IGSL Ltd

Oxigen Site at Derryarkin, Co. Offaly

Ground Investigation ReportFACTUAL

Project No. 23072 April 2021



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FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project (**Oxigen Site at Derryarkin, Co. Offaly**) have been carried out by IGSL Limited in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (2015) and BS 1377 (Parts 1 to 9) and the following European Norms:

- EN 1997-2 Eurocode 7: 2007 Geotechnical Design Part 2: Ground Investigation & Testing
- EN ISO 22475-1:2006 Geotechnical Investigation and Sampling Sampling Methods & Groundwater Measurements
- EN ISO 14688-1:2017 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 1: Identification and Description
- EN ISO 14688-2:2017 Geotechnical Investigation and Testing Identification and Classification of Soil, Part 2: Principles for a classification
- EN ISO 14689-1:2017 Geotechnical Investigation and Testing Identification, description & classification of rock

Reporting

No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations. The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points. Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction, mining works or karstification below or close to the site.

This report has been prepared for Oxigen and Fehily Timoney & Company Consultants and the information should not be used without their prior written permission. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

Boring Procedures

Unless otherwise stated, 'shell and auger' or cable percussive boring technique has been employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing complies with the recommendations of IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

It is highlighted that some disturbance and variation is unavoidable in particular ground (e.g. blowing sands, gravel / cobble dominant glacial deposits etc). Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the



engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Soil Sampling

Three categories of sampling methods are outlined in EN ISO 22475-1:2006. The categories are referenced A, B and C for any given ground conditions and are shown in Tables 1 and 2 of EN ISO 22475-1:2006. Reference should be made to EN 1997-2:2002 for guidelines on sample class and quality for strength and compressibility testing. Samples of quality classes 1 or 2 can only be obtained by using Category A sampling methods.

Class 1 thin wall undisturbed tube samples (UT100) were obtained in fine grained soils and strictly meet the requirements of EN 1997-2:2002 and EN ISO 22475-1:2006. Soil samples for laboratory tests are divided into five classes with respect to the soil properties that are assumed to remain unchanged during sampling, handling transport and storage. The minimum sample quality required for testing purposes to Eurocode 7 compatibility (EN 1997-2:2002) is shown in Table A.

Table A – Details of Sample Quality Requirements

EN 1997 Clause	Test	Minimum Sample Quality Class
5.5.3	Water Content	3
5.5.4	Bulk Density	2
5.5.5	Particle Density	N/S
5.5.6	Particle Size Analysis	N/S
5.5.7	Consistency Limits	4
5.5.8	Density Index	N/S
5.5.9	Soil Dispersivity	N/S
5.5.10	Frost Susceptibility	N/S
5.6.2	Organic Content	4
5.6.3	Carbonate Content	3
5.6.4	Sulphate Content	3
5.6.5	pH	3
5.6.6	Chloride Content	3
5.7	Strength Index	1
5.8	Strength Tests	1
5.9	Compressibility Tests	1
5.10	Compaction Tests	N/S
5.11	Permeability	2

N/S – not stated. Presume a representative sample of appropriate size.

Samples recovered from trial pits or trenches meet the requirements of IS EN ISO 22475-1. It is highlighted that unforeseen circumstances such as variations in geological strata may lead to lower quality sample classes being obtained.

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible, drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.



Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Where peat has been encountered, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 and Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986.

Retention of Samples

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining offally County Council, Planning Dept., Inspectif material will be discarded. Unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

1. INTRODUCTION

IGSL has undertaken a programme of geotechnical site investigation works at a c. 1.9 acre site for a proposed Oxigen Facility in the townland of Derryarkin, Croghan, Tullamore, County Offaly. Agricultural sheds and a slatted unit occupy the current site with concrete hardstanding to the north of the livestock housing unit. The site is located approximately 1.5km southwest of the R400 Regional Road linking Rochfortbridge in the northwest with the town of Rhode in the southeast. The site is bounded by agricultural pastureland with raised bogland locally. An operational sand and gravel pit is situated to the west of the site. Access was gained to the site via a gravel track leading off the R400 road.

Figure 1 – Site Location Plan (boxed area denotes the area of investigation)



Ordnance Survey of Ireland Licence No. EN 0070021 © Ordnance Survey Ireland / Government of Ireland

The investigation comprised machine-excavated trial pitting, cable percussion boring with rotary open-hole drilling activities. Groundwater monitoring wells were installed in each of the four constructed rotary drillholes. The investigations were executed in accordance with BS 5930, Code of Practice for Site Investigations (2015) and EN 1997-2 Eurocode 7 Part 2 Ground Investigation & Testing and supervised by an IGSL engineering geologist.

Geotechnical, chemical and environmental laboratory testing was scheduled on a range of soil Offally County Council. Planning Dept. Inspection Purposes Only samples. The geotechnical testing on soils includes moisture contents, Atterberg Limits and Particle Size Distribution [PSD] classification tests. Chemical analysis comprised BRE SD1 testing (i.e. total sulfur, sulfate contents) undertaken by Chemtest Laboratories. Environmental testing was



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2. FIELDWORK

2.1 General

The fieldworks were undertaken during January and February 2021. The works which form this report comprise the following:

- o Trial Pitting (5 No.)
- o Cable Percussion Boring (6 No.)
- o Rotary Open-Hole Drillholes (4 No.)
- Groundwater Monitoring
- Surveying of Exploratory Hole Locations

2.2 Trial Pits

Trial pitting was undertaken at five locations across the site. The trial pits were excavated, logged and sampled under the direction of an IGSL geotechnical engineer in accordance with BS 5930 (1999+A2:2010). Bulk disturbed samples (typically 20 to 30kg) were taken as the pits progressed. In addition, environmental samples were taken at shallow depths in each trial pit. Soil samples, stored in glass jars, were transported to the selected environmental laboratory in cooler boxes.

The bulk samples were placed in heavy-duty polyethylene bags and sealed before being transported to Naas for laboratory testing. The trial pits were backfilled with the as-dug arisings and reinstated to the satisfaction of IGSL's site geotechnical engineer. The trial pit logs and photos are presented in Appendix 1 and include descriptions of the soils encountered, groundwater conditions and stability of the pit sidewalls.

2.3 Cable Percussion Boreholes

Cable percussion boring (200mm diameter) was undertaken at six locations using a Dando 2000 rig. The boreholes extended to depths of between 5.20m and 8.50m below ground level. Boring commenced through hand-dug services inspection pits excavated to 1.20m. Each service pit was excavated only after undertaking a careful CAT [Cable Avoidance Tool] survey and following consultation of all available utility plans. Disturbed bulk samples were recovered at 1m intervals or change of strata during boring and these are denoted 'B' on the engineering logs.

Standard Penetration Tests (SPT's) were performed in the boreholes and given the nature of the soils, a solid cone was used. It is noted that the SPT N-Values reported are the number of blows for 300mm increment penetration (e.g. BH01 at 2.0m where N=21). These exclude the seating blow values, which represent the initial 150mm depth of penetration. Where partial penetration was achieved during testing, the number of blows is shown for the actual penetration depth achieved (e.g. BH01 at 6.0m where N=50/75mm). In accordance with Eurocode 7, the SPