3.1 Sampling

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

4.3.2 Laboratory Analysis

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

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

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

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

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

Table 4.1

	Sui	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
BH-9	Fill Material	Soil	0.4-0.8m	
БП-9	Natural Ground	WAC	4-5m	Gravel
BH-10	Fill Material	Soil	1.7.2.5m	
	Fill Material	WAC	0.5-1m	
DH 12	Fill Material	WAC	3-4m	
BH-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	
BH-12	Natural Ground	WAC	3-4m	Clay
	Natural Ground	WAC	8-10m	Gravel
DC 0	Fill Material	WAC	0.5-1m	
RC-8	Fill Material	WAC	1-2m	
W 2	Fill Material	WAC	0.5-1m	
W-2	Fill Material	WAC	1-2m	

4.3.3 Results

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

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

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

Table 4.2 Soil Results Dublin Centre 2008

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

^{*}Denotes limit for mineral oil

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

Waste Acceptance Criteria (WAC) Testing

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

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

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

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

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

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

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

Table 4.3 Fill Material WAC Dublin Centre 2008

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

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

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	-	

^{*}If DOC is less than 500 then a higher limit can be accepted
** Limit is for Mineral Oil

^{**} 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	Inort EU Limits for
Parameter	Depth (m)	1.0-2.0	0.5-1	1.0-2.0	Landfill	Non-Hazardou
	Unit	1.0-2.0			Landini	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	AND DESCRIPTIONS
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		Market Market Barrier
PAH (17).	mg/kg	280	230	570	Murphy's 100r	mg/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	TWIN	EU Limits for	
Parameter	Depth (m) Unit	4-5 m	13-14 m	4-5 m	4-5 m	EU Limits for Inert 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	THE WAY	
Dissolved Organic Carbon	mg/kg	13	39	14	19	500	800	
Total Dissolved Solids	mg/kg	<2000	<2000	<2000	<2000	4000	60000	
Total Organic Carbon	%	3.1	0.52	2.8	2.4	3%*		
BTEX	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	6		
PCBs	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	1		
TPH	mg/kg	<50	<50	<50	57	500**	The Assessment	
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	Alteria de la constante		
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	TOTAL STREET	

*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	
PCBs	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	1	
TPH	mg/kg	<50	<50	<50	<50	500**	
PAH (16)	mg/kg	<1.0	<1.0	<1.0	<1.0	EAW WITH	-
PAH (17).	mg/kg	<1.0	<1.0	<1.0	<1.0	Murphy's 100mg/kg	

*If DOC is less than 500 then a higher limit can be accepted ** Limit is for Mineral Oil

4.4 Groundwater

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

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

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

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

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

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

Table 4.5 Groundwater Results Dublin Centre December 2008

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

5. DISCUSSION

5.1 Discussion

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

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

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

5.2 Soils

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

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

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

5.3 Groundwater

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

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

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

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

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

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

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

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

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

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

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

6.2 Recommendations

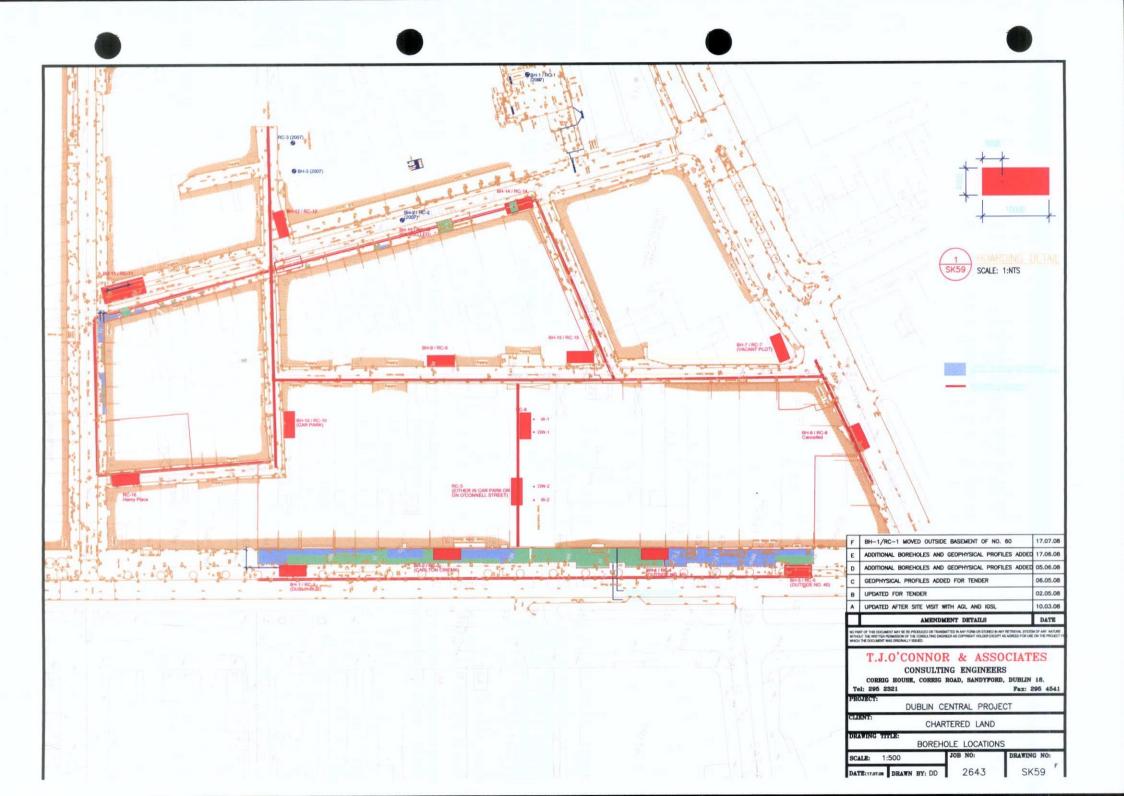
OCM recommend that following site clearance and as part of the bulk excavation samples of the fill and subsoil excavated in the vicinity of BH-12, W-2 and RC-8 be tested to confirm the waste characterisation i.e. inert or non-hazardous.

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

DCC PLAN NO 2862/21 RECEIVED: 01/06/2021

APPENDIX 1

Site Map



APPENDIX 2 Borehole Logs

January 2009 (SM/DC)

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GEOTECHNICAL BORING RECORD

REPORT NUMBER

13696

BOREHOLE NO. BH7 CONTRACT Dublin Central Development - Draft SHEET Sheet 1 of 2 CO-ORDINATES **RIG TYPE** Dando 150 DATE STARTED 05/08/2008 BOREHOLE DIAMETER (mm) DATE COMPLETED 12/08/2008 200 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 16.00 **BORED BY** CLIENT Dublin Central Developments Ltd J. O'Hara **ENGINEER** CASING DEPTH (m) 16.00 PROCESSED BY AGL Consulting Ltd S. Letch Samples Standpipe Details E Ξ Elevation Ref. Number Recovery Sample Field Test Description -egend Depth Depth Depth (m) Results - 0 MADE GROUND consisting of concrete 0.30 MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick. N = 7 (1, 1, 1, 2, 2, 2) AF4959 В 1.50-1.50 (5, 7, 15, 13, 11, 18) В AF4960 2.70-2.70 N = 633 (6, 5, 9, 13, 17, 24) AF4961 В 3.60-3.60 N = 100/225 mm (9, 20, 33, 38, 29) Dog a 4 20 Dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and B AF4962 4.50-4.50 subrounded to subangular of limestone 2000 0000 N = 26(7, 7, 6, 7, 6, 7) 000 В 5.50-5.50 80 6 N = 31 (2, 4, 6, 8, 8, 9) В AF4964 6.30-6.30 В N = 13AF4965 7.30-7.30 (5, 3, 3, 3, 3, 4) 8000 8000 8 -8 AF4966 (1, 1, 3, 5, 5, 8) 00000 В 8.30-8.30 مو 9000 000 q 200 -HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Sealed Rise Time Casing Time From (m) To (m) Comments Comments Strike (h) Depth At To (min) 4.2 Boulder 0.5 5.00 5.00 5.00 20 Moderate Hard Strata Boring 5.6 8 8 4 12.6 13.5 16 16 Hard Strata Boring Hard Strata Boring Hard Strata Boring 12.5 13.5 **GROUNDWATER DETAILS** GDT Boulder Hole Casing Depth to Water Date Comments GSL Depth Depth 01-08-08 05-08-08 2.00 2.00 End of shift GPJ Start of shift INSTALLATION DETAILS 05-08-08 5.10 End of shift Start of shift End of shift 5.60 6.00 Tip Depth RZ Top RZ Base Type 4.80 5.40 5.00 Date 06-08-08 5.00 6.00 06-08-08 8.60 9.00 12-08-08 15.00 13.00 15.00 50mm SP Start of shift REMARKS Hand dug inspection pit excavated to 1.20m. Blowing gravels from 5.6m bgl to base of hole. Falling and rising head test completed. 00 BH



GEOTECHNICAL BORING RECORD

REPORT NUMBER

13696

BOREHOLE NO. CONTRACT Dublin Central Development - Draft BH7 SHEET Sheet 2 of 2 **CO-ORDINATES RIG TYPE** Dando 150 DATE STARTED 05/08/2008 GROUND LEVEL (m AOD) BOREHOLE DIAMETER (mm) 200 DATE COMPLETED 12/08/2008 BOREHOLE DEPTH (m) 16.00 CLIENT **Dublin Central Developments Ltd BORED BY** J. O'Hara **ENGINEER** AGL Consulting Ltd CASING DEPTH (m) 16.00 PROCESSED BY S. Letch Samples Standpipe Details Ξ Œ Elevation Ref. Number Sample Type Recovery Field Test Depth (Legend Description Depth Depth (m) Results Dense grey slightly clayey/silty sandy GRAVEL with 0 10.00 (8, 7, 7, 6, 6, 6) many cobbles and lenses of brown slightly sandy AF4967 B 10 20-10 20 gravelly clay. Gravel is fine to coarse and subrounded 10.40 to subangular of limestone. Very dense grey slightly sandy GRAVEL with some cobbles. Gravel is fine to coarse and subrounded to (12, 15, 16, 21, 25, 38) AF4968 11.00-11.00 subangular of limestone. N = 100/225 mm 12 AF4969 B 12 00-12 00 (11, 20, 26, 33, 41) N = 100/90 mm AF4970 В 13.00-13.00 13 (25, 44, 56) N = 100/185 mm AF4971 В 14.00-14.00 (8, 11, 33, 48, 19) N = 100/150 mm (17, 27, 39, 61) AF4972 В 15 00-15 00 15 900 15.80 Hard brown slightly sandy gravelly CLAY with some AF4973 BB 15.90-15.90 100/90 mm cobbles 16 16.00 AF4974 16.00-16.00 (25, 40, 60) Obstuction - possible boulder End of Borehole at 16.00 m 19 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Time Casing Sealed Rise Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) 4.2 0.5 Boulder Hard Strata Boring Hard Strata Boring Hard Strata Boring 1/10/08 9 12.6 13.5 5.6 8847 9 12.5 13.5 GDT **GROUNDWATER DETAILS** 16 16 Hard Strata Boring 16 Hole Casing Depth to Water Date Comments IGSL Depth Depth 07-08-08 End of shift 12.50 12.50 GPJ 08-08-08 12 50 12 50 6 40 Start of shift INSTALLATION DETAILS

Date Tip Depth RZ Top RZ Base 08-08-08 11-08-08 13.50 13.50 13.50 13.50 2.70 6.20 End of shift Start of shift Type 15.00 13.00 15.00 11-08-08 16.00 16.00 4.80 End of shift 12-08-08 50mm SP 12-08-08 16 00 16.00 5.20 Start of shift End of shift LOG DCD REMARKS Hand dug inspection pit excavated to 1.20m. Blowing gravels from 5.6m bgl to base of hole. Falling and rising head test completed. BH



GEOTECHNICAL BORING RECORD

REPORT NUMBER

13696

	NTRACT		in Centr	al Developmen	t - Draft						BOREH SHEET	OLE N	NO.	BH9 Sheet 1 of 2	2
	ORDINA		AOD)		10001007 10	RIG TYPE Dando 150 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 17.50 CASING DEPTH (m) 17.50					DATE STARTED			ETED 23/07/2008	
	ENT		in Centr	ral Developmen	is Liu						BORED PROCES		ву	J. McDonne S. Letch	
										Sar	nples				
Debut (III)			De	escription		Legend	Elevation	Depth (m)	Ref. Number	Sample	Depth (m)	Recovery	Second Page 1	Field Test Results	Standpipe
11	MADE C	ROUN	D consis	sting of reinforc sting of brown g h some cobbles	rey sandy			0.20	AF1908	В	1.00-1.00			N = 7 (2, 2, 2, 1, 1, 3) N = 36	
2	GRAVE	/ery dense grey brown slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and subrounded to subangular of limestone.						2.00	71 1303	В	2.10-2.10			(4, 6, 7, 2, 10, 17)	
	and sub								AF1910	В	2.50-2.50	0			
									AF1911	В	3.00-3.00			N = 39 (7, 9, 8, 10, 10, 11)	
									AF1912	В	4.00-4.00	0		N = 28 (2, 3, 6, 7, 8, 7)	
									AF1913	В	5.00-5.00	0		N = 34 (3, 4, 7, 7, 9, 11)	
									AF1914	В	6.00-6.00	0		N = 27 (3, 3, 4, 8, 8, 7)	
						000			AF1915	В	7.00-7.00	0		N = 77 (7, 18, 20, 25, 20, 12	2)
						2 \$0 2 80 2 80 2 80 2 80 2 80 2 80 2 80 2 8	5		AF1916	В	8.00-8.0	0		N = 69 (6, 12, 16, 20, 20, 13	3)
									AF1917	В	9.00-9.0	0		N = 18 (6, 6, 5, 5, 5, 3)	
1/	ARD STR	ATA BO	RING/	CHISELLING			ER ST	RIKE	ETAILS	,	-				17.41
or	m (m) To	(m)	Time	Comments		Wate		asing	Sealed	Ris		ime	Co	mments	
1	6.2	6.5 7.5	(h) 1 2	Boulder Boulder		Strik 5.50		epth 5.50	At No	3.1		min) 5		Rapid	
						GRO	UNDWA		DETAILS				1		
						Da	te	Hole Depth	Casing Depth		epth to Vater	Comn	nents	S	
						15-07 16-07		2.00	2.00			End of s			
	Date -07-08			op RZ Base 0 13.50	Type 50mm SP	16-0. 16-0. 17-0.	7-08	7.00 7.00	7.00 7.00		4.50	End of s Start of	shift		



1/10/08

IGSL.GDT

GPJ

LOG DCD

BH

GEOTECHNICAL BORING RECORD

REPORT NUMBER

13696

CONTRACT BOREHOLE NO. Dublin Central Development - Draft BH9 SHEET Sheet 2 of 2 **CO-ORDINATES** RIG TYPE Dando 150 DATE STARTED 15/07/2008 BOREHOLE DIAMETER (mm) 200 DATE COMPLETED 23/07/2008 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 17.50 Dublin Central Developments Ltd CLIENT BORED BY J McDonnell CASING DEPTH (m) PROCESSED BY **ENGINEER** AGL Consulting Ltd 17.50 S. Letch Samples Standpipe Details Œ $\widehat{\Xi}$ Elevation Ref. Number Sample Type Recovery Field Test Description Legend Depth (Depth (Depth (m) Results 3000 AF 1918 10 00-10 00 Very dense grey brown slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse 00000 and subrounded to subangular of limestone. (continued) No CPT as gravel blowing up casing N = 41 (11, 13, 11, 10, 10, 10 AF1919 В 11.00-11.00 2000 0000 N = 43AF1920 В 12 12.00-12.00 (7, 5, 8, 8, 13, 14) A \$ 0000 B és N = 78AF1921 В 13 (6, 6, 10, 18, 25, 25) 30 13.50 Hard dark brown slightly sandy gravelly CLAY with 9. occasional cobbles N = 68 (6, 11, 15, 17, 19, 17) AF1922 B 14.00-14.00 14 20 Very dense grey brown slightly sandy GRAVEL with 0 AF1923 14.40-14.40 14.50-14.50 some cobbles. Gravel is medium to coarse and 9 14.50 Failed subrounded to subangular of limestone. 100 blows Hard dark brown slightly sandy gravelly CLAY with N = 45/150 mm AF1924 В 15.00-15.00 occasional cobbles 8 (20, 35, 20, 25) 0 0.0 Very dense grey brown slightly sandy GRAVEL with some cobbles. Gravel is medium to coarse and 8 15.90 S AF1925 В 16.00-16.00 80 0 subrounded to subangular of limestone 8 16.50 Hard black slightly sandy gravelly CLAY with occasional cobbles. AF1828 В 16.80-16.80 N = 100 17.00 Obstuction - possible boulder AF1829 17.10-17.10 (8, 12, 20, 30, 30, 20) End of Borehole at 17.50 m 17.50 18 19 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time From (m) To (m) Comments Comments Strike (h) Depth At To (min) 16.2 17 16.5 17.5 Boulde Boulder **GROUNDWATER DETAILS** Hole Depth to Water Casing Date Comments Depth Depth 17-07-08 13.00 13.00 5.00 End of shift 18-07-08 18-07-08 13.00 4.60 Start of shift INSTALLATION DETAILS 5.80 4.65 End of shift Start of shift 16.50 16.50 Tip Depth RZ Top RZ Base Type Date 22-07-08 13.50 12.00 13.50 50mm SP REMARKS Hand dug inspection pit excavated to 1.20m. Falling and rising head tests completed. Standing from 24th to 28th July - No access



REPORT NUMBER

13696

BOREHOLE NO. BH10 CONTRACT Dublin Central Development - Draft SHEET Sheet 1 of 2 **CO-ORDINATES RIG TYPE** Dando 150 DATE STARTED 30/07/2008 BOREHOLE DIAMETER (mm) DATE COMPLETED 13/08/2008 200 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 15.45 BORED BY CLIENT **Dublin Central Developments Ltd** J. McDonnell CASING DEPTH (m) 15.45 PROCESSED BY **ENGINEER** AGL Consulting Ltd S. Letch Samples Standpipe Details E (E) Elevation Ref. Number Recovery Field Test Sample egend-Description Depth (Depth Depth (m) Type Results MADE GROUND consisting of concrete. 0.10 MADE GROUND consisting of brown grey sandy slightly gravelly clay with some cobbles and red brick. AF1830 В 1.00-1.00 N = 6AF1831 В 2.00-2.00 (1, 1, 2, 1, 1, 2) AF1832 В 3.00-3.00 3 00 Q O O Very dense grey slightly clayey/silty sandy GRAVEL (8, 18, 16, 11, 17, 7) with many cobbles. Gravel is fine to coarse and 20 0 subrounded to subangular of limestone 200 0000 N = 30 (3, 5, 7, 7, 8, 8) AF1833 R 4 00-4 00 000 2000 80 BD N = 50AF1834 В 5.00-5.00 (8, 8, 14, 14, 12, 10) 0000 Dense grey slightly clayey/silty sandy GRAVEL with 5.50 2000 many cobbles. GRAVEL is fine to coarse and 80 subrounded to subangular of limestone. 2000 AF1835 В 6.00-6.00 6 (4. 6. 6. 7. 7. 8) 0000 101 6.80 Very stiff black slightly sandy gravelly CLAY with 79 N = 56 (3, 15, 18, 12, 11, 15) AF1836 В 7.00-7.00 occasional cobbles .0. 2000 7.50 Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and 200 N = 100/225 mmsubrounded to subangular of limestone. AF1837 В 8.00-8.00 (15, 24, 25, 30, 45) 0000 000 AF1838 9.00-9.00 В 9 (7. 9. 14. 15. 13. 10) 0000 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) Hard Strata Boring 882 8.00 8.00 6.50 20 Moderate Hard Strata Boring 15.4 15.45 Boulder **GROUNDWATER DETAILS** GDT Hole Casing Depth to Water Date Comments IGSL Depth Depth 30-07-08 6.00 6.00 End of shift GPJ 4.80 INSTALLATION DETAILS

Date | Tip Depth RZ Top | RZ Base 08-08-08 Start of shift 08-08-08 8.00 8.00 6.10 4.55 End of shift Type 11-08-08 8.00 Start of shift 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.



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 GROUND LEVEL (m AOD) BOREHOLE DIAMETER (mm) 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 E Ξ Elevation Ref. Number Recovery Sample Type Field Test Depth (Legend Depth (Description Depth (m) Results 10 00-10 00 Very dense grey slightly clayey/silty sandy GRAVEL with many cobbles. Gravel is fine to coarse and AF1839 (9, 13, 16, 24, 19, 17) subrounded to subangular of limestone. (continued) N = 100/160 mm AF1840 В 11.00-11.00 (13, 39, 50, 40, 10) N = 100/170 mm (12, 30, 40, 45, 15) AF1841 В 12.00-12.00 12 N = 100/125 mmAF1842 В 13.00-13.00 13 (12, 23, 62, 38) 13.80 Hard black slightly sandy gravelly CLAY with N = 100/230 mm AF1843 В 14.00-14.00 occasional cobbles. (4, 10, 20, 35, 40, 5) N = 100/75 mm (12, 43, 100) AF1844 B 15 00-15 00 Obstuction - possible boulder 15.40 AF1845 В 15.45-15.45 End of Borehole at 15.45 m 15.45 16 19 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Time Water Casing Sealed Rise Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) Hard Strata Boring 1/10/08 14.5 15.45 Hard Strata Boring Boulder 11 15.4 GDT **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments IGSL Depth Depth 11.00 11.00 14.50 14.50 15.45 11.00 11.00 14.50 14.50 15.45 11-08-08 4.90 End of shift Start of shift End of shift Start of shift 13696.GPJ 12-08-08 4 60 INSTALLATION DETAILS

Date Tip Depth RZ Top RZ Base 12-08-08 13-08-08 5.60 4.50 Type 13-08-08 5.60 End of shift LOG DCD REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.0m to aid drilling. Blowing gravels from 9.5m to 10.5m and 11.5m to 12.0m bgl. Falling and rising head test completed. Standing 5.5 days - stopped by Client due to Landowner request. BH

															13090	_
CON	ITRACT	Dubl	in Central	Developmen	nt - Draft							BOREH	OLE N	NO.	BH12	-
	000000	TEO		***					_			SHEET			Sheet 1 of 2	
.0-	ORDINA	TES				IG TYPE				Dando 20	00	DATE S			12/10/2008	
GRO	DUND L	EVEL (m	AOD)				E DIAMETE			200		DATE (COMPI	LETE	D 16/10/2008	
	ENT			Developmen	no Liu		E DEPTH (r	n)		13.60		BORED			J. McDonnel	I
NG	INEER	AGL	Consulting	g Ltd	C	ASING D	EPTH (m)			13.60	Sar	PROCE nples	SSED	BY	S. Letch	1
Depth (m)			Des	scription			Legend	Elevation	Depth (m)	Ref. Number	Sample		î	Recovery	Field Test Results	Standpipe
0	MADE	CPOLINI	Consistir	ng of brown s	slightly cands	, ×	******	Ш		112	0) -		- (Y		8
1	gravelly	clay with	some rec	d brick and co	oncrete.	,				AF4857	В	1.00-1.	00		N = 14 (2, 2, 3, 3, 4, 4)	
2										AF4858	В	2.00-2.	00		N = 11 (2, 2, 2, 3, 3, 3)	
3	Firm becoming stiff brown slightly sandy graw with occasional cobbles.				ly gravelly C	LAY 2	2	3	.40	AF4859	В	3.00-3.	00		N = 30 (4, 8, 10, 8, 6, 6)	
4		with occasional cobbles.				₹ 2				AF4860	В	4.00-4.	00		N = 17 (4, 3, 4, 4, 4, 5)	
5						\$ \$	9.0.0			AF4861	В	5.00-5.	00		N = 34 (4, 6, 8, 8, 9, 9)	
6	Very st	iff becom with occas	ing hard b sional cob	plack slightly s bles	sandy grave	lly $\frac{\zeta_1}{\zeta_2}$		6	.00	AF4862	В	6.00-6.	00		N = 49 (6, 6, 9, 10, 12, 18)	
7						3				AF4863	В	7.00-7	00		N = 100/200 mm (14, 20, 35, 35, 30)	
8						\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		١		AF4864	В	8.00-8	.00		N = 54 (6, 8, 12, 12, 14, 16)	
9						4				AF4865	В	9.00-9	.00		N = 55 (7, 8, 11, 14, 14, 16)	
HA	RD STR	RATA BO		ISELLING			WATER									17.41
ron	n (m) 1	o (m)	Time (h)	Comments			Water Strike	Casing Depth		Sealed At	Ri		Time (min)	Co	mments	
7	.1	7.5		Boulder			June	Dopui		, 11	-		,)			
							GROUND Date	Hol	le	Casing		epth to	Com	ments		
							12-10-08	Dep		Depth		Water	End of			
		ION DE					13-10-08 14-10-08	1.2	0	1.20 7.00		*	Start of	of shift		
	Date -10-08	Tip Dept	th RZ To		Type 50mm S		14-10-08	7.0	0	7.00		6.70	Start o			
10,15		300000000000000000000000000000000000000	inspection p	it excavated to 1	9.000,000,000	20										

	NTRA	A.5503	blin Centra	al Development - Dra	aft						BOREHOL SHEET	E NO.	BH12 Sheet 2 of 2	
		INATES D LEVEL (r	m AOD)		RIG TYI BOREH	PE OLE DIAME	TER (m		Dando 20 200		DATE STA			
	ENT SINEE		ıblin Centra SL Consultir	al Developments Ltd ng Ltd		OLE DEPTH			13.60 13.60		BORED BY		J. McDonnel S. Letch	I
Depth (m)			De	escription		Legend	Elevation	Depth (m)	Ref. Number	Sample Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe
10	Very CLA	y stiff becor Y with occ	ming hard asional co	black slightly sandy bbles <i>(continued)</i>	gravelly				AF4866 AF4867	В	11.00-11.00		N = 100/50 mm (8, 42, 100) N = 100/90 mm (10, 38, 80, 20)	
12	occa	asional cob rounded to	obles. Grav subangula	clayey/silty sandy GF rel is fine to coarse a ar of limestone.	nd	2000		11.50	AF4868	В	12.00-12.00		N = 68 (9, 11, 15, 16, 18, 19)	
13	cobb			gravelly CLAY with	occasional			12.50	AF4869	В	13.00-13.00		N = 100/150 mm (22, 35, 40, 60)	
14														
15														
15														
16														
14 15 16 17														
15 16 17			Time	IISELLING			_	KE DET		Rise	e Tim	e		
15 16 17	n (m)		Time (h)	IISELLING Comments Boulder		WATEI Water Strike 11.50	Ca: De		AILS Sealed At No	Risc To 10.5	(mir	1)	Comments Moderate	
15 16 17 18	n (m)	To (m)	Time (h)	Comments		Water Strike 11.50	Ca: De 11	epth .50 ER DET Hole	Sealed At No AILS Casing	10.5 De	0 (mir 50 20	1)	Moderate	
15 16 17 18 19	n (m)	To (m)	Time (h) 2	Comments		Water Strike 11.50	Cas De 11	epth .50	Sealed At No	10.5	pth to /ater	1)	Moderate	

										BODELLO				-
10:	NTRACT	Dublin C	entral Development - Draft							BOREHO SHEET	DLE N	O.	W2 Sheet 1 of 3	3
	ORDINAT	TES VEL (m AO	D)	RIG TYPE	LE DIAMET	ER (m		Dando 30	00	DATE ST			25/09/2008	
	ENT		Central Developments Ltd		LE DEPTH (m)	2	21.40		BORED		DV	J. Edwards S. Letch	/ J. McD
T	SINCLK	AGL COI	isulting Ltd	CASING	DEPTH (m)				_	nples	SED	ы	S. Letch	
Deput (III)			Description	I	Legend	Elevation	Depth (m)	Ref. Number	Sample	Depth (m)	,100000	recovery.	Field Test Results	Standpipe
)	MADE G gravelly	ROUND co	onsisting of brown slightly s me red brick and concrete.	andy				AG3601	В	0.50-0.50				
	MADE G	ROUND co	onsisting of concrete.				0.60	AG3601	В	0.30-0.30				
			onsisting of brown slightly s me red brick and concrete.	andy			0.90	AG3602	В	1.00-1.00):			
								AG3603	В	2.00-2.00)			4
								AG3604	В	3.00-3.00				
			silty sandy GRAVEL with o	ccasional	<u> </u>		4.20	AG3605	В	4.00-4.00)			
		Gravel is fill lar of limes	ne to coarse and subround tone.	ed to	80000000000000000000000000000000000000			AG3606	В	5.00-5.00				
5					80 80			AG3607	В	6.00-6.00	0			
7	cobbles.	htly clayey/ Gravel is m lar of limes	silty sandy GRAVEL with n nedium to coarse and subro tone.	ounded to	000000000000000000000000000000000000000		6.50	AG3608	В	7.00-7.00				
8					60 0			AG3609	В	8.00-8.00	o .			
9								AG3610	В	9.00-9.00	0			
HA	ARD STRA	TA BORIN	G/CHISELLING		WATER	STRI	KE DET	AILS						
or	m (m) To	(m) Tin			Water Strike	123	sing	Sealed At	Ris		ime nin)	Con	nments	
2	2.1	1.8 1 2.2 1 3.2 0.7	Made Ground Obstruction Made Ground Obstruction Made Ground Obstruction		4.80		.80	No	4.3		20	Мо	oderate	
45 45	5.2 5.7 6 8	4.9 1 5.3 1 5.8 1 8 1 9 1	Boulder Boulder 0 6.5hrs Chiselling 3.5hrs Ha 7hrs Chiselling 3hrs Hard 5	Strata Boring			Hole Depth	Casing Depth	De V	valei		ments		
NS	Date Date		S RZ Top RZ Base T	уре	26-09-08 26-09-08 27-09-08 27-09-08 28-09-08 28-09-08		2.00 2.00 6.00 6.00 8.00 8.00 9.00 9.00	2.00 2.00 6.00 6.00 8.00 9.00 9.00		5.50 5.40 5.00 4.20 4.80 4.50	End of Start of End of Start of End of Start of End of Start of	f shift shift f shift shift f shift shift		
Œ	3 0 1	3.0m to aid dril Casing size red 4.0m bgl. Cas Re set up rig o	ection pit excavated to 1,20m. Wa ling. Blowing gravels from 4.9m tc duced from 300mm to 250mm dia sing left in borehole to allow rotary no 09/10/08 to advance hole after rickhead and gravel falling in behin	o 6m bgl. meter at follow on. otary rig	25-05-00		5.50	3.00		7.00	Start O	. omit		

COI	NTRAC	T Duk	olin Centr	al Devel	opmer	nt - Draft							BOREH SHEET	OLE N	NO.	W2 Sheet 2 of 3	
	ORDIN	ATES LEVEL (n	AOD)				G TYPI	E DLE DIAMET	ER (m		ando 30	000	DATE S			25/09/2008	
CLII	ENT	Duk	olin Centr		opmer	nts Ltd BO	OREHO	LE DEPTH			1.40		BORED	BY		J. Edwards /	J. McDo
NG	SINEER	AGI	Consulti	ng Ltd		CA	ASING	DEPTH (m)					PROCES	SSED	BY	S. Letch	
E									_	Ê		_	nples		>		be
Deptn (m)			D	escription	n			Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)		Recovery	Field Test Results	Standpipe Details
10	cobble		is mediu	m to coa	rse ar	L with many nd subrounde					AG3611	В	10.00-10.				
12	cobble to coa Grey s cobble	es and barse and solightly cla	nds of da ubrounde yey/silty is mediu	rk grey c ed to sub sandy G m to coa	lay. G angula RAVE	L with many ravel is medi ar of limestor L with many nd subrounde	ium ne.	18:00 C C C C C C C C C C C C C C C C C C		11.20 11.40	AG3613	В	12.00-12.0	00			
13								3000			AG3614	В	13.00-13.0	00			
14								No.			AG3615	В	14.00-14.0	00			
15		frown slightly sandy gravelly CLAY with occasional								15.50	AG3616	В	15.00-15.0	00			
16	cobble			II. OI A						10.40	AG3617	В	16.00-16.0	00			
17	cobble Re-set	s t up rig af	ter rotary	rig adva	nced t	occasional to rockhead be cased off.				16.40							
18																	
								0.0.									
HA	RD ST	RATA BO	RING/CI	HISELLIN	NG			WATER	_								
ron	n (m)	To (m)	Time (h)	Comme	nts			Water Strike		sing S	Sealed At	Rise		ime nin)	Con	nments	
12	1 2.2 4 6	12.2 14 16 16.2	10 10 10	7hrs Chise	elling 31 elling 41	nrs Hard Strata nrs Hard Strata nrs Hard Strata	Boring						,				
16		16.4 19.5	2 3 8	Boulder		g rs Hard Strata B	Boring	GROUNI		ER DETA		-	nth to				
19		21.4	8			nrs Hard Strata		Date 29-09-08	[Depth 11.00	Depth 11.00	W 4	1.80	End of			-1
	TALLA Date	TION DE Tip Dep	TAILS th RZ To	op RZ E	Base	Туре		30-09-08 30-09-08 01-10-08 01-10-08 02-10-08		11.00 12.20 12.20 14.00 14.00	11.00 12.20 12.20 14.00 14.00	4 4 4 5	1.50 1.80 1.80 5.00	Start of End of Start of End of Start of	f shift shift f shift shift		
REN	MARKS	Hand dug 3.0m to ai Casing siz 14.0m bgl Re set up	d drilling. B e reduced Casing lef	from 300m	m to 25	20m. Water add m 4.9m to 6m b i0mm diameter	gl. at	02-10-08 03-10-08 03-10-08 09-10-08 09-10-08		16.00 16.00 16.40 16.40 19.50	16.00 16.00 16.40 16.40 19.50	5 4 4 4	5.00 5.50 5.90 5.80	End of Start of End of Start of End of	shift f shift shift f shift		

CON	NTRACT	Dublin Central Development - Dra	ıft						BOREHO	LE NO.	W2 Sheet 3 of 3	
	ORDINA	TES EVEL (m AOD)	RIG TYP	PE OLE DIAMET	ER (m		ando 30	000	DATE STA		25/09/2008	
CLIE	ENT SINEER	Dublin Central Developments Ltd AGL Consulting Ltd	BOREH	OLE DEPTH			1.40		BORED B	BY	J. Edwards	J. McDon
	MACEIX	AGE Consulting Eta	CASING	DEFIN (III)				_	nples	SED B1	S. Letti	
Depth (m)		Description		Legend	Elevation	Depth (m)	Ref. Number	Sample	_	Recovery	Field Test Results	Standpipe Details
20	cobbles	ghtly clayey/silty sandy GRAVEL with . Gravel is medium to coarse and sub ular of limestone.	many rounded to			20.00						
	Obstuct End of	ion - rockhead Borehole at 21.40 m				21.30						
22	End of	Soletiole at 21.40 III				21.40						•
23												
24												
25												
26												
27							Ī					•
28												
29												
HA	RD STR	ATA BORING/CHISELLING		WATER	STRIE	KE DET	AILS					
ron	n (m) T	o (m) Time Comments		Water Strike	Cas	sing S	Sealed At	Ris		me nin) Cor	mments	
		VIII		Clike	26	pu i	/ 11	10	(111			
				GROUN		ER DET	AILS Casing	I De	enth to			
				Date		Depth	Depth	V	valer	Comments		
	TALLAT Date	ION DETAILS Tip Depth RZ Top RZ Base	Туре	10-10-0	5	21.40	21.40		5.00 E	end of shift		
REI	WARKS	Hand dug inspection pit excavated to 1.20m. W 3.0m to aid drilling. Blowing gravels from 4.9m Casing size reduced from 300mm to 250mm d 14.0m bgl. Casing left in borehole to allow rota Re cet up rig on 09/10/08 to advance hole after	to 6m bgl. iameter at ry follow on.	m								



REPORT NUMBER

13696

Dublin Central Development - Draft BOREHOLE NO. CONTRACT **BH14** SHEET Sheet 1 of 2 CO-ORDINATES() RIG TYPE Dando 2000 DATE STARTED 09/11/2008 BOREHOLE DIAMETER (mm) 200 13/11/2008 GROUND LEVEL (m AOD) DATE COMPLETED BOREHOLE DEPTH (m) 12.00 CLIENT Dublin Central Developments Ltd **BORED BY** J. McDonnell **ENGINEER** AGL Consulting Ltd PROCESSED BY CASING DEPTH (m) 12.00 S. Letch Samples Standpipe Details E Ξ Elevation Ref. Number Sample Type Recovery Field Test _egend Description Depth Depth Depth (m) Results 0 MADE GROUND consisting of granite cobblelock 0.10 MADE GROUND consisting of concrete. 0.20 MADE GROUND consisting of brown slightly sandy gravelly clay with some red brick and concrete. 1.00-1.00 ENV (3, 3, 5, 5, 4, 4) AF4832 N = 122.00-2.00 2 ENV (2, 2, 3, 3, 3, 3) AF4833 3.00-3.00 3.00-3.00 (2, 2, 2, 3, 3, 3) AF4834 Stiff brown slightly sandy gravelly CLAY. 3.20 N = 22 (3, 3, 5, 5, 6, 6) ENV 4.00-4.00 AF4835 4.00-4.00 AF4836 В 5.00-5.00 Very stiff brown slightly sandy very gravelly CLAY. 5.00 (8, 14, 16, 16, 15, 10) ō ō AF4837 В 6.00-6.00 14, 20, 20, 24, 20, 20) 0_ 2000 6.50 Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and subrounded to subangular of limestone. AF4838 В 7 00-7 00 (9, 14, 15, 19, 20, 30) 00000 000 N = 100/225 mm AF4839 В 8.00-8.00 8 80 (14, 21, 30, 30, 40) 20 80 000 11. N = 100/275 mm AF4840 В 9.00-9.00 9 12, 16, 20, 20, 32, 28) HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Rise Time Casing Sealed Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) 26/11/08 8.3 8.1 Boulder 6.60 6.60 5.00 5 Moderate GDT **GROUNDWATER DETAILS** Depth to Water Casing Date Comments IGSL Depth Depth 6.50 6.50 9.70 End of shift 13696.GPJ 6.50 6.00 Start of shift End of shift | INSTALLATION DETAILS | Date | Tip Depth | RZ Top | RZ Base 12-11-08 13-11-08 5.60 Type Start of shift LOG DCD REMARKS
Hand dug inspection pit excavated to 1.20m. Night work - shift started at 1800hrs to accommodate Moore Street traders. Shift finished at 2300hrs due to T2 licence restrictions. Standing 5 hours each day totalling 20 hours standing. 2 No. Falling and 1 No. Rising head test completed. Casing left in borehole to allow rotary follow on. BH



REPORT NUMBER

ON	NTRACT	Dublin	Central Development - Dra	ft						BOREHOL	E NO.	BH14	
0-	ORDINA	TES()		RIG TYP	PE		[Dando 20	00	SHEET DATE STA	ARTED	Sheet 2 of 2 09/11/2008	
RC	DUND L	EVEL (m A	OD)	BOREH	OLE DIAMET	ER (m	m) 2	200		DATE CO	MPLET	ED 13/11/2008	
LIE	ENT	Dublin	Central Developments Ltd	BOREH	OLE DEPTH	(m)	1	12.00		BORED B	Υ	J. McDonnel	
NG	SINEER	AGL C	onsulting Ltd	CASING	DEPTH (m)		1	12.00		PROCESS	ED BY	S. Letch	
=						_	Û.			nples	>		e
neptru (m)			Description		Legend	Elevation	Depth (m)	Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe
111	occasio	nal cobbles	lightly clayey/silty sandy GR s. Gravel is fine to coarse ar pangular of limestone. <i>(conti</i>	nd	\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$			AF4841	В	11.00-11.00		N = 82 (9, 13, 16, 19, 22, 25) N = 100/225 mm (15, 19, 35, 31, 34)	VIII
2	End of	Borehole a	t 12.00 m				12.00						
3													
4													
5													
6													
7												le F	
													1
8													
9												. 1 .*	
A	RD STR		ING/CHISELLING		WATER				Ris	Tin			
		o (m)	(h) Comments		Strike	Cas De	pth	Sealed At	To			Comments	
11	1.9	12	1.25 Boulder										
					GROUN Date		Hole	Casing	De	epth to C	ommer	nts	
NS	TALLA]	ION DETA	NLS		13-11-08		Depth 12.00	Depth 12.00			nd of shift		
	Date	Tip Depth	RZ Top RZ Base	Туре									
E	MARKS	started at 18 finished at 23	spection pit excavated to 1.20m. Ni 00hrs to accommodate Moore Stre 300hrs due to T2 licence restriction lay totalling 20 hours standing. 2 N	et traders. Shir s. Standing 5	ft								



REPORT NUMBER

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BOREHOLE NO. CONTRACT Dublin Central Development - Draft **BH15** SHEET Sheet 1 of 3 **CO-ORDINATES** RIG TYPE Dando 150 DATE STARTED 15/09/2008 BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD) 200 DATE COMPLETED 24/09/2008 BOREHOLE DEPTH (m) 21.20 CLIENT Dublin Central Developments Ltd BORED BY J. McDonnell **ENGINEER** AGL Consulting Ltd CASING DEPTH (m) 21.20 PROCESSED BY S. Letch Samples Standpipe Details (E) Ξ Elevation Ref. Number Recovery Sample Field Test Legend Depth (Description Depth Depth (m) Type Results 0 MADE GROUND consisting of tarmacadam. MADE GROUND consisting of brown slightly sandy 0.20 gravelly clay with some red brick, ash and concrete. AF4821 В 1.20-1.20 (1, 1, 1, 1, 1, 1) N = 7 (1, 2, 2, 2, 1, 2) AF4822 В 2.00-2.00 AF4823 В 3.00-3.00 (4, 4, 4, 3, 2, 8) 3.50 Very dense grey slightly clayey/silty sandy GRAVEL 2000 with occasional cobbles. Gravel is fine to coarse and 80. subrounded to subangular of limestone. N = 111 (12, 16, 25, 30, 27, 29) AF4824 В 4.00-4.00 N = 100/150 mm В AF4825 5.00-5.00 (35, 48, 52) AF4826 В 6.00-6.00 0 (15, 22, 30, 29, 27, 33) 000 400 AF4827 В 7 00-7 00 (4, 6, 4, 5, 4, 4) -8 0000 N = 56AF4828 В 8.00-8.00 (6, 9, 11, 16, 15, 14) 00 AF4829 В N = 879.00-9.00 (9, 11, 16, 25, 20, 26) 8 80-HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Rise Time Casing Sealed Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) 0.5 3.8 Boulder 6.00 6.00 No 4.70 5 Moderate 1/10/08 3.9 4.8 5.8 Boulder Boulder 0.5 6 14.4 16.7 18.5 Boulder **GROUNDWATER DETAILS** GDT Hard Strata Boring 14.4 Hard Strata Boring Hard Strata Boring Hard Strata Boring Depth to Water Hole Casing Date Comments IGSL Depth Depth 18.5 21 End of shift 21.2 21 Boulder 3.50 GP.J 16-09-08 3.50 Start of shift INSTALLATION DETAILS

Date Tip Depth RZ Top RZ Base 16-09-08 17-09-08 6.00 End of shift Start of shift 6.00 Type LOG DCD REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling. BH



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BOREHOLE NO. **BH15** CONTRACT Dublin Central Development - Draft SHEET Sheet 2 of 3 CO-ORDINATES **RIG TYPE** Dando 150 DATE STARTED 15/09/2008 DATE COMPLETED 24/09/2008 BOREHOLE DIAMETER (mm) 200 GROUND LEVEL (m AOD) BOREHOLE DEPTH (m) 21.20 CLIENT Dublin Central Developments Ltd BORED BY J. McDonnell AGL Consulting Ltd CASING DEPTH (m) PROCESSED BY **ENGINEER** 21.20 S. Letch Samples Standpipe Details E Elevation Ref. Number Recovery Field Test -egend Depth Description Depth Depth (m) Type Results AF4830 10.00-10.00 N = 54 (7, 10, 11, 11, 17, 15) 0000 Very dense grey slightly clayey/silty sandy GRAVEL with occasional cobbles. Gravel is fine to coarse and 000000 subrounded to subangular of limestone. (continued) N = 47 (3, 5, 9, 9, 14, 15) AF4831 В 11.00-11.00 \$000 \$000 AF4832 В 12.00-12.00 12 (5, 7, 20, 15, 16, 18) 1000 ABA N = 100/150 mm AF4833 В 13.00-13.00 13 (3, 11, 26, 74) AF4834 В 14 00-14 00 -00 Hard black slightly sandy gravelly CLAY with (9 14.40 AF4835 1.1 14.50-14.50 1% rec occasional cobbles N = 100/240 mm AF4836 В 15.50-15.50 (11, 15, 20, 25, 45, 10) 16 AF4837 В 16.50-16.50 0 (10, 15, 19, 24, 30, 27) N = 100/150 mm AF4838 В 17.50-17.50 (20, 29, 40, 60) 18 00 N = 100/210 mm AF4839 В 18.50-18.50 (12, 26, 34, 37, 29) 19 = 100/180 mm AF4840 В 19.50-19.50 (12, 30, 36, 44, 20) HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Rise Time Casing Sealed Time From (m) To (m) Comments Comments (h) Strike Depth At To (min) 3.8 0.5 Boulde 3.9 Boulder Boulder Boulder 5 6 14.4 16.7 18.5 21 0.5 **GROUNDWATER DETAILS** GDT Hard Strata Boring 8 14.4 16.7 18.5 Hard Strata Boring Hard Strata Boring Hard Strata Boring Depth to Water Hole Casing Date Comments IGSL Depth Depth 11.00 11.00 End of shift GPJ INSTALLATION DETAILS

Date Tip Depth RZ Top RZ Base 18-09-08 5.50 Start of shift 14.40 14.40 16.70 16.70 14.40 14.40 16.70 16.70 18-09-08 5.80 End of shift 5.80 6.40 6.10 19-09-08 19-09-08 Start of shift End of shift Type 22-09-08 Start of shift 22-09-08 18.50 18.50 6.50 End of shift 23-09-08 Start of shift **REMARKS** Hand dug inspection pit excavated to 1,20m. Water added from 3.5m to aid drilling.



REPORT NUMBER

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BOREHOLE NO. CONTRACT Dublin Central Development - Draft **BH15** SHEET Sheet 3 of 3 **CO-ORDINATES RIG TYPE** Dando 150 DATE STARTED 15/09/2008 BOREHOLE DIAMETER (mm) GROUND LEVEL (m AOD) 200 DATE COMPLETED 24/09/2008 BOREHOLE DEPTH (m) 21.20 Dublin Central Developments Ltd CLIENT **BORED BY** J. McDonnell **ENGINEER** AGL Consulting Ltd CASING DEPTH (m) 21.20 PROCESSED BY S. Letch Samples Standpipe Details E Depth (m) Recovery Elevation Ref. Number Sample Type Field Test Legend Depth (Description Depth (m) Results 20 Hard black slightly sandy gravelly CLAY with occasional cobbles (continued) N = 100/175 mm (13, 29, 35, 42, 23) AF4841 В 20.50-20.50 End of Borehole at 21.20 m 21.20 22 23 26 27 28 29 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time From (m) Comments Comments To (m) Strike (h) Depth At To (min) 3.5 3.9 4.8 5.8 Boulder Boulder Boulder 0.5 3.8 1/10/08 0.5 6 14.4 16.7 18.5 21 21.2 Boulder GDT **GROUNDWATER DETAILS** 11 14.4 16.7 Hard Strata Boring Hard Strata Boring Hard Strata Boring Hard Strata Boring Hole Casing Depth to Water Date Comments IGSL Depth Depth 18.5 23-09-08 21.20 21.20 End of shift Boulder 13696 GPJ INSTALLATION DETAILS

Date Tip Depth RZ Top RZ Base Type BH LOG DCD REMARKS Hand dug inspection pit excavated to 1.20m. Water added from 3.5m to aid drilling.



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O-ORDINATES(_) GROUND LEVEL (m) CORE DIAMETER (mm) INCLINATION NOINEER AGL Consulting Engineers Fracture Spacing (mm) By W W W G G O D D D G G G G G G G G G G G G G G G G	ONTRAC	T [Jublin	Central D	Nevelonme	nt - Draft					DRILL	HOLE NO)	OW1	
CORE DIAMETER (mm) Dublin Central Developments Ltd. NGINEER AGL Consulting Engineers Fracture Spacing (mm) Public Consulting Engineers Fracture Spacing (mm) Discontinuities DATE COMPLETED 16/09/2008 Millennium A. Mahony Strata description Discontinuities Discontinuities	ONTRAC	1 1	nlianc	Central L	evelopme	ant - Dran									
MGINEER AGL Consulting Engineers FLUSH Polymer Gel LOGGED BY A. Mahony FLUSH Polymer Gel LOGGED BY A. Mahony Strata description FLUSH Polymer Gel LOGGED BY A. Mahony Strata description FLUSH Polymer Gel LOGGED BY A. Mahony Inspection Pit - observed by driller as made ground consisting of gravel and cobbles.	O-ORDIN	ATES	(_)								D. D. D. D. C. C. C. C.				
Inspection Pit - observed by driller as made ground consisting of gravel and cobbles.	LIENT NGINEER					ents Ltd.	The same of the sa	ION							
observed by driller as made ground consisting of gravel and cobbles.	Core Run Depth (m)	2 2	O.D	Spac (mr	cing m)	Legend	Non-intact zones (shaded)	ta description	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
	3						Inspect observer made gof grav	ed by driller as ground consisti rel and cobbles. ETRIX OPEN DRILLING: red by driller as ground consistir x, wood and cla ETRIX OPEN DRILLING: red by driller as ground consistir x, wood and cla	1.20 ng y.						
EMARKS INSTALLATION REMARKS			tion pi	t to 1.2m.				August 100 mm							
and dug inspection pit to 1.2m. Headworks.								GPOLINDA	ATER DE	ΓΔΙΙ S					
Fleadworks.								Sec. 10.2	Hole	Casing	Depth to	Comme	ents		
GROUNDWATER DETAILS Date Hole Casing Depth to Comments								Date	Depth	Depth	Water	Committee	-110		
GROUNDWATER DETAILS	ISTALLA	_		2000											
GROUNDWATER DETAILS Date Hole Casing Depth to Water Comments	Date 16-09-08														
GROUNDWATER DETAILS Date Hole Depth Depth Under Comments NSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type		13	.00	10.50 27.00	13.50 33.00		nm SP nm SP								



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CO-C	ORE	OINAT	TES(Central D	- FOIOPITR	JIN - DIE							HOLE NO		OW'	2 of 4
LIE	ENT			_)									SHEET	Г		Office	2014
NG	INE	ER	ENT Dublin Central Developments Ltd GINEER AGL Consulting Engineers							LEVEL (m) METER (mm)				STARTE			/2008 /2008
Depth (m)	Depth (m)								NCLINATION LUSH	ON		-90 Polymer G		ED BY ED BY		Miller A. Ma	
Downhole Depth (m)	Core Run	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mn	n) ₅₀₀	Legend	Non-intact zones (shaded)	Strata	description	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
11 11 12									HOLE D	TRIX OPEN PRILLING: ed by driller as of gravel ed)						8///X:	
13			0000					HOLE D	TRIX OPEN PRILLING: ed by driller as of clay and	13.20							
17									HOLE D	TRIX OPEN ORILLING: ed by driller as of clay	16.20						
REM Hand							0				19.20						
REM										INSTALLAT	ION REM	ARKS					
Hand	d dug inspection pit to 1.2m.									Headworks.							
										GROUNDW	ATER DET	TAILS					
										Date	Hole Depth	Casing Depth	Depth to Water	Comme	ents		
NST	ΓΔΙΙ	ΔΤΙ	ח אס	ETA	II S												
1431	Date	Hard Colored			1000000	RZ Base		Туре									
16-0	09-0	8	13.5	0	10.50 27.00	13.50 33.00	501	mm S	SP								



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DRILLHOLE NO OW1 CONTRACT Dublin Central Development - Draft SHEET Sheet 3 of 4 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 15/09/2008 CORE DIAMETER (mm) DATE COMPLETED 16/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony E Details Downhole Depth Core Run Depth SPT (N Value) Fracture zones Spacing Discontinuities Strata description Standpipe (E Elevation % (mm) intact Legend Depth (ď ď 0 T.C.F S.C. Ø 250 500 O. manalaman 20 _0_ SYMMETRIX OPEN HOLE DRILLING: Observed by driller as 20.70 800 returns of clay and \gravel (continued)
SYMMETRIX OPEN 21 HOLE DRILLING: 21.50 Observed by driller as returns of gravel and Cobbles.
SYMMETRIX OPEN 22.00 22 HOLE DRILLING: Observed by driller as returns of weathered OPEN HOLE 23 DRILLING: No recovery, observed by driller as returns of rock. 25 26 27 28 29 GDT IGSL 13696.GPJ REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water NEWLOG 10M Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type 16-09-08 13.50 10.50 13.50 50mm SP 16-09-08 33.00 27.00 50mm SP 33.00



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	NTR				Central D	evelopme	ent - Dra	_				SHEE			OW Shee	1 t 4 of 4
co	-ORI	OINA	TES(_)					ORE DIAMETER (mm)				STARTE COMPLI			9/2008 9/2008
	ENT				Central Donsulting E	evelopme Engineers	ents Ltd.		ICLINATION LUSH		-90 Polymer Ge		ED BY		Miller A. Ma	nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%		Fract Spac (mr	n) 500	Legend	Non-intact zones (shaded)	Strata description	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
31									OPEN HOLE DRILLING: No recovery observed by driller as returns of rock. (continued)							
33								End of Corehole at 33 (m)	33.00							
34	1															
35																
36																
37																
38																
39																
REI	MAR	KS							INSTALLATIO	N REM	ARKS					
			pectio	on pit	to 1.2m.				Headworks.							
									GROUNDWAT	ER DE	TAILS					
										Hole Depth	Casing Depth	Depth to Water	Comme	ents		
NIC	TA: -	A	2115	CTA:	1.6											
	Date			ETAI epth	RZ Top	RZ Base	Т	ype								
16-	-09-0 -09-0	8	13.5	0	10.50 27.00	13.50 33.00	50m	nm S	P P							



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_				2 2												
CONTR	RACT	D	ublin	Central D	evelopme	nt - Draf	t					DRILLI SHEET	HOLE NO)	RC08	
CO-OR	DINA	TES(_)					ROUND L	EVEL (m) METER (mm)		102		STARTE		13/09/2	
CLIENT				Central Donsulting E	evelopmer Engineers	nts Ltd.		ICLINATIC	ON		-90 Polymer Ge	DRILLI LOGGI			Millenn A. Mah	
Downhole Depth (m) Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (mr	m)	Legend	Non-intact zones (shaded)	Des	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
0								made gro	d by driller as bund consisti, sand, brick er.						EGITIKATI KATI KATI KATI KATI KATI KATI KA	
REMA Hand o		specti	on pi	it to 1.2m.					INSTALLA		MARKS					
	3								Headworks							
									GROUNDV		_					
									Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
INSTA	LLAT	ION F)FTA	All S												4
Dat				RZ Top	RZ Base	-	Туре)								
14-09	-08	13.0	00	6.00	13.00	50r	nm s	SP								
14-09	-08	32.	UC	26.50	32.50	50r	nm S	25								



REPORT NUMBER

co	NTR	ACT	D	ublin	Central [Developn	nent - Dr	aft					DRILL	HOLE N	0	RC0 Sheet	8 2 of 33
СО	-ORI	DINA.	TES(_)						LEVEL (m) METER (mm)	1	102	DATE	STARTE		13/09 14/09	
	ENT				Central [NCLINATI FLUSH	ON		90 Polymer G	The second secon	ED BY		Millen A. Ma	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa	300	Legend	Non-intact zones (shaded)	De	escription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
	WAR								made g of grave and timi	ed by driller as round consisting el, sand, brick ber. (continued) ETRIX OPEN DRILLING: ed by driller as of gravelly clay	1.20	ARKS				KUITKUITKUITKUITKUITKUITKUITKUITKUITKUIT	
			pectio	on pit	to 1.2m.					Headworks.							
										GROUNDWA	TER DET	AILS					
										Date	Hole Depth	Casing Depth	Depth to Water	Comme	ents		
NS	TALI	ΔΤΙ	ON D	FTA	II S												
	Date				RZ Top	RZ Base	9	Туре)								
14	-09-0 -09-0	8	13.0 32.5	0	6.00 26.50	13.00 32.50	50	mm :	SP								



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	ATES	(_)				ND LEVEL (m)		102	SHEE	HOLE NO STARTED COMPLETER	13/09	4 of 33 /2008
IENT GINEER			Central Developmensulting Engineers	ents Ltd.	INCLIN			-90 Polymer Ge	DRILL	ED BY ED BY	Millen A. Ma	nium
Core Run Depth (m)	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Description	Depth (m)		continuities	Elevation	Standpipe Details	SPT (N Value)
					HO! Obs	MMETRIX OPEN LE DRILLING: erved by driller as rns of gravelly cla ntinued)	y				KATIKATI KATI KATI KATI KATI KATI KATI K	
MARKS nd dug ir		ion pit	to 1.2m.			Headworks		MARKS				
						GROUNDW	ATER DE	TAILS				
						Date	Hole Depth	Casing Depth	Depth to Water	Comments		
				Щ			Debiti	Deptil	* * atci			
Date			LS RZ Top RZ Base	т	уре							



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	Dublin	Central Developme	ent - Dra	_				DRILL SHEET	HOLE NO)	RC0 Sheet	8 5 of 33
O-ORDINATE	ES(_)				GROUND LEVEL (m) ORE DIAMETER (mm) 1	102		STARTEI COMPLE			
CLIENT		Central Developme onsulting Engineers	ents Ltd.		LUSH		90 Polymer Ge		ED BY ED BY		Millen 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)	Description	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
					SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly cla (continued) SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel.	4.20					KIJI KUJI KUJI KUJI KUJI KUJI KUJI KUJI	
REMARKS Hand dug inspe	ection pit	to 1.2m.			Headworks	TION REM	ARKS					
					GROUNDV	VATER DE	TAILS					
					Date	Hole Depth	Casing Depth	Depth to Water	Comme	ents		
NSTALLATIO Date Ti	N DETA			Туре		-1						



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CLII	ENT			ublin	Central Developme	ents Ltd.	0	GROUND LEVEL (m) CORE DIAMETER (mm) INCLINATION -90 Patron Col.			DATE	SHEET Sheet 6 of 33				
T	SINE	ER	Α	GL C	onsulting Engineers		F	LUSH		Polymer Ge	LOGG	ED BY		A. Mai	nony	
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)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)	
5								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued)						KUITKUITKUITKUITKUITKUITKUITKUITKUITKUIT		
_	MARI d du		pection	on pit	to 1.2m.			Headworks.	ON REM	ARKS						
		een .		-30												
								GROUNDWA'	Hole	Casing	Denth to					
								Date	Depth	Depth	Depth to Water	Comme	ents			
14-	Date 09-0	8 7		0	RZ Top RZ Base 6.00 13.00 26.50 32.50	50r	Type	SP								



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DRILLHOLE NO RC08 Dublin Central Development - Draft CONTRACT SHEET Sheet 7 of 33 GROUND LEVEL (m) DATE STARTED CO-ORDINATES(_) 13/09/2008 102 DATE COMPLETED 14/09/2008 CORE DIAMETER (mm) INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium ENGINEER FLUSH LOGGED BY A. Mahony AGL Consulting Engineers Polymer Gel Standpipe Details Downhole Depth Core Run Depth SPT (N Value) Fracture zones Spacing Discontinuities Description E Elevation (mm) intact ; Legend Q.D. Depth T.C. S.C. 250 B. سسسلسست SYMMETRIX OPEN 000 HOLE DRILLING: 000 Observed by driller as returns of gravel. (continued) 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 00 000 000 11/11/08 000 GDT 000 IGSL. REMARKS INSTALLATION REMARKS GPJ Hand dug inspection pit to 1.2m. 13696. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Depth to Water Hole Casing Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 50mm SP



REPORT NUMBER

13696

DRILLHOLE NO CONTRACT Dublin Central Development - Draft RC08 SHEET Sheet 8 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 DATE COMPLETED CORE DIAMETER (mm) 102 14/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony Downhole Depth (m) zones (shaded) Standpipe Details Depth (N Value) Fracture Spacing Description Discontinuities Run (E) (mm) Elevation intact S.C.R.9 Legend T.C.R. 0 Depth Core ø 250 500 ď SYMMETRIX OPEN 000 HOLE DRILLING: 000 Observed by driller as returns of gravel. (continued) 000 000 000 000 000 000 000 00 000 00 000 000 000 000 000 000 000 000 00 00 00 000 11/11/08 00 000 GDT 00 000 IGSL. GPJ REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Depth to Water Hole Casing 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 IGSL 32.50 50mm SP 14-09-08 32.50 26.50



REPORT NUMBER

13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 9 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 FLUSH** Polymer Gel AGL Consulting Engineers LOGGED BY A. Mahony Ξ E Details Downhole Depth Core Run Depth SPT (N Value) Fracture zones Spacing Discontinuities Description Standpipe E Elevation % (mm) intact 2 Legend Depth (œ T.C.F S.C. Ø 250 Non 500 0 manulumun 000 SYMMETRIX OPEN HOLE DRILLING: 000 Observed by driller as returns of gravel. (continued) 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 GDT 11/11/08 000 000 IGSL GPJ REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Depth to Water Hole Casing Date Comments Depth Depth **INSTALLATION DETAILS** Date Tip Depth RZ Top RZ Base Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

CONT	TRA	ACT	D	ublin	Central Developme	ent - Dra	ft					DRILLHOLE NO SHEET			RC08 Sheet 10 of 33		
0-0	RD	INA	TES(_)				GROUND LEVEL (m)		102	DATE	STARTED COMPLET		13/09/2008			
LIEN		ER			Central Developme onsulting Engineers	ents Ltd.		NCLINATION LUSH		-90 Polymer Gel	DRILLED BY LOGGED BY			Miller A. Ma			
	Core Kun Deptn (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Description	Depth (m)	Disc	ontinuities		Elevation	Standpipe Details	SPT (N Value)		
9								SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued)									
EMA				- 14		1001		INSTALLA'	TION REM	IARKS							
and	aug	g ins	pection	on pit	to 1.2m.			Headworks.									
								GROUNDW									
								Date	Hole Depth	Casing Depth	Depth to Water	Commer	nts				
STA	111	ΔΤΙ	ח אכ	ETAI	ıs												
	ate				RZ Top RZ Base	1	ype					, 1,1					
	9-0	8	13.0	0	6.00 13.00 26.50 32.50	50n	nm S	SP									



REPORT NUMBER

13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 11 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 CORE DIAMETER (mm) DATE COMPLETED 14/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** FLUSH A. Mahony AGL Consulting Engineers Polymer Gel LOGGED BY \widehat{E} Standpipe Details Downhole Depth Core Run Depth (N Value) Fracture zones Spacing Discontinuities Description (H Elevation % (mm) S.C.R.% Non-intact Legend 0 T.C.R. Depth ø 250 500 ďuuuuuuuu 10 SYMMETRIX OPEN 000 HOLE DRILLING: 000 Observed by driller as returns of gravel. (continued) 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 000 00 000 000 000 GDT 000 GSL REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

ONTI	RACT	C	ublin C	Central Developme	ent - Draf	t				DRILL SHEE	HOLE NO)	RC0	8 1 12 of 33
0-OF	RDINA	TES(_)				ROUND LEVEL (m) DRE DIAMETER (mm)		102	DATE	STARTEI COMPLE		13/09	/2008
LIEN				Central Developmensulting Engineers	ents Ltd.	10000	CLINATION USH		-90 Polymer Ge	A CONTRACTOR OF THE PARTY OF TH	ED BY		Millen A. Ma	
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Description	Depth (m)	Disc	ontinuities		Elevation	Standpipe Details	SPT (N Value)
					000000000000000000000000000000000000000		SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravel. (continued) SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay	11.70						
MAI	RKS						INSTALLAT	ION REM	ARKS					
nd d	lug ins	specti	on pit to	o 1.2m.			Headworks.							
							GROUNDW	ATER DE	TAILS					
							Date	Hole	Casing	Depth to Water	Comme	nts		
							24.0	Depth	Depth	vvater				
STA	LLAT	ON E	ETAIL	.S										
Dat				RZ Top RZ Base		уре								
	-08 -08	13.0	00	6.00 13.00 26.50 32.50		nm Si								



REPORT NUMBER

13696

DRILLHOLE NO Dublin Central Development - Draft RC08 CONTRACT SHEET Sheet 13 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 DATE COMPLETED 14/09/2008 CORE DIAMETER (mm) INCLINATION -90 DRILLED BY CLIENT Dublin Central Developments Ltd. Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony Standpipe Details Downhole Depth Depth SPT (N Value) Fracture intact zones Spacing Description Discontinuities Run E (mm) Elevation Legend CR Depth (T.C.R. 0 a 250 500 D. <u>uuuuuluuuuu</u> 12 0_ SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. (continued) GDT 11/11/08 13696.GPJ IGSL REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Depth to Water Hole Casing Date Comments Depth Depth INSTALLATION DETAILS Tip Depth RZ Top RZ Base Date Type 13.00 32.50 14-09-08 13.00 6.00 50mm SP 26.50 50mm SP 14-09-08 32.50



REPORT NUMBER

13696

DRILLHOLE NO Dublin Central Development - Draft CONTRACT **RC08** SHEET Sheet 14 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 CORE DIAMETER (mm) 102 DATE COMPLETED 14/09/2008 -90 INCLINATION CLIENT Dublin Central Developments Ltd. **DRILLED BY** Millennium AGL Consulting Engineers **ENGINEER FLUSH** Polymer Gel LOGGED BY A. Mahony Downhole Depth (m) (shaded) Details Core Run Depth SPT (N Value) Fracture intact zones Spacing Description Discontinuities Standpipe (E) R.Q.D.% Elevation (mm) % Legend Depth (T.C.R. C. S.C. 250<u>......</u> SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. (continued) GDT 11/11/08 IGSL REMARKS INSTALLATION REMARKS RC NEWLOG 1M PER PG 13696.GPJ Hand dug inspection pit to 1.2m. Headworks. **GROUNDWATER DETAILS** Hole Casing Depth to Water Comments Date Depth Depth **INSTALLATION DETAILS** Date Tip Depth RZ Top RZ Base Type 14-09-08 13.00 6.00 13.00 50mm SP IGSL 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

13696

DRILLHOLE NO CONTRACT RC08 Dublin Central Development - Draft SHEET Sheet 15 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 DATE COMPLETED CORE DIAMETER (mm) 14/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. **DRILLED BY** Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** LOGGED BY A. Mahony Polymer Gel Standpipe Details Downhole Depth Depth (N Value) Fracture zones (Spacing Description Discontinuities Run E Elevation (mm) intact Legend T.C.R. S.C.R. 0 Depth (ø 250 500 œ سسسلسسس 0_ SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. (continued) GDT 11/11/08 IGSL GPJ REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. Headworks. 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

_	-ORI	DINA			Central Developme	ent - Dra		GROUND LEVEL (m)		102	DATE	HOLE NOTESTARTE	D	13/09/	16 of 33 2008
	IENT GINE				Central Developme	ents Ltd.	11	NCLINATION LUSH		102 -90 Polymer G	DRILL	ED BY	יבט	Millenr A. Mah	nium
Downhole Depth (m)	V(5.6.)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	Legend	Non-intact zones (shaded)	Description	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
15	15.00							SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay. (continued)	16.00						
	MAR nd du		pection	on pit	to 1.2m.			Headworks.	ON REMA	ARKS					
								GROUNDWAT	TER DET	TAILS					
								Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
14	Date -09-0	18		00	RZ Top RZ Base 6.00 13.00 26.50 32.50	50n	ype nm S	SP SP							



REPORT NUMBER

13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 17 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 CORE DIAMETER (mm) 102 DATE COMPLETED 14/09/2008 INCLINATION -90 DRILLED BY Millennium CLIENT Dublin Central Developments Ltd. **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony Downhole Depth (m) Standpipe Details Core Run Depth SPT (N Value) Fracture zones (Spacing Discontinuities Description E (mm) Elevation Non-intact Legend C.R.º T.C.R. 0 Depth (d 250 500 œ سسسلسسس 16 16.00 Stiff brown sandy gravelly CLAY (gravel is predominantly fine, N = 100/80mm (10, 15, 30, angular to sub-rounded) 60, 10) 100 0 0 GDT IGSL REMARKS INSTALLATION REMARKS GPJ Hand dug inspection pit to 1.2m. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Type Date 13.00 50mm SP 14-09-08 13.00 6.00 32.50 50mm SP 14-09-08 32.50 26.50



REPORT NUMBER

	RACT			Central Developme	ent - Drai	G	GROUND LEVEL (m) ORE DIAMETER (mm)	1	02	DATE	HOLE NO T STARTE COMPLE	D	13/09	et 18 of 33 9/2008 9/2008
LIEN				Central Developme onsulting Engineers	ents Ltd.	1000	FLUSH -90 Polymer		90 Polymer Gel	DRILLED BY Gel LOGGED BY			Millennium A. Mahony	
Core Run Depth (m)		S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Description	Depth (m)	Disc	ontinuities		Elevation	Standpipe Details	SPT (N Value)
17 17.0	1000	0	0				Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded)	17.05	Apive					N = 55/31 mm (25, 45, 55)
land o		spect	ion pi	t to 1.2m.			Headworks.	A KEINIA	MNO					
							GROUNDWAT	ER DET	AILS				1111	4 4 4
							Date	Hole epth	Casing Depth	Depth to Water	Comme	ents		
Dat 14-09 14-09	-08		Depth 00	RZ Top RZ Base 6.00 13.00 26.50 32.50	50n	ype nm S	SP SP		Se Vac M. I					



GPJ

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER

13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 19 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 CORE DIAMETER (mm) DATE COMPLETED 14/09/2008 INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** FLUSH A. Mahony AGL Consulting Engineers Polymer Gel LOGGED BY Standpipe Details Downhole Depth Core Run Depth SPT (N Value) Fracture zones Spacing Description Discontinuities E Elevation (mm) intact Legend T.C.R. Depth (0 ø S.C. 250 500 Non ď سسسلسسس 18 18.00 Stiff brown sandy gravelly CLAY (gravel is predominantly fine, angular to sub-rounded and locally rounded) (continued) 100 0 0 18.50 N = 50/20mm (25, 50, 50)IGSL.GDT 11/11/08 REMARKS INSTALLATION REMARKS Hand dug inspection pit to 1.2m. 13696. Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

	-ORI	ACT DINA			Central D)evelopme	ent - Dra	G		LEVEL (m)		02	SHEE	STARTE	D	RC08 Sheet 20 of 33 13/09/2008 0 14/09/2008		
	ENT				Central D		ents Ltd.	11	CORE DIAMETER (mm) INCLINATION FLUSH			-90 Polymer Gel		DRILLED BY LOGGED BY		Millennium A. Mahony		
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mr	cing m)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)	
19		100	0	0					gravelly predomi angular and loca (continu	wn sandy CLAY (gravel is nantly fine, to sub-rounded ally rounded) ed) 0.4-19.6) to soft rown SILT	19.40							
	19.90	100	0	0			× × × × × × × × × × × × × × × × × × ×		Firm slig green br	htly gravelly own CLAY	19.90							
	MAR		nect:	on ni	t to 1.2m.					INSTALLATIO	ON REMA	ARKS						
ial	iu uu	9 1115	Pecili	on pil	ι ι Ο 1.ZIII.					Headworks.								
										GROUNDWA	TER DET	AILS						
										Date	Hole Depth	Casing Depth	Depth to Water	Comme	ents			
											- Pari	- Sept II						
INS		LATI				57.5	_	-										
	Date	1	ip D	epth	RZ Top	RZ Base		Гуре										
	-09-C		13.0	0	6.00	13.00		nm S	CO									



REPORT NUMBER

	NTRA				Central Developme	ent - Draf		NIND LEVEL ()			SHEET				et 21 of 33
0:	-ORE	OINAT	ΓES(_)				OUND LEVEL (m) E DIAMETER (mm)	102	The second second	STARTE			9/2008 9/2008
	ENT				Central Developme onsulting Engineers	ents Ltd.	FLU	INATION SH		-90 Polymer Ge	DRILLI LOGG				nnium ahony
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)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
20	20.00	100	31	26			ci S g ci p	lottled brown black ayey, very gravelly AND (medium rained) with local obbles. Gravel is redominantly coarse and rounded to ub-angular.	20.80	Disconting and plan	nuities are s ar and clay d. Dips are	mooth			
	MAR nd du		pecti	on pit	to 1.2m.			INSTALLA Headworks	TION REM	IARKS				KAI	4
								GROUND		2 II AT					
								Date	Hole	Casing	Depth to Water	Comm	nents		
	NTA:		011						Depth	Depth	vvalei				
	Date			epth	RZ Top RZ Base	Т	уре								
14	-09-0	08	13.0	00	6.00 13.00 26.50 32.50	50n	nm SP								



REPORT NUMBER

CON	NTRA	АСТ	D	ublin	Central	Develop	men	t - Drat	ft					DRILL SHEE	HOLE N	0	RC08	B 22 of 33
00-	ORD	INA	TES(_)							LEVEL (m) METER (mm)	1	02	DATE	STARTE		13/09/	2008
	ENT	ER			Central			ts Ltd.		LUSH	ON		90 Polymer G		ED BY		Millen	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (n	cture acing nm)	ı	Legend	Non-intact zones (shaded)	De	escription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
21	11.50									strong, fi bedded, black, fii ARGILL LIMEST slightly a moderat Pyrite di throughe calcite v (continual)	out. Local eining.	21.87	Disconti and plar smeared are sub-	nuities are s nar and clay d. Dips are d. Continued the through ha oient clay sr	smooth t. Dips irline			
DE	IA DI	(8								slightly a	and locally	ION DEM	0.0000000000000000000000000000000000000	s throughou	t.			
-	d dug		pectio	on pit	to 1.2m						Headworks.	ION KEMA	KND					
											TIGAUWUIKS.							
											GROUNDW							
											Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
	ΓΔΙΙ	ΔΤΙ	ם אכ	ΕTΛ	II S													
INST		-									1							
INST	Date	Т	ip De	epth	RZ Top	RZ Ba	se	1	ype									



REPORT NUMBER

13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 23 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 CORE DIAMETER (mm) DATE COMPLETED 14/09/2008 -90 INCLINATION CLIENT DRILLED BY Dublin Central Developments Ltd. Millennium **ENGINEER** AGL Consulting Engineers **FLUSH** Polymer Gel LOGGED BY A. Mahony Standpipe Details Downhole Depth Core Run Depth SPT (N Value) Fracture zones Spacing Description Discontinuities E % Elevation (mm) ntact Legend 0 Depth (œ Ø T.C. S.C. 250 500 œ سسسلسسس 22 moderately weathered. Pyrite dispersed. Discontinuities are smooth and planar, and clay Incipient fractures smeared throughout. Dips are sub-10° with hairline common. Moderately strong to moderately weak, thinly and insipient clay smeared fractures throughout. bedded to laminated, (continued) 100 0 0 black, calcareous SHALE. Fresh to slightly and locally moderately weathered. Pyrite dispersed. Incipient fractures common. (continued) 22.80 11/11/08 IGSL.GDT 100 0 0 INSTALLATION REMARKS GPJ REMARKS Hand dug inspection pit to 1.2m. 13696.0 Headworks. NEWLOG 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 26.50 50mm SP



REPORT NUMBER

СО	NTR	ACT	D	ublin	Central D	evelopme	ent - Draf	t						DRILL SHEE	HOLE N	0	RC08 Sheet	B 24 of 33
00	-ORI	DINA	TES(_)						LEVEL (m) METER (mm)		102			STARTE		13/09/ 14/09/	
	GINE				Central D		ents Ltd.		LUSH	ON		-90 Polyn	ner Gel		ED BY		Milleni A. Mal	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fract Spac (mr	cing m)	Legend	Non-intact zones (shaded)	De	escription	Depth (m)		Disco	ontinuities		Elevation	Standpipe Details	SPT (N Value)
23	23.10								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 in. (continued)	l.	and sm are and frac	d plana eared to sub-10 d insipie	uities are s r, and clay hroughou 0° with ha ent clay sr hroughou	t. Dips irline neared			
		100	57	50		54			thin to m grey to d grained LIMEST slightly a moderat Pyrite di	out. Local	to	Dis and sub	d plana	uities are s r. Dips ar ith local s cture.	е			
	MAR									INSTALLAT	TION REM	MARK	8					
Har	nd du	g ins	pection	on pit	t to 1.2m.					Headworks.								
										GROUNDW	ATER DE	TAILS	5					
										Date	Hole Depth		sing pth	Depth to Water	Comm	ents		
NS	TAL	ΔΤΙ	ח אס	FTA	II S													
	Date					RZ Base		ype										
14	-09-0	8 8	13.0 32.5		6.00 26.50	13.00 32.50	50m 50m											



REPORT NUMBER

ONTR		_		entral Developme	in - Dial	_	SBULIND L	EVEL (m)				SHEET			- Inches	t 25 of 33
O-ORI						С		ETER (mm)		10		DATE	STARTE		13/09	/2008 /2008
LIENT				entral Developme sulting Engineers	nts Ltd.		LUSH	N		-90 Pc	olymer Ge	DRILLI LOGGI			Miller A. Ma	
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Desc	cription	Denth (m)		Disc	ontinuities		Elevation	Standpipe Details	SPT (N Value)
24							thin to me grey to da grained S LIMESTO slightly an	ly weathered. persed ut. Local ining.			and plana		•			
							moderate	ly strong to ly weak, thinly	24.		and plana	uities are s				
							black, cald SHALE. slightly ar moderate Pyrite disp Incipient f	Fresh to nd locally ly weathered. persed.	24.	49	sub-10° v fractures Discontinand plana smeared	uities are s ar and clay Dips are	mooth			
24.60	100	0	0				strong, th bedded, of black, fine ARGILLA LIMESTO slightly ar	CEOUS ONE. Fresh to nd locally ly weathered. persed ut. Local				with sub ver	rtical			
24.80				ij)			moderate bedded to black, cal SHALE. slightly ar	Fresh to nd locally ly weathered. persed.	24.	80	and plan	nuities are s ar and clay . Dips are	mooth			
REMAR		pecti	on pit t	o 1.2m.				INSTALLAT	ION RE	MA	RKS				102213	
			Total Casas					Headworks.								
								GROUNDWA	Hole	DETA	AILS Casing	Depth to	0			
							-	Date	Depth	-	Depth	Depth to Water	Comm	ents		
NSTAL	LATI	ON E	ETAIL	.S												
Date	9 .	Tip D	epth F	RZ Top RZ Base 6.00 13.00		Type	9									



REPORT NUMBER

CONT	ΓRA	СТ	D	ublin	Central [Developme	ent - Dra	ft						DRILL SHEE	HOLE N	0	RC0 Sheet	8 t 26 of 33
0-0	RD	INAT	TES(_)						LEVEL (m) METER (mm)	102		DATE	STARTE		13/09	0/2008 0/2008
LIEN		R				Developme Engineers	ents Ltd.		LUSH	ON		-90 Polyr	mer Ge	E-50,000 E-00	ED BY		Miller A. Ma	nnium ahony
	Core Kun Deptn (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa	m) ₅₀₀	Legend	Non-intact zones (shaded)	De	escription	Depth (m)		Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
15									moderate bedded black, can SHALE. slightly a moderate Pyrite di Incipient	tely strong to tely weak, thin to laminated, alcareous Fresh to and locally tely weathere spersed. t fractures n. (continued,	d.	an sm su	nd plan	uities are s ar and clay Dips are (continued				
									strong, t bedded, black, fir ARGILL LIMEST slightly a moderat Pyrite di	out. Local	to	an sm	nd plan	uities are s ar and clay Dips are				
		100	75	45														
									thin to m grey to d grained LIMEST slightly a moderat Pyrite di	o very strong nedium bedde dark grey, fine SILICEOUS ONE. Fresh and locally tely weathered spersed out. Local	ed, e to	Di: an sn	nd plan	uities are s ar and clay Dips are			STATES TO STATES	
EMA	A P.M	(8			F				calcite v	eining.	TION REI	MARK	'S					
-100	110		pectio	on pit	to 1.2m.					Headworks								
										GROUNDY	VATER DI	ETAIL	S					
										Date	Hole Depth	Ca	asing epth	Depth to Water	Comm	ents		
STA	Δ11	ΔΤΙ	ח אכ	ETA	II S													
31/	ate				RZ Top	RZ Base		Гуре	1.									



REPORT NUMBER

	ORE	DINAT			Central Developme	ant-Did		GROUND L	EVEL (m)	1	02	DATE	STARTE	ED	13/09	27 of 33 /2008
	ENT				Central Developmensulting Engineers	ents Ltd.	1	INCLINATIO			90 Polymer Ge	DRILL			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)	Des	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
26										26.11	and plana smeared sub-10°.	nuities are s ar and clay . Dips are (continued))			
								moderate bedded to black, ca SHALE. slightly a moderate Pyrite dis Incipient	Fresh to nd locally ely weathered. spersed. fractures		to slightly	nuities are s rough and Dips are sub				
	26.60	100	30	0				strong, the bedded, black, fin ARGILLA LIMESTO slightly a moderate Pyrite dis	o moderately nin to medium dark grey to e grained ACEOUS DNE. Fresh to nd locally ely weathered. spersed jut. Local	26.32	and plans smeared sub-10°	nuities are s ar and sligh . Dips are with iron ox uub-vertical	tly clay			
DE	MAR	N.C.							INSTALLATIO	AN DEMAND	ADIVE					
			pecti	on pit	to 1.2m.				Headworks.	N KEW	ARKS					
									GROUNDWAT	Hole	Casing	Denth to				
14	Date -09-0	08		00	RZ Top RZ Base 6.00 13.00 26.50 32.50	50		e SP SP	Date	Depth	Depth	Depth to Water	Comn	iens		



REPORT NUMBER

CO	NTR	ACT	D	ublin	Central Developm	ent - Dr	aft					DRILL SHEE	HOLE NO	0	RC08	8 28 of 33
CO-	-ORE	OINA"	TES(_)				GROUND LEVE CORE DIAMETE		1	02		STARTE		13/09/ 14/09/	
	ENT	ER			Central Developm onsulting Engineers			LUSH			90 Polymer Ge		ED BY		Millen	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Descrip	tion	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
27		100	61	7				Strong to mostrong, thin to bedded, dark black, fine graded ARGILLACE LIMESTONE slightly and lo moderately when the price throughout. It calcite veining (continued)	o medium grey to ained OUS . Fresh to acally eathered. eed Local		and plana smeared sub-10° v stained s	uities are s ar and sligh Dips are with iron ox ub-vertical (continued	itly clay			
								Moderately si moderately w bedded to lan black, calcare	eak, thinly ninated, ous	27.52	and plana	uities are s ar and clay Dips are	smooth			
								SHALE. Free slightly and lc moderately w Pyrite dispers Incipient fract common.	cally eathered. ed.							
REN	MARI	KS						INS	TALLATION	REMA	RKS				- Ind	
Han	d du	g ins	pection	on pit	to 1.2m.			Hea	adworks.							
								GR	OUNDWATE	R DET	AILS					
)ata H	lole epth	Casing Depth	Depth to Water	Comme	ents		
INS.	TALL	ATIO	אר ב	FTA	II S											
			2000		RZ Top RZ Base		Туре									
1	Date															



REPORT NUMBER

CONTRACT	D	ublin (Central Developme	nt - Draf	t					200000000000000000000000000000000000000	HOLE N	0	RC0	
CLIENT	D	ublin (Central Developme	nts Ltd.	COF	LINATION	ETER (mm)	-	102 90	DATE (STARTE COMPL ED BY		13/09 14/09 Miller	
Core Run Depth (m) 12.0.8.%	S.C.R.%	1.Q.D.%	Fracture Spacing (mm)		Non-intact zones (shaded)	Desc	ription y strong to y weak, thinly	Depth (m)	Discontir	continuities nuities are sar and clay		Elevation	Standpipe Details W	SPT (N Value)
100	58	0			s r	bedded to black, calc SHALE. F slightly and moderately Pyrite disp Incipient fr	laminated, careous resh to d locally y weathered.		smeared	. Dips are (continued)				
28.40					t g L s	thin to med grey to da grained SI LIMESTO slightly and	y weathered. bersed		Discontin	nuities are s ar. Dips are				
100	83	69	74	50						,				
REMARKS Hand dug ins	specti	on pit	to 1.2m.				Headworks.	ON REM	ARKS					
							GROUNDWA	TER DE	TAILS					
							Date	Hole Depth	Casing Depth	Depth to Water	Comm	nents		
Date 14-09-08 14-09-08		epth 00	RZ Top RZ Base 6.00 13.00 26.50 32.50	50r	Гуре nm SP nm SP									



REPORT NUMBER

	NI IV	ACT		ublin	Central Developm	ent - Dra						DRILL SHEE	HOLE NO	J	RC08 Sheet	30 of 33
00	ORE	OINA'	TES(_)					LEVEL (m) METER (mm)	1	02	1555	STARTE COMPLE		13/09/ 14/09/	
	ENT	ER			Central Developm onsulting Engineers			LUSH	ON		90 Polymer Ge		ED BY ED BY		Millen A. Mal	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%		Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	De	escription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
29								-		29.17	and plan	nuities are s ar. Dips ar (continued	е			
								moderat bedded black, ca SHALE.	tely strong to tely weak, thinly to laminated, alcareous Fresh to and locally		and plan smeared sub-10°.					
								Pyrite di Incipient commor Strong to thin to m grey to d grained	tely weathered. spersed. t fractures h. o very strong, nedium bedded dark grey, fine SILICEOUS ONE. Fresh to],	and plan	nuities are s ar and clay I. Dips are	smooth			
	29.50							slightly a moderat Pyrite di througho Strong to strong, t bedded,	and locally ely weathered. spersed		to slightly	nuities are s y rough and l. Non-intad	clay			
								ARGILL LIMEST slightly a	ACEOUS ONE. Fresh to and locally tely weathered. spersed		and sligh	nuities are s atly undulos sub-10°.				
		100	27	27				thin to m grey to d grained LIMEST slightly a			and plan sub-10°	nuities are s ar. Dips ar with undulo cal fracture	e se			
DEI	MAR	KC							INSTALLAT	ION REMA	ABKS				[·.:⊞·]	
			pection	on pit	to 1.2m.				Headworks.	OH IVEIAN						
									GROUNDWA	ATER DET	AILS	<u> </u>				
									Date	Hole Depth	Casing Depth	Depth to Water	Comme	ents		
			01: -							Бери	Бериі					
INS	IAL	LATI		ETA		_	Туре									
	Date	-	Tin D	anth	RZ Top RZ Base		1/no									



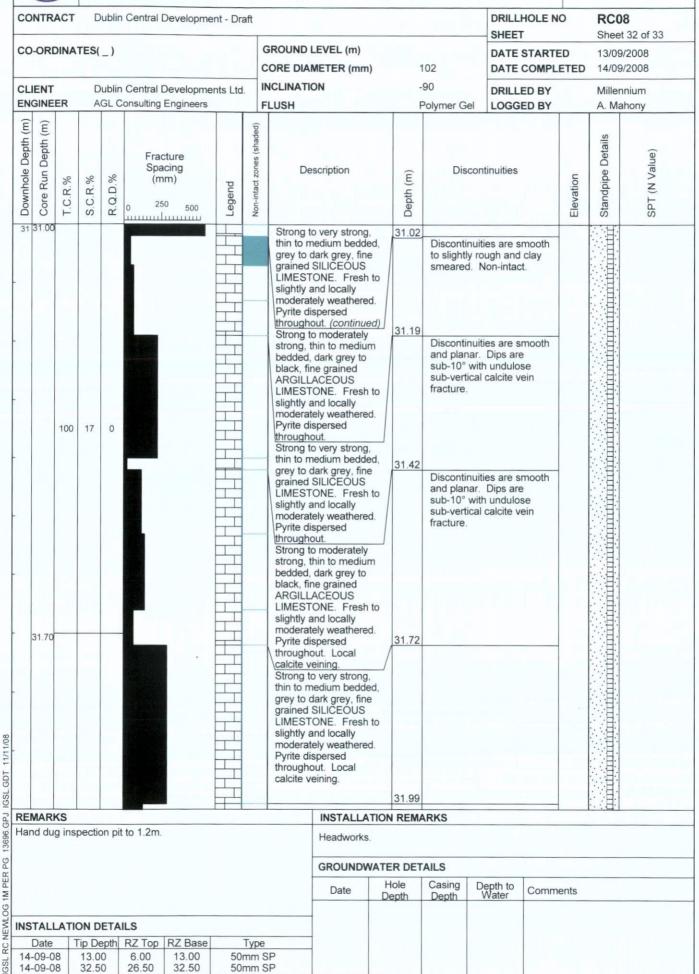
REPORT NUMBER

13696

CONTRACT DRILLHOLE NO **RC08** Dublin Central Development - Draft SHEET Sheet 31 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 CORE DIAMETER (mm) 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 Downhole Depth (m) Standpipe Details Core Run Depth (N Value) Fracture zones (Spacing Description Discontinuities (H) % (mm) Elevation intact Legend T.C.R. Depth œ O ø 250 500 S ď munulumum 30 Strong to very strong, Discontinuities are smooth thin to medium bedded, and planar. Dips are grey to dark grey, fine grained SILICEOUS sub-10° with undulose 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 Discontinuities are smooth strong, thin to medium and planar, slightly clay 76 100 58 bedded, dark grey to smeared. Dips are black, fine grained sub-10° ARGILLACEOUS LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. GDT 30.95 IGSL INSTALLATION REMARKS GPJ REMARKS Hand dug inspection pit to 1.2m. Headworks 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth 90 INSTALLATION DETAILS Date Tip Depth RZ Top RZ Base 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





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13696

DRILLHOLE NO RC08 CONTRACT Dublin Central Development - Draft SHEET Sheet 33 of 33 GROUND LEVEL (m) CO-ORDINATES(_) DATE STARTED 13/09/2008 102 DATE COMPLETED 14/09/2008 CORE DIAMETER (mm) INCLINATION -90 CLIENT Dublin Central Developments Ltd. DRILLED BY Millennium **ENGINEER** FLUSH LOGGED BY AGL Consulting Engineers Polymer Gel A. Mahony E Standpipe Details Depth Downhole Depth SPT (N Value) Fracture zones (Spacing Description Discontinuities Run I Œ Elevation (mm) Non-intact Legend C.R. 0 Depth T.C.R. Core Ø 250 500 S œ <u>uuuuluuuuu</u> 32 Discontinuities are smooth Strong to moderately strong, thin to medium and planar. Dips are bedded, dark grey to sub-10°. (continued) black, fine grained ARGILLACEOUS 100 50 50 32.11 LIMESTONE. Fresh to Discontinuities are smooth slightly and locally and planar. Dips are moderately weathered. sub-10° with sub-vertical Pyrite dispersed calcite vein fracture. throughout. Local Pyrite lense 32.34m calcite veining. (continued) Strong to very strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS LIMESTONE. Fresh to 32.35 slightly and locally moderately weathered. Discontinuities are smooth Pyrite dispersed and planar. Dips are throughout. Local sub-10° calcite veining. Strong to moderately strong, thin to medium bedded, dark grey to 32.50 black, fine grained 32.50 **ARGILLACEOUS** LIMESTONE. Fresh to slightly and locally moderately weathered. Pyrite dispersed throughout. Local calcite veining. End of Corehole at 32.5 (m) 11/11/08 GDT IGSL **INSTALLATION REMARKS** GPJ REMARKS Hand dug inspection pit to 1.2m. Headworks. 1M PER PG **GROUNDWATER DETAILS** Hole Casing Depth to Water Date Comments Depth Depth 90 **INSTALLATION DETAILS** Tip Depth RZ Top RZ Base Date Type 14-09-08 13.00 6.00 13.00 50mm SP 14-09-08 32.50 26.50 32.50 50mm SP



REPORT NUMBER

10	38	7														136	90
COI	NTR	ACT	D	ublin	Central	Developm	ent - Dra	ft					10000000000000000000000000000000000000	HOLE N	0	RC1	
0-	-ORE	DINA'	TES(_)						LEVEL (m)				STARTE		18/11/	1 of 15 2008
							especial in growth surrocurren	-	CORE DIA	METER (mm)		102 -90		COMPL	ETED		2008
	ENT	ER			Central I consulting	Developm Ltd	ents Ltd		LUSH	014		-90 Polymer G	Control Spiritory	ED BY		19/11/ Milleni A. Mai	
	(m.							ed)									
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa (m	300	Legend	Non-intact zones (shaded)	De	escription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
1									SYMME HOLE DObserver	TRIX OPEN DRILLING: ad by driller as of fill (concrete ack/brown clay DRILLING: d by driller as of clayey cobbles							
_	IARI						00			INSTALLAT	ION REM	ARKS				MM	
spe	ectio	- 6¾ n pit	hrs U (wide	nload ned	d sludge to pip	tanks, loa oe) and m	d & erect ove equip	fen	cing, dig nt onto								
	tion.									GROUNDWA	TER DE	ΓAILS					
										Date	Hole	Casing	Depth to Water	Comme	ents		
											Depth	Depth	vvater				
_			D NC														
	Date 11-0		8.00		RZ Top 4.50	RZ Base 8.00		ype									
	11-0		25.0	0	20.00	25.00		nm S									



REPORT NUMBER

CO-ORDINATES(_) GROUND LEVEL (m) CORE DIAMETER (mm) INCLINATION FLUSH Polymer Gel Discontinuities Practure Spacing (mm) Practure Spacing (mm) SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles (continued)	ARTED MPLETED BY	Standpipe Details A. M. Standpipe Details	1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008 1/2008
CORE DIAMETER (mm) Dublin Central Developments Ltd NGINEER AGL Consulting Ltd FLUSH Description Discontinuities Symmetrix Open HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles (continued)	MPLETED BY BY	Standpipe Details A. M. Standpipe Details	1/2008 1/2008 nnium ahony
NGINEER AGL Consulting Ltd FLUSH Polymer Gel LOGGED FLUSH Polymer Gel Description (E) Hdd-O Discontinuities SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles (continued)	ВУ	Standpipe Details	ahony
SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles (continued)	Elevation	MK	SPT (N Value)
HOLE DRILLING: Observed by driller as returns of clayey gravelly cobbles (continued)			
SYMMETRIX OPEN HOLE DRILLING: Observed by driller as returns of gravelly clay			N = 4 (20, 5, 1, 1, 1, 1, 1)
EEMARKS INSTALLATION REMARKS 8/11/08- 63/hrs Unload sludge tanks, load & erect fencing, dig			
8/11/08- 6½nrs Unload sludge tanks, load & erect tencing, dig ispection pit (widened due to pipe) and move equipment onto ispection.			
GROUNDWATER DETAILS			
Date Hole Casing Depth to Depth Water	Comments		
NSTALLATION DETAILS			
Date Tip Depth RZ Top RZ Base Type 19-11-08 8.00 4.50 8.00 50mm SP			



REPORT NUMBER

1©	S	5														13	090
CON	TR/	ACT	D	ublin	Central E	Developm	ent - Dra	ft					DRILL	HOLE N	0	RC1	16
00.0	200	IALA	ree/	,					POLIND	LEVEL (m)			SHEET				et 3 of 15
-0-0	JKL	INA	IE3(_)						METER (mm)	102	The state of the s	STARTE COMPL			1/2008
CLIE		ΕR			Central D		ents Ltd	11	NCLINATIO	57		-90 Polymer G	DRILL	ED BY		19/1 Miller	1/2008 nnium ahony
(m)	Œ.							(pa									
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Frac Spac (m)	cing m)	Legend	Non-infact zones (shaded)	De	escription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
5									HOLE D Observe	TRIX OPEN RILLING: ed by driller a of gravelly cla ed)	s						N = 22 (1, 12, 8, 6 1, 7) N = 45 (1, 4, 7, 9, 12, 17)
DEM	ADI	/6								INCTALL	TION DEA	MADIC					
REM 18/11	1/08	- 6 ³ / ₄	hrs L	Inloa	d sludge t	anks, loa	d & erec	t fend	cing, dig	INSTALLA	HON REN	IAKKS					
nspe	ectio	n pit	(wide	ened	due to pip	e) and m	ove equi	pmei	nt onto								
	0.7700756									GROUND			1000				
										Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
				ETA													
D 19-1	ate		8.0		RZ Top 4.50	RZ Base 8.00		Type nm S									
	11-0		25.0		20.00	25.00		nm S									



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108																13	696
ONTF	RACT	D	ublin	Central De	evelopme	ent - Dra	ft							HOLE N	0	RC'	
)-OP	DINA	TES/	1				(GROUND L	EVEL (m)				SHEE	STARTE	ED.		t 4 of 15 1/2008
. 011	-114M	, 20(_/						IETER (mm)	1	02		COMPL			1/2000
IEN	г	D	ublin	Central De	evelopme	ents Ltd	11	NCLINATIO	N		-5	90	DRILL	ED BY		19/1 Mille	1/2008 nnium
GINE	EER			onsulting Li			F	LUSH			F	olymer G		ED BY			ahony
Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracti Spaci (mm	ing n)	Legend	Non-intact zones (shaded)	Des	scription		Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
EMAI	RKS							HOLE DI Observed	d by driller a f gravelly cla	s	REMARK	ARKS					N = 41 (1, 2, 2, 4, 15, 20)
/11/0	8- 6 ³ /	hrs L	Inload	d sludge ta	anks, loa	d & erec	t fen	ncing, dig	O IALLE		- SEIVIP						
ect atior		(wide	ened (due to pipe	e) and m	ove equi	pme	ent onto	000	***							
									GROUND	1							
									Date		ole pth	Casing Depth	Depth to Water	Comm	nents		
TA	LAT	1011	ETA	11 6													
Dat	LLAT				RZ Base		Турє	9									
-11-	-08	8.0	0	4.50	8.00	50r	mm	SP									
19-11- 19-11-	-08		0			50r		SP									



REPORT NUMBER

1																		
со	NTR	ACT	D	ublin	Central I	Developm	ent - Dra	aft						DRILL	HOLE N	0	RC1	1 6 et 5 of 15
со	-ORI	DINA	TES(_)				_ (CORE DIA	LEVEL (m) METER (mn	n)		02	DATE	STARTE COMPLI		18/1	1/2008
	ENT				Central I	Developm Ltd	ents Ltd		INCLINATI FLUSH	ON			90 olymer Ge		ED BY			1/2008 nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Spa		Legend	Non-intact zones (shaded)		escription		Depth (m)	Dise	continuities		Elevation	Standpipe Details	SPT (N Value)
REI 18/									HOLE I	ETRIX OPEN DRILLING: ed by driller a of gravelly cl ed)	as ay	.00.						N = 46 (2, 4, 8, 10, 12, 16)
REI	MAR	KS					1		1	INSTALL			RKS				N///	
18/	11/08 ectio	8- 6 ³ / ₄	hrs L	Inloa	d sludge	tanks, loa be) and m	d & erec	t fen	ncing, dig									
loca	ation.		(wide	Silou	ade to pi	oc) and m	ove equ	ipiric	ant onto	GROUND	MATERI)ET	All S					
										1220 1/1	Hole	_	Casing	Depth to	Co			
										Date	Depth		Depth	Depth to Water	Comme	ents		
INS	TAL	LATI	ON F	ETA	ILS													
10	Date				RZ Top	RZ Base		Туре	9									
19	-11-0	80	8.0	0	4.50	8.00	50	mm :	SP									
19	-11-0	18	25.0	00	20.00	25.00	50	mm	SP									



REPORT NUMBER

0-		ACT	D	ublin	Central De	evelopme	nt - Draf	t				DRILLI- SHEET	HOLE NO	RC1	16 et 6 of 15
	ORD	INAT	TES(_)				GROUND I	LEVEL (m) METER (mm)	1	02	100001000000000000000000000000000000000	STARTED COMPLETE	D	1/2008
	ENT	ER			Central De		nts Ltd	INCLINATION FLUSH	ON		90 Polymer Gel	DRILLE			1/2008 nnium ahony
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fractu Spacii (mm	ing 1) 500	Legend	Non-intact zones (shaded)	scription	Depth (m)	Disco	ontinuities	Elevation	Standpipe Details	SPT (N Value)
	10.00	87	0	0				Dark bro	GRAVEL d and coarse). own, firm, sandy CLAY. Gravel ed and medium	10.20					N = 50 (2, 3, 3, 11 17, 19)
11	10.40							gravelly	own, slightly (fine) SAND n to fine)	10.85					
		100	0	0				slightly s	own, firm to stiff, sandy, gravelly Gravel is fine to ,, sub-angular to nded.	11.10					
	11.90				-					11.90					
18/	MAR 11/08	3- 63/4	hrs l	Jnloa	ad sludge ta	anks, load	d & erect	fencing, dig	INSTALLATIO	ON REM	ARKS				
	ection.		(wide	ened	due to pipe	e) and mo	ove equi	pment onto							
									GROUNDWA			Donth to			
									Date	Hole Depth	Casing Depth	Depth to Water	Comments	3	
NIC	TAI	LATI	I MO)ET	All S										
145	Date				RZ Top	RZ Base		Гуре							
	-11-(-11-(80	8.0	0	4.50 20.00	8.00 25.00	50r	nm SP nm SP							



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The same	3 S	7													136	90
0	NTRA	ACT	D	ublin	Central Developm	nent - Dra	ıft					DRILL SHEE	HOLE NO)	RC16	7 of 15
0	-ORE	INA	res(_)					LEVEL (m) METER (mm)	1	02	DATE	STARTE		18/11/2	
	ENT	ER			Central Developmonsulting Ltd	nents Ltd		NCLINATIO	ON		90 Polymer Ge	, manufacture (1)	ED BY ED BY		19/11/2 Millenr A. Mah	
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)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
2	12.30	100	0	0				slightly s CLAY w cobbles to coars								
3								cobbles LIMEST moderat	yey olack) gravelly of argillaceous ONE (probable e to highly ed bedrock).	12.60						
		100	41	9				moderat bedded black, ca SHALE. slightly v	ely strong to ely weak, thinly to laminated, alcareous Fresh to veathered with fractures.		Disconting and plant and slight stained	nuities are s iar. Clay sm ttly iron oxic (13.51m-13 sub-10°.	eared le			
	13.90							to mediu to dark of grained LIMEST	o locally ely strong, thin medded, grey grey, fine SILICEOUS ONE. Fresh to weathered.	13.70	to slightly planar. In 13.7m-1 clay sme	4.02m. Dip	ained vily			
_	MAR		her !	lale :	d aludas tables las	nd & area	t for	oina dia	INSTALLATIO	N REMA	ARKS				WIIA	
sp	ectio				d sludge tanks, loa due to pipe) and n											
Ca	ation.								GROUNDWAT	ER DET	AILS					
										Hole epth	Casing Depth	Depth to Water	Comme	ents		
NS	TAL	LATIO	ЭИ Г	ETA	ILS											
_	Date				RZ Top RZ Base	е	Туре)								
10	-11-0		8.0		4.50 8.00 20.00 25.00		mm S									



REPORT NUMBER

:01	NTR/	ACT	D	ublin C	Central Developme	ent - Dra	ft						HOLE NO	0	RC16	
00-	ORD	INA	ΓES(_)				ROUND L	EVEL (m) METER (mm)	1	02		STARTE		18/11/2	2008
	ENT	ER			Central Developmensulting Ltd	ents Ltd		ICLINATIO LUSH	N		90 Polymer Ge	DRILLI LOGGI			19/11/2 Millenn A. Mah	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	Des	scription	Depth (m)	Disc	continuities		Elevation	Standpipe Details	SPT (N Value)
14								moderate bedded t black, ca SHALE. slightly w incipient Strong to thin to m	ely strong to ely weak, thinly o laminated, lcareous Fresh to reathered with fractures. o very strong, edium bedded, ark grey, fine	14.28	and plan smeared with varia	nuities are si ar and heav . Dips are si able fracture nuities are si ar. Dips are	ily clay ub-10° es.			
								grained S	SILICEOUS ONE. Fresh.	14.48						
		100	43	29				Moderate	ely strong to ely weak, thinly o laminated, llcareous	14.90	and plan	nuities are s ar. Clay smo 14.71m. Di	eared			
15								strong, th	moderately nin to medium dark grey, fine	15.01	and plan	nuities are s ar. Clay sm Dips are				
								LIMEST locally sl weather	ed.		to slightly	nuities are s y rough and Dips are sub				
	15.40							bedded, grey, fine SILICEC LIMEST slightly w Pyrite ler Moderati moderati bedded to black, ca	ONE. Fresh to reathered. Inse 15.25m. Insely, strong to lely weak, thinly to laminated, alcareous Inselvent of the strong to laminate of the s	15.28		nuities are s ar. Dips are				
										15.84		nuities are s ar. Dips are				
REI	MAR	KS							INSTALLATION	ON REMA	ARKS				K///X	
nsp	ectio	on pit			sludge tanks, loa ue to pipe) and m											
oca	ition.								GROUNDWA	TER DET	TAILS					
									Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
INS	TAL	LATI	ON [DETAIL	LS											



REPORT NUMBER

CO	NTR	ACT	D	ublin	Central Developm	ent - Dra	ift					DRILL SHEE	HOLE N	0	RC10	6 9 of 15
0	-ORI	OINA'	TES(_)					LEVEL (m) METER (mm)		102		STARTE		18/11/	2008
	ENT				Central Developm	ents Ltd		NCLINATIO	ON		90 Polymer Ge		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)	Legend	Non-intact zones (shaded)		scription	Depth (m)		continuities		Elevation	Standpipe Details	SPT (N Value)
16		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 ar (continued	е			
17	17.10							to mediu to dark of grained LIMEST argillace Slightly	ely strong, thin medded, grey grey, fine SILICEOUS ONE with ous zones. weathered with ical calcite vein	17.20	to slightly planar. D with sub-	nuities are s y rough and jos are sub vertical cal throughout.	-10°			
		100	100	100												
18/1	MAR 11/08	- 63/4	hrs U	nload	sludge tanks, loa	d & erec	t fend	cing, dig	INSTALLATIO	N REMA	ARKS					
nsp	ection.	n pit	(wide	ned d	lue to pipe) and m	ove equi	pmei	nt onto								
									GROUNDWAT	Hole	Casing	Donth to	T			
									Date	Depth	Depth	Depth to Water	Comme	ents		
NS	TALI	LATIC	ON D	ETAII	LS					11 11 11						
	Date				RZ Top RZ Base		Гуре									
40	-11-0	8	8.00		4.50 8.00 20.00 25.00		nm S									



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CONTRACT Dublin Central Development - Draft GROUND LEVEL (m) CORE DIAMETER (mm) DATE STARTED DATE COMPLETED DATE COMPLETED DATE COMPLETED DATE COMPLETED DATE COMPLETED DATE STARTED DATE COMPLETED DATE COMPLETED DATE STARTED DATE COMPLETED DATE COMPLETED DATE COMPLETED DATE STARTED DATE COMPLETED DESCRIPTION Fracture Spacing (mm) Pueblin Central Developments Ltd Fracture Spacing (mm) Description Discontinuities Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout.	RC16 Sheet 10 of 15 18/11/2008 19/11/2008 Millennium A. Mahony A. Mahony LdS Onle A. Mahony
GROUND LEVEL (m) CORE DIAMETER (mm) DATE STARTED DATE COMPLETED INCLINATION FLUSH Polymer Gel DATE STARTED DATE COMPLETED DATE COMPLETED DATE STARTED DATE COMPLETED DATE STARTED DATE COMPLETED DATE STARTED DATE COMPLETED DISCONTINUITIES DISCONTINUITIES Strong to locally moderately strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS DISCONTINUITIES are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout.	18/11/2008 19/11/2008 Millennium A. Mahony
ENGINEER AGL Consulting Ltd FLUSH Polymer Gel Discontinuities Flush Polymer Gel Discontinuities Flush Forget By Fracture Spacing (mm) Publish Flush Discontinuities Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout.	A. Mahony
Strong to locally moderately strong, thin to medium bedded, grey to dark grey, fine grained SILICEOUS Discontinuities are smooth to slightly rough and planar. Dips are sub-10° with sub-vertical calcite fracture throughout.	upipe Details
moderately strong, thin to slightly rough and to medium bedded, grey planar. Dips are sub-10° to dark grey, fine with sub-vertical calcite grained SILICEOUS fracture throughout.	Stand SPT (
LIMESTONE with argillaceous zones. Slightly weathered with sub-vertical calcite vein throughout. (continued)	
Strong to moderately strong, thin to medium bedded, dark grey, fine grained ARGILLACEOUS LIMESTONE (slightly siliceous). Fresh to locally slightly weathered. Pyrite lense 19.39m.	
Moderately strong to moderately weak, thinly bedded to laminated black, calcareous SHALE. Fresh to locally slightly weathered. Incipient fractures common. 19.68 Discontinuities are smooth and planar. Dips are sub-10°. Discontinuities are smooth to slightly rough and planar. Dips are sub-10°.	
REMARKS INSTALLATION REMARKS 8/11/08- 63/hrs Unload sludge tanks, load & erect fencing, dig	
spection pit (widened due to pipe) and move equipment onto cation.	
Date Depth Depth Water Comments	
NSTALLATION DETAILS Date Tip Depth RZ Top RZ Base Type	
19-11-08 8.00 4.50 8.00 50mm SP 19-11-08 25.00 20.00 25.00 50mm SP	



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co	-ORI	OINA'	ΓES(_)					LEVEL (m) METER (mm)		102	T-1000 T-1000	STARTE COMPLI		18/11	11 of 15 /2008
	ENT				Central Developmer	nts Ltd		LUSH	ON		90 Polymer Ge	The State of the S	ED BY		19/11 Millen A. Ma	/2008 Inium Ihony
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)
20					610			thin to m grey to d grained LIMEST argillace	o very strong, nedium bedded, dark grey, fine SILICEOUS ONE, locally ous zones. continued)		to slightly	nuities are s rough and pips are sub ed)	i			
		100	59	57				strong, t bedded, grained ARGILL	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh to lightly ed.	20.41	Disconting and plant sub-10°	nuities are s ar. Dips ar with sub-ve 20.7m-20.	e ertical			
21					F			thin to m grey to d grained LIMEST	o very strong, nedium bedded, dark grey, fine SILICEOUS ONE. Fresh. nse 20.93 &	20.88	Discontir to slightly planar. D with sub- 20.88m-2	nuities are s rough and lips are sub- vertical fra 20.97m.	1 5-10°			
	21.20							Moderat moderat bedded, calcared Fresh to	ely strong to ely weak, thinly black, ous SHALE. locally slightly ed with incipient	21.42	and pland infilled 2° Dips are		ay m.			
- Co								Strong to strong, t bedded, grained ARGILL	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh to lightly		and plan sub-10° fractures 21.76m-2	nuities are s ar. Dips ar with sub-ve 21.51-21.0 21.92m and 22.69m-cla	e ertical 68m, d			
_	MAR								INSTALLATIO	N REM	ARKS					
nsp		n pit			d sludge tanks, load due to pipe) and mov				I							
									GROUNDWAT Date	Hole	Casing	Depth to Water	Comme	ents		
INIC	TAL	LAT	ON D	ETA	11 8					Depth	Depth	vvater				
-	Date			epth	RZ Top RZ Base		Туре									
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501	NTR/	ACT	D	ublin	Central Developme	ent - Dra	aft					DR SHI		HOLE N	0	RC1	6 t 12 of 15
00	ORE	OINA	ΓES(_)				GROUND L	LEVEL (m)	1	02	DA	TE :	STARTE			/2008
	ENT				Central Developme	ents Ltd		INCLINATION FLUSH	ON		90 Polymer Ge	A		D BY		19/11 Miller A. Ma	/2008 nnium
	(m)				induting Eta		_	1 20011			olymor of	, , ,	00.				inorry
Downhole Depth (m)	Core Run Depth (T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Dise	continuiti	ies		Elevation	Standpipe Details	SPT (N Value)
22		100	55	47				strong, ti bedded, grained ARGILL LIMEST locally sl weathers	o very strong, ledium bedded, lark grey, fine	22.70	Discontil and plan sub-10° fractures 21.76m-22.45m-smeared	ar. Dips with subs 21.92m 22.69m 1. (contin	are si	tical 8m,			
23	22.90	100	100	87				grained : LIMEST locally si weather		23.50							
	23.50							strong, t bedded, grained ARGILL LIMEST locally si	ed. Pyrite lense		Disconti and plan 23.5m-2 sub-10°.	ar. Clay 3.58m.	sm	eared			
18/		3- 63/4			sludge tanks, load				INSTALLATIO	ON REM	ARKS						
loca	ection.	on pit	(WID	ened (due to pipe) and m	ove equ	ipm	ent onto	GROUNDWA	TER DET	TAII S						
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INS				DETAI	LS RZ Top RZ Base												
	Date						Typ										



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CO-	-ORE	OINA'	ES(_)					LEVEL (m) METER (mm)		102		STARTE		18/11/	
	ENT	ER			Central Developme onsulting Ltd	ents Ltd		NCLINATION	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)	Legend	Non-intact zones (shaded)	De	scription	Depth (m)	Dis	continuities		Elevation	Standpipe Details	SPT (N Value)
24		100	91	73				moderal bedded black, ca SHALE. (continu Strong to strong, to bedded, grained ARGILL LIMEST locally so weather	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh to	24.21	and plan sub-10°.	nuities are s iar. Dips are (continued nuities are s iar. Dips an	mooth			
25	24.90							thin to m grey to d grained	o very strong, nedium bedded, dark grey, fine SILICEOUS ONE. Fresh.	25.21	to slightly	nuities are s y rough and Dips are sub				
		100	100	95	F					26.00						
	MARI 1/08		hrs I	nload	l sludge tanks, load	& erec	t fen	cina dia	INSTALLATIO		ARKS					
insp					due to pipe) and mo											
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ING	TALL	ΔΤΙ	ח אכ	ETAI	LS											
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100	21	/												100	,50
ОИТ	RAC	Т	Dublin	Central D	evelopme	ent - Draf	t				DRILL	HOLE NO)	RC10	6 14 of 15
0-0	RDIN	IATES	(_)					LEVEL (m) METER (mm)		102	0.0000000000000000000000000000000000000	STARTE			
LIEN	NT NEER			Central D		ents Ltd	INCLINAT FLUSH	ION		-90 Polymer Ge	DRILL			19/11/ Millen A. Ma	
Downhole Depth (m)	Core Kun Depun (m.)	S.C.R.%	R.Q.D.%	Fract Spac (mr	cing m)	Legend	Non-intact zones (shaded)	escription	Depth (m)	Disc	ontinuities		Elevation	Standpipe Details	SPT (N Value)
26							strong, bedded grained ARGILI LIMES' Strong thin to o grey to grained	to moderately thin to mediun to mediun to mediun to dark grey, fin to very strong, medium bedde dark grey, fine to SILICEOUS TONE. Fresh.	e 26.22	and plana sub-10°. Discontint to slightly planar. D	uities are s ar. Dips are uities are s rough and ips are sub	mooth			
26	.50						modera bedded	ately strong to ately weak, thir I, black, ous SHALE.	26.50 26.56	Disconting and plans sub-10°. Disconting	uities are s ar. Dips are uities are s ar. Dips are	mooth			
27							strong, bedded grained ARGIL LIMES interbe- limesto	to moderately thin to medium d, dark grey, fin d LACEOUS TONE with dded siliceous one. Fresh. ense 27.0m.	e	sub-10°.					
	10	00 97	87	E			modera bedded	ately strong to ately weak, thir d, black, eous SHALE.	27.25 nly 27.44	Disconting and plans sub-10°.	nuities are s ar. Dips are)			
							strong, bedded grained ARGIL	to moderately thin to mediur d, dark grey, fir d LACEOUS TONE. Fresh.	ne	and plansub-10°.	nuities are s ar. Dips an				
							thin to grey to grained	to very strong, medium bedde dark grey, fine d SILICEOUS TONE. Fresh	ed,	Discontir to slightly	nuities are s rough and lips are sub	i			
REMA	ARKS	3						INSTALLA	TION REM	ARKS				IV//A	
rspe	ction						fencing, dig pment onto								
ocatio	OII.							GROUNDY	VATER DE	TAILS					
								Date	Hole Depth	Casing Depth	Depth to Water	Comm	ents		
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	1-08 1-08		00	4.50 20.00	8.00 25.00		nm SP nm SP								
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co	NTRA	ACT	D	ublin	Central Developme	nt - Dra	ft					DRILL	HOLE N	0	RC10	6 15 of 15
CLI	ORE ENT	OINAT	D	ublin	Central Developme	ents Ltd	C		LEVEL (m) METER (mm) ON	-	02 90 Polymer Ge	DATE DATE DRILL	STARTE COMPLI ED BY ED BY		18/11/ 19/11/ Milleni A. Mai	2008 2008 nium
® 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)
	28.10							strong, t bedded, grained ARGILL	o moderately hin to medium dark grey, fine ACEOUS ONE. Fresh.	28.10		nuities are s ar. Dips ar				
								moderat bedded, calcared Fresh	ous SHALE.	28.70	and plan sub-10°.	nuities are s ar. Dips are				
29		100	86	74				thin to m grey to d grained	o very strong, neededed, dark grey, fine SILICEOUS ONE. Fresh.		to slightly	nuities are s y rough and pips are sub				
								strong, t bedded, grained ARGILL		29.25	Discontin	nuities are s ar. Dips ar	smooth e			
	29.80				Pillus.			End of 0 (m)	Corehole at 29.8	29.80						
REI	MAR	KS							INSTALLATIO	N REMA	ARKS					
					d sludge tanks, load due to pipe) and mo											
loca	ition.								GROUNDWAT	ER DET	AILS					
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INS	TALI	LATIO	ON D	ETA	ILS											

APPENDIX 3 Soil Sampling Protocol

January 2009 (SM/DC)

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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

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- (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.

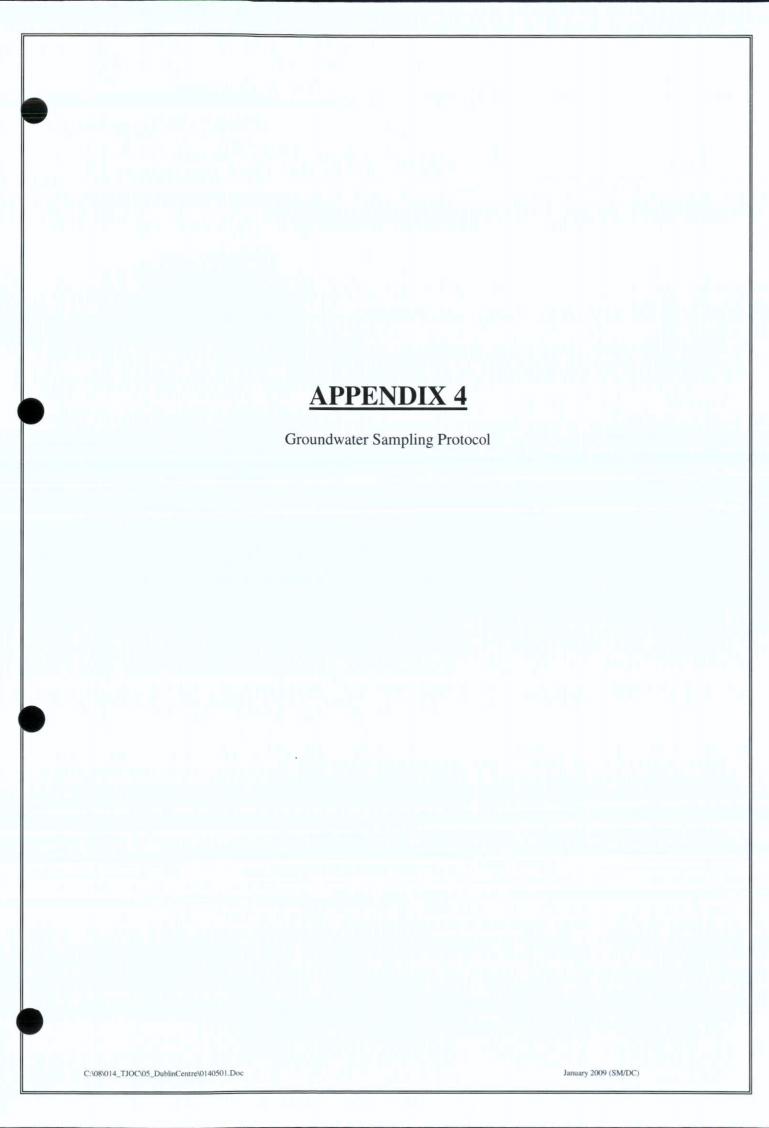
3.0 FIELD QA/QC SAMPLES

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.

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- 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 Collection of Water Samples

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

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

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

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

- 5) Record pertinent information in the field logbook and on the Field Data Sheet for Well Sampling. Complete chain-of-custody form.
- 6) Place custody seals on the container caps. As soon as possible, place sample containers in a cooler with bagged ice and maintain at 4°C until extraction. Surround the bottles with vermiculite.

- 7) Obtain the semi-volatile compound/pesticides/PCBs sample(s) by transferring the water to a laboratory prepared 1000 ml amber glass bottle with Teflon-lined cap. Fill the bottle to the bottom of the neck and follow steps 4, 5 and 6 above.
- 8) Dissolved metals (if necessary) requires the team to filter the sample water through a .45 micron filter. The water is collected in a 1 litre, unpreserved, plastic or glass bottle with HNO₃ 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 HNO₃ 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.

DCC PLAN NO 2862/21 RECEIVED: 01/06/2021

APPENDIX 5

Laboratory Results



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. Elles

Name: L. Ellis

Title: Team Leader

STL Midlands

Rayner House, 80 Lockhurst Lane, Coventry, CV6 5PZ

Tel: +44 (0)24 7658 4800 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

Laboratory Number: 10715372

Issue

Sample 1

Sample Source:

Report Number:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

BH7 0.50m-1.00m

Sample Date:

Sample Received

11 August 2008

Analysis Complete:

14 August 2008

Test Description	Result	Units	Accreditation	Method
Antimony as Sb, dry weight	1.6	mg/kg	Y Mid	30C
Arsenic as As, dry weight	16	mg/kg	Y Mid	30/30C
Barium as Ba, dry weight	150	mg/kg	Y Mid	30
Cadmium as Cd, dry weight	0.65	mg/kg	Y Mid	30
Chromium as Cr, dry weight	11	mg/kg	Y Mid	30
Copper as Cu, dry weight	19	mg/kg	Y Mid	30
ron as Fe, dry weight	8900	mg/kg	Y Mid	30
Lead as Pb, dry weight	42	mg/kg	Y Mid	30
Manganese as Mn, dry weight	830	mg/kg	Y Mid	30
Mercury as Hg, dry weight	<0.25	mg/kg	Y Mid	30C
Nickel as Ni, dry weight	24	mg/kg	Y Mid	30
Tin as Sn,dry weight	<2.0	mg/kg	Y Mid	30
Zinc as Zn, dry weight	68	mg/kg	Y Mid	30
TPH >C6 - C10	<50	mg/kg	Y Mid	317
FPH >C10 - C20	<50	mg/kg	Y Mid	317
TPH >C20 - C40	180	mg/kg	Y Mid	317
FPH >C6 - C40, Total	180	mg/kg	Y Mid	317
naphthalene	0.80	mg/kg	Y Mid	307
acenaphthylene	<0.10	mg/kg	Y Mid	307
acenaphthene	0.48	mg/kg	Y Mid	307
luorene	0.32	mg/kg	Y Mid	307
phenanthrene	4.0	mg/kg	Y Mid	307
anthracene	0.92	mg/kg	Y Mid	307
luoranthene	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
enzo(b)fluoranthene	1.4	mg/kg	Y Mid	307
enzo(k)fluoranthene	0.70	mg/kg	Y Mid	307
enzo(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 Mid	307
PAH, Total of 16 EPA	23	mg/kg	Y Mid	307
penzene	<0.10	mg/kg	Y Mid	327







Report Number:

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:

BH7 0.50m-1.00m

Sample Date:

Sample Received

11 August 2008

Analysis Complete:

14 August 2008

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

Analyst Comments for 10715372:

No Analyst Comment

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





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

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
Γin as Sn,dry weight	3.5	mg/kg	Y Mid	30
Zinc as Zn, dry weight	86	mg/kg	Y Mid	30
TPH >C6 - C10	<50	mg/kg	Y Mid	317
TPH >C10 - C20	<50	mg/kg	Y Mid	317
PH >C20 - C40	150	mg/kg	Y Mid	317
PH >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
cenaphthene	<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
penzo(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 = 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: 10715374

Issue

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

	tocolved 11 August 2000	, and you	Jonipiete. 14 Aug	guat 2000
Test Description	Result	Units	Accreditation	Method
Antimony as Sb, dry weight	1.7	mg/kg	Y Mid	30C
Arsenic as As, dry weight	13	mg/kg	Y Mid	30/30C
Barium as Ba, dry weight	79	mg/kg	Y Mid	30
Cadmium as Cd, dry weight	1.6	mg/kg	Y Mid	30
Chromium as Cr, dry weight	14	mg/kg	Y Mid	30
Copper as Cu, dry weight	30	mg/kg	Y Mid	30
Iron as Fe, dry weight	25000	mg/kg	Y Mid	30
Lead as Pb, dry weight	59	mg/kg	Y Mid	30
Manganese as Mn, dry weight	1500	mg/kg	Y Mid	30
Mercury as Hg, dry weight	<0.25	mg/kg	Y Mid	30C
Nickel as Ni, dry weight	37	mg/kg	Y Mid	30
Tin as Sn,dry weight	3.7	mg/kg	Y Mid	30
Zinc as Zn, dry weight	94	mg/kg	Y Mid	30
TPH >C6 - C10	<50	mg/kg	Y Mid	317
TPH >C10 - C20	<50	mg/kg	Y Mid	317
TPH >C20 - C40	<50	mg/kg	Y Mid	317
TPH >C6 - C40, Total	<50	mg/kg	Y Mid	317
naphthalene	<0.10	mg/kg	Y Mid	307
acenaphthylene	<0.10	mg/kg	Y Mid	307
acenaphthene	<0.10	mg/kg	Y Mid	307
fluorene	<0.10	mg/kg	Y Mid	307
phenanthrene	0.20	mg/kg	Y Mid	307
anthracene	<0.10	mg/kg	Y Mid	307
luoranthene	0.13	mg/kg	Y Mid	307
pyrene	<0.10	mg/kg	Y Mid	307
penzo(a)anthracene	<0,10	mg/kg	Y Mid	307
chrysene	<0.10	mg/kg	Y Mid	307
penzo(b)fluoranthene	<0.10	mg/kg	Y Mid	307
penzo(k)fluoranthene	<0.10	mg/kg	Y Mid	307
penzo(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
ndeno(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 Midfands, 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

Name: L. Ellis

Date: 14 August 2008

Signed: X. Elles

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

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. Elles

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







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 1

Job Description: **Donal Crean**

Job Location: 08-014-05

Number of Samples

included in this report 16

Job Received:

31 October 2008

Number of Test Results

included in this report 400

Analysis Commenced: 31 October 2008

Signed: X. Ellas

Name: L. Ellis

Date: 19 November 2008

Title:

Team Leader

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

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.





COV/558587/2008 Report Number:

Laboratory Number: 10888346

Issue

of 16 Sample 1

Sample Source:

O Callaghan Moran & Assoc.

Sample Received

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description: Sample Date:

BH7 13.0-14.00m

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888346:

No Analyst Comment

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

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

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





Report Number:

COV/558587/2008

Issue

Laboratory Number: 10888347

Sample 2 of 16

Sample Source:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

BH15 0.5-1.00m

Sample Date:

Sample Received 31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888347:

No Analyst Comment

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

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

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





Report Number: COV/558587/2008

Laboratory Number: 10888348

Issue 1

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.	deceived 31 October 20	Analysis	complete. 13 No	veriber 2000
Test Description	Result	Units	Accreditation	Method
EN 12457-3 Leachate	Y		N Mid	EN12457-3
Moisture Content Ratio at 105C	1.51	% ratio	N Mid	33
Moisture at 105c	1.5	%	N Mid	33
TOC by Ignition in O2	5.2	%	N Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N Mid	312
Mineral Oils, >C10 - C40	86	mg/kg	Y Mid	317
Naphthalene	0.16	mg/kg	N Mid	307
Acenaphthylene	<0.10	mg/kg	N Mid	307
Acenaphthene	<0.10	mg/kg	N Mid	307
Fluorene	<0.10	mg/kg	N Mid	307
Phenanthrene	0.42	mg/kg	N Mid	307
Anthracene	<0.10	mg/kg	N Mid	307
Fluoranthene	0.14	mg/kg	N Mid	307
Pyrene	0.12	mg/kg	N Mid	307
Benzo(a)anthracene	0.12	mg/kg	N Mid	307
Chrysene	0.32	mg/kg	N Mid	307
Benzo(b)fluoranthene	0.13	mg/kg	N Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N Mid	307
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	1.4	mg/kg	N Mid	307
penzene	<0.10	mg/kg	Y Mid	327
bluene	<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)	98.51	%	N Mid	Calculated

Analyst Comments for 10888348:

No Analyst Comment

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

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

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





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.

BH15 12.0-13.00m

Sample Description: Sample Date:

Sample Received 31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888349:

No Analyst Comment

Accreditation Codes: Y = UKAS Accredited, N = Not UKAS Accredited, M = MCERTS, S = Sub-contracted,
Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn,
For Microbiological determinands 0 or ND=Not Detected, For Legionelia 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

	10 110001100 01 0010001 200	o rinalysis c	ompiete. I	o November 2000
Test Description	Result	Units	Accredita	tion Method
EN 12457-3 Leachate	Y		N M	lid EN12457-3
Moisture Content Ratio at 105C	0.99	% ratio	N M	lid 33
Moisture at 105c	0.98	%	N M	lid 33
TOC by Ignition in O2	5.6	%	N M	lid 27
PCB, Total of 7 Congeners	<0.010	mg/kg	N M	lid 312
Mineral Oils, >C10 - C40	150	mg/kg	Y M	lid 317
Naphthalene	5.5	mg/kg	N M	lid 307
Acenaphthylene	0.11	mg/kg	N M	lid 307
Acenaphthene	7.1	mg/kg	N M	lid 307
Fluorene	4.4	mg/kg	N M	lid 307
Phenanthrene	40	mg/kg	N M	lid 307
Anthracene	13	mg/kg	N M	lid 307
Fluoranthene	38	mg/kg	N M	lid 307
Pyrene	34	mg/kg	N M	lid 307
Benzo(a)anthracene	18	mg/kg	N M	lid 307
Chrysene	17	mg/kg	N M	lid 307
Benzo(b)fluoranthene	14	mg/kg	N M	id 307
Benzo(k)fluoranthene	7.7	mg/kg	N M	id 307
Benzo(a)pyrene	19	mg/kg	N M	id 307
Dibenz(a,h)anthracene	1.1	mg/kg	N M	id 307
Benzo(g,h,i)perylene	6.9	mg/kg	N M	id 307
ndeno(1,2,3-c,d)pyrene	6.9	mg/kg	N M	id 307
Coronene	1.5	mg/kg	N M	id 307
PAH, Total of 17 WAC	230	mg/kg	N M	id 307
penzene	<0.10	mg/kg	Y M	id 327
oluene	<0.10	mg/kg	Y. M	id 327
ethylbenzene	<0.10	mg/kg	Y M	id 327
n&p-Xylene	<0.20	mg/kg	Y M	id 327
o-xylene	<0.10	mg/kg	Y M	id 327
Dry Ratio (BSEN 12457)	99.02	%	N M	id Calculated

Analyst Comments for 10888350:

No Analyst Comment

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

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

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





Report Number:

COV/558587/2008

Laboratory Number: 10888351

Issue

Sample 6 of 16

Sample Source:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

W2 1.00-2.00m

Sample Date:

Sample Received 31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888351:

 ${\frak{'}}$ TPH soils: detection limits raised due to original sample being over-range. ${\frak{'}}$

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 Legionelia ND=Not Detected in volume of sample filtered. I/S=Insufficient sample







Report Number:

COV/558587/2008

Laboratory Number: 10888352

Issue

Sample 7 of 16

Sample Source:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

BH8 0.50-1.00m

Sample Date:

Sample Received

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888352:

No Analyst Comment

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

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

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





Report Number:

COV/558587/2008

Laboratory Number: 10888353

Issue

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
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
Dry Ratio (BSEN 12457)	98.53	%	N Mid	Calculated

Analyst Comments for 10888353:

No Analyst Comment

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

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

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







Report Number: Laboratory Number: 10888354

COV/558587/2008

Issue

Sample 9 of 16

Sample Source:

O Callaghan Moran & Assoc.

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

BH7 13.0-14.00m 10:1

Sample Date:

Sample Received

31 October 2008

Analysis Complete: 13 November 2008

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

Analyst Comments for 10888354:

No Analyst Comment

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

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

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







Report Number:

COV/558587/2008

Laboratory Number: 10888355

Issue

Sample 10 of 16

Sample Source:

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

Sample Description:

BH15 0.5-1.00m 10:1

Sample Date:

Sample Received

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888355:

No Analyst Comment

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







Report Number: COV/558587/2008

Issue 1

Sample 11 of 16

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

Laboratory Number: 10888356

Sample Description: BH15 1.0-2.00m 10:1

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

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

Analyst Comments for 10888356:

No Analyst Comment

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

Analysed at: 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 12 of 16

Sample Source:

O Callaghan Moran & Assoc.

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

Laboratory Number: 10888357

BH15 12.0-13.00m 10:1

Sample Date:

Sample Received

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888357:

No Analyst Comment

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

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

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







Report Number:

COV/558587/2008

Laboratory Number: 10888358

Issue

Sample 13 of 16

Sample Source:

O Callaghan Moran & Assoc.

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

W2 0.50-1.00m 10:1

Sample Date:

Sample Received

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888358:

No Analyst Comment

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

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

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. VS=insufficient sample





Report Number:

COV/558587/2008

Issue

Sample 14 of 16

Sample Source:

O Callaghan Moran & Assoc.

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

Laboratory Number: 10888359

W2 1.00-2.00m 10:1

Sample Date:

Sample Received 31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888359:

No Analyst Comment

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

Analysed at: Brl = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered, VS=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	Accreditation	Method
Leachate BSEN 10:1 extract	Y		N Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N Mid	25C
Arsenic, Soluble	<50	ug/l	N Mid	25C
Barium, Soluble	0.021	mg/l	Y Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y Mid	56
Calcium, Soluble	690	mg/l	Y Mid	53F
Chromium, Soluble	<100	ug/l	Y Mid	53F
Copper, Soluble	<100	ug/l	Y Mid	53F
Lead, Soluble	<100	ug/l	Y Mid	53F
Mercury, Soluble	<0.30	ug/l	Y Mid	56
Molybdenum, Soluble	0.010	mg/l	N Mid	68
Nickel, Soluble	<100	ug/l	Y Mid	53F
Selenium, Soluble	<6.0	ug/l	N Mid	25C
Zinc, Soluble	<100	ug/l	Y Mid	53F
Phenol Index	<0.050	mg/l	N Mid	32A
Sulphate as SO4	1500	mg/l	Y Mid	60
Chloride as Cl	4.3	mg/l	Y Mid	60
Dissolved Solids	2400	mg/l	N Mid	18
Fluoride as F-	<0.20	mg/l	Y Mid	20
TOC (Filtered)	5.2	mg/l	Y Mid	41

Analyst Comments for 10888360:

No Analyst Comment

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

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

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





Report Number:

COV/558587/2008

Laboratory Number: 10888361

Issue

Sample 16 of 16

Sample Source:

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

Sample Description:

BH8 1.00-2.00m 10:1

Sample Date:

Sample Received

31 October 2008 Analysis Complete: 13 November 2008

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

Analyst Comments for 10888361:

No Analyst Comment

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

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

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

Signed: X. Ellas

Name: L. Ellis

Date: 19 November 2008

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

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: CHART

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

Severn Trent Laboratories Limited







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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Report Number:

COV/569308/2008

Issue 1

Laboratory Number: 10956741

Sample 1 of 22

Sample Source:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

Sample Description:

BH7 4.00m-5.00m

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956741:

No Analyst Comment

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

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

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample





Report Number:

COV/569308/2008

Laboratory Number: 10956742

Issue

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
ndeno(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
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
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

Laboratory Number: 10956743

Issue

Sample 3

of 22

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

BH12 3.00m-4.00m Sample Description:

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation	Method
EN 12457-3 Leachate	Y		N Mid	EN12457-3
Moisture Content Ratio at 105C	0.29	% ratio	N Mid	33
Moisture at 105c	0.29	%	N Mid	33
TOC by Ignition in O2	3.0	%	N Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N Mid	312
Mineral Oils, >C10 - C40	170	mg/kg	Y Mid	317
Naphthalene	<0.10	mg/kg	N Mid	307
Acenaphthylene	<0.10	mg/kg	N Mid	307
Acenaphthene	<0.10	mg/kg	N Mid	307
Fluorene	<0.10	mg/kg	N Mid	307
Phenanthrene	0.11	mg/kg	N Mid	307
Anthracene	<0.10	mg/kg	N Mid	307
Fluoranthene	<0.10	mg/kg	N Mid	307
Pyrene	<0.10	mg/kg	N Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N Mid	307
Chrysene	<0.10	mg/kg	N Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N Mid	307
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)	99.71	%	N Mid	Calculated

Analyst Comments for 10956743:

No Analyst Comment

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

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

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml. It/S=Insufficient sample





Report Number:

COV/569308/2008

Laboratory Number: 10956744

Issue

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 EN12457-3
EN 12457-3 Leachate	Y		N Mid	
Moisture Content Ratio at 105C	0.28	% ratio	N Mid	33
Moisture at 105c	0.28	%	N Mid	33
TOC by Ignition in O2	2.4	%	N Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N Mid	312
Mineral Oils, >C10 - C40	57	mg/kg	Y Mid	317
Naphthalene	0.15	mg/kg	N Mid	307
Acenaphthylene	<0.10	mg/kg	N Mid	307
Acenaphthene	<0.10	mg/kg	N Mid	307
Fluorene	<0.10	mg/kg	N Mid	307
Phenanthrene	<0.10	mg/kg	N Mid	307
Anthracene	<0.10	mg/kg	N Mid	307
Fluoranthene	<0.10	mg/kg	N Mid	307
Pyrene	<0.10	mg/kg	N Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N Mid	307
Chrysene	<0.10	mg/kg	N Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N Mid	307
Indeno(1,2,3-c,d)pyrene	<0.10	mg/kg	N Mid	307
Coronene	<0.10	mg/kg	N Mid	307
PAH, Total of 17 WAC	<1.0	mg/kg	N Mid	307
benzene	<0.10	mg/kg	Y Mid	327
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
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: Bril = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn.

For Microbiological detarminands 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: 10956745

Issue Sample 5

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

of 22

Test Description	Result	Units	Accreditation		Method
EN 12457-3 Leachate	Y		N	Mid	EN12457-3
Moisture Content Ratio at 105C	0.37	% ratio	N	Mid	33
Moisture at 105c	0.37	%	N	Mid	33
TOC by Ignition in O2	1.4	%	N	Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N	Mid	312
Mineral Oils, >C10 - C40	<50	mg/kg	Y	Mid	317
Naphthalene	0.18	mg/kg	N	Mid	307
Acenaphthylene	<0.10	mg/kg	N	Mid	307
Acenaphthene	<0.10	mg/kg	N	Mid	307
Fluorene	<0.10	mg/kg	N	Mid	307
Phenanthrene	<0.10	mg/kg	N	Mid	307
Anthracene	<0.10	mg/kg	N	Mid	307
Fluoranthene	<0.10	mg/kg	N	Mid	307
Pyrene	<0.10	mg/kg	N	Mid	307
Benzo(a)anthracene	<0.10	mg/kg	N	Mid	307
Chrysene	<0.10	mg/kg	N	Mid	307
Benzo(b)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(k)fluoranthene	<0.10	mg/kg	N	Mid	307
Benzo(a)pyrene	<0.10	mg/kg	N	Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N	Mid	307
Benzo(g,h,i)perylene	<0.10	mg/kg	N	Mid	307
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
enzene	<0.10	mg/kg	Y	Mid	327
bluene	<0.10	mg/kg	Y	Mid	327
thylbenzene	<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)	99.63	%	N	Mid	Calculated

Analyst Comments for 10956745:

No Analyst Comment

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

Analysed at: 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

Sample 6 of 22

Sample Source:

O Callaghan Moran & Assoc.

Laboratory Number: 10956746

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

Analyst Comments for 10956746:

No Analyst Comment

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

Analysed at: 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 Legionalia volume analysed 1g is approximately equivalent to 1ml. I/S=Insufficient sample







Report Number:

COV/569308/2008

Laboratory Number: 10956747

Issue

1 Sample 7

of 22

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

BH14 1.00m-2.00m Sample Description:

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	EN12457-0
Moisture Content Ratio at 105C	0.91	% ratio	N Mid	33
Moisture at 105c	0.90	%	N Mid	33
TOC by Ignition in O2	3.8	%	N Mid	27
PCB, Total of 7 Congeners	<0.010	mg/kg	N Mid	312
Mineral Oils, >C10 - C40	180	mg/kg	Y Mid	317
Naphthalene	0.48	mg/kg	N Mid	307
Acenaphthylene	<0.10	mg/kg	N Mid	307
Acenaphthene	0.17	mg/kg	N Mid	307
Fluorene	0.13	mg/kg	N Mid	307
Phenanthrene	1.7	mg/kg	N Mid	307
Anthracene	0.27	mg/kg	N Mid	307
Fluoranthene	1.1	mg/kg	N Mid	307
Pyrene	1.2	mg/kg	N Mid	307
Benzo(a)anthracene	0.62	mg/kg	N Mid	307
Chrysene	0.62	mg/kg	N Mid	307
Benzo(b)fluoranthene	0.52	mg/kg	N Mid	307
Benzo(k)fluoranthene	0.23	mg/kg	N Mid	307
Benzo(a)pyrene	0.44	mg/kg	N Mid	307
Dibenz(a,h)anthracene	<0.10	mg/kg	N Mid	307
Benzo(g,h,i)perylene	0.43	mg/kg	N Mid	307
Indeno(1,2,3-c,d)pyrene	0.39	mg/kg	N Mid	307
Coronene	<0.10	mg/kg	N Mid	307
PAH, Total of 17 WAC	8.3	mg/kg	N Mid	307
benzene	<0.10	mg/kg	Y Mid	327
toluene	<0.10	mg/kg	Y Mid	327
ethylbenzene	<0.10	mg/kg	Y Mid	327
m&p-Xylene	<0.20	mg/kg	Y Mid	327
o-xylene	<0.10	mg/kg	Y Mid	327
Dry Ratio (BSEN 12457)	99.10	%	N Mid	Calculated

Analyst Comments for 10956747:

No Analyst Comment

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

Analysed at: Bri = STL Bridgend, Cov = STL Coventry, Mid = STL Midlands, Rea = STL Reading, Run = STL Runcorn,
For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.

I/S=Insufficient sample







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

Analyst Comments for 10956748:

No Analyst Comment





Report Number:

Sample Source:

COV/569308/2008

Laboratory Number: 10956749

Issue 1

Sample 9 of 22

O Callaghan Moran & Assoc.

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

Sample Description. Bill 4 3.00111-4

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
p-xylene	<0.10	mg/kg	Y Mid	327
Dry Ratio (BSEN 12457)	99.60	%	N Mid	Calculated

Analyst Comments for 10956749:

No Analyst Comment

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

Analysed at: Br! = 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

DCC PLAN NO 2862/21 RECEIVED: 01/06/2021





Report Number:

COV/569308/2008

Laboratory Number: 10956750

Issue

Sample 10 of 22

Sample Source:

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

Sample Description:

BH14 8.00m-10.00m

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956750:

No Analyst Comment





Report Number:

COV/569308/2008

Laboratory Number: 10956751

Issue

Sample 11 of 22

Sample Source:

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

Sample Description:

BH9 4.00m-5.00m

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956751:

No Analyst Comment







Report Number:

COV/569308/2008

Laboratory Number: 10956752

Issue

Sample 12 of 22

Sample Source:

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

Sample Description:

BH7 4.00m-5.00m 10:1

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Laboratory Number: 10956753

Issue

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 Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956753:

No Analyst Comment







Report Number:

COV/569308/2008

Laboratory Number: 10956754

Issue

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

Analyst Comments for 10956754:

No Analyst Comment





Report Number:

COV/569308/2008

Laboratory Number: 10956755

Issue

Sample 15 of 22

Sample Source:

O Callaghan Moran & Assoc.

Sample Point Description: O Callaghan Moran & Assoc.

BH12 4.00m-5.00m 10:1

Sample Description: Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:
Antimony, Soluble	<0.030	mg/I	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.0068	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	12	mg/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	<0.30	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/I	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







Report Number:

COV/569308/2008

Laboratory Number: 10956756

Issue

Sample 16 of 22

Sample Source:

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

Sample Description:

BH12 8.00m-10.00m 10:1

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation	Method
Leachate BSEN 10:1 extract	Y		N Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/I	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 CI	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







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.

Sample Description:

Sample Date:

BH14 0.50m-1.00m 10:1

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956757:

No Analyst Comment







Report Number:

COV/569308/2008

Laboratory Number: 10956758

Issue

Sample 18 of 22

Sample Source:

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

Sample Description:

BH14 1.00m-2.00m 10:1

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation	Method
Leachate BSEN 10:1 extract	Y		N Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N Mid	25C
Arsenic, Soluble	<50	ug/l	N Mid	25C
Barium, Soluble	0.0097	mg/l	Y Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y Mid	56
Calcium, Soluble	69	mg/l	Y Mid	53F
Chromium, Soluble	48	ug/l	Y Mid	53F
Copper, Soluble	44	ug/l	Y Mid	53F
Lead, Soluble	<10	ug/l	Y Mid	53F
Mercury, Soluble	0.68	ug/l	Y Mid	56
Molybdenum, Soluble	0.043	mg/l	N Mid	68
Nickel, Soluble	<10	ug/l	Y Mid	53F
Selenium, Soluble	<6.0	ug/l	N Mid	25C
Zinc, Soluble	<10	ug/l	Y Mid	53F
Phenol Index	<0.050	mg/I	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







Report Number: COV/569308/2008

Laboratory Number: 10956759

Issue 1

Sample 19 of 22

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

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation	Method	
Leachate BSEN 10:1 extract	Y		N Mid	EN12457-3 10:1	
Antimony, Soluble	<0.030	mg/l	N Mid	25C	
Arsenic, Soluble	<50	ug/I	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





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	Accreditation	Method
Leachate BSEN 10:1 extract	Y		N Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N Mid	25C
Arsenic, Soluble	<50	ug/l	N Mid	25C
Barium, Soluble	0.0046	mg/l	Y Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y Mid	56
Calcium, Soluble	18	mg/l	Y Mid	53F
Chromium, Soluble	<10	ug/l	Y Mid	53F
Copper, Soluble	<10	ug/l	Y Mid	53F
Lead, Soluble	<10	ug/l	Y Mid	53F
Mercury, Soluble	0.39	ug/I	Y Mid	56
Molybdenum, Soluble	0.018	mg/l	N Mid	68
Nickel, Soluble	<10	ug/l	Y Mid	53F
Selenium, Soluble	<6.0	ug/l	N Mid	25C
Zinc, Soluble	<10	ug/l	Y Mid	53F
Phenol Index	<0.050	mg/l	N Mid	32A
Sulphate as SO4	<11	mg/l	Y Mid	60
Chloride as 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. Sample Description:

BH14 8.00m-10.00m 10:1

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

Test Description	Result	Units	Accreditation		Method
Leachate BSEN 10:1 extract	Y		N	Mid	EN12457-3 10:1
Antimony, Soluble	<0.030	mg/l	N	Mid	25C
Arsenic, Soluble	<50	ug/l	N	Mid	25C
Barium, Soluble	0.027	mg/l	Y	Mid	54F
Cadmium, Soluble	<0.10	ug/l	Y	Mid	56
Calcium, Soluble	24	mg/l	Y	Mid	53F
Chromium, Soluble	<10	ug/1	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 CI	3.5	mg/l	Y	Mid	60
Dissolved Solids	<200	mg/l	N	Mid	18
Fluoride as F-	0.24	mg/l	Y	Mid	20
TOC (Filtered)	2.3	mg/l	Y	Mid	41

Analyst Comments for 10956761:

No Analyst Comment

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

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

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml.

It/S=insufficient sample







Report Number:

COV/569308/2008

Laboratory Number: 10956762

Issue

Sample 22 of 22

Sample Source:

O Callaghan Moran & Assoc.

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

BH9 4.00m-5.00m 10:1

Sample Date:

Sample Received 12 December 2008 Analysis Complete: 24 December 2008

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

Analyst Comments for 10956762:

No Analyst Comment

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

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. Relating to Legionella volume analysed 1g is approximately equivalent to 1ml. I/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

Organic Chemistry Manager Title:

STL Coventry

Coventry, CV4 9GU

Tel: +44 (0)24 7642 1213 STL Business Centre, Torrington Avenue, Fax: +44 (0)24 7685 6575

www.stl-ltd.com

Severn Trent Laboratories Limited

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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

Signed: dusa lay

included in this report 4

Job Received:

03 December 2008

Number of Test Results

included in this report 188

Name: S. Clancy

Date: 19 December 2008

Title:

Organic Chemistry Manager

Analysis Commenced: 03 December 2008

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

Laboratory Number: 10940877

Issue 1

Sample 1 of 4

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

Sample Description: RC-16S

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

Test Description	Result	Units	Accreditation	Method
Antimony, Soluble	0.00048	mg/l	Y MID	56
Arsenic, Soluble	0.0069	mg/l	Y MID	56
Barium, Soluble	0.056	mg/l	Y MID	54F
Cadmium, Soluble	<0.00010	mg/l	Y MID	56
Hardness, Calcium as CaCO3	100	mg/l	N MID	53F
Chromium, Soluble	< 0.030	mg/l	Y MID	56
Copper, Soluble	0.025	mg/l	Y MID	56
ron, Soluble	0.41	mg/l	Y MID	56
_ead, 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/I	Y MID	53F
Sodium, Soluble	100	mg/l	Y MID	53F
in, 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 CI	150	mg/l	Y MID	60
Sulphide as S	0.14	mg/l	Y MID	38A
PH >C6 - C10	<100	ug/l	Y MID	318
TPH >C10 - C20	330	ug/l	Y MID	318
PH >C20 - C40	7700	ug/l	Y MID	318
TPH >C6 - C40, Total	8000	ug/l	Y MID	318
Naphthalene	2.2	ug/l	Y MID	331
Acenaphthene	0.68	ug/l	Y MID	331
Acenaphthylene	0.12	ug/l	Y MID	331
Fluorene	0.78	ug/I	Y MID	331
Phenanthrene	7.6	ug/l	Y MID	331
Anthracene	1.1	ug/I	Y MID	331
Fluoranthene	5.6	ug/I	Y MID	331
Pyrene	4.6	ug/I	Y MID	331
Benzo(a)anthracene	3.6	ug/I	Y MID	331
Chrysene	7.3	ug/l	Y MID	331







Report Number:

COV/566856/2008

Issue

Laboratory Number: 10940877

Sample 1 of 4

Sample Source:

O Callaghan Moran & Associates

Sample Point Description: O Callaghan Moran & Associates

Sample Description:

RC-16S

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

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

Analyst Comments for 10940877:

No Analyst Comment







Report Number:

COV/566856/2008

Laboratory Number: 10940878

Issue

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







Report Number:

COV/566856/2008

Issue

Laboratory Number: 10940878

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

Analyst Comments for 10940878:

No Analyst Comment





Report Number:

Sample Source:

COV/566856/2008

Laboratory Number: 10940879

Issue

Sample 3

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/l	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/I	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 CI	39	mg/l	Y MID	60
Sulphide as S	<0.010	mg/l	Y MID	38A
TPH >C6 - C10	<100	ug/l	Y MID	318
TPH >C10 - C20	<100	ug/l	Y MID	318
TPH >C20 - C40	<100	ug/l	Y MID	318
TPH >C6 - C40, Total	<100	ug/l	Y MID	318
Naphthalene	0.054	ug/l	Y MID	331
Acenaphthene	<0.010	ug/l	Y MID	331
Acenaphthylene	<0.010	ug/l	Y MID	331
Fluorene	<0.010	ug/l	Y MID	331
Phenanthrene	0.017	ug/l	Y MID	331
Anthracene	<0.010	ug/l	Y MID	331
Fluoranthene	<0.010	ug/l	Y MID	331
Pyrene	<0.010	ug/l	Y MID	331
Benzo(a)anthracene	<0.010	ug/l	Y MID	331
Chrysene	<0.010	ug/l	Y MID	331







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:

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

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

Analyst Comments for 10940879:

No Analyst Comment





Report Number:

COV/566856/2008

Laboratory Number: 10940880

Issue

Sample 4

Sample Source:

O Callaghan Moran & Associates

Sample Point Description: O Callaghan Moran & Associates

Sample Description:

W1-B

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

Test Description	Result	Units	Accreditation	Method
Antimony, Soluble	0.00015	mg/l	Y MID	56
Arsenic, Soluble	<0.0010	mg/l	Y MID	56
Barium, Soluble	0.018	mg/l	Y MID	54F
Cadmium, Soluble	<0.00010	mg/l	Y MID	56
Hardness, Calcium as CaCO3	360	mg/l	N MID	53F
Chromium, Soluble	<0.030	mg/i	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 1

Laboratory Number: 10940880

Sample 4 of 4

Sample Source:

O Callaghan Moran & Associates

Sample Point Description: O Callaghan Moran & Associates

Sample Description:

W1-B

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

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

Analyst Comments for 10940880:

No Analyst Comment

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

Signed: Ausa Clay

Name: S. Clancy

Date: 19 December 2008

Title:

Organic Chemistry Manager



ANALYST COMMENTS FOR REPORT

COV/566856/2008

Issue

Date of Issue: 19 December 2008

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

Signed: Ausa 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

mple No Description			Determinand	Comm	nents		
	~			Name:	S. Clancy	Date:	19 December 2008
Signed	: Jusa	lay		Title:	Organic Chemist	try Manager	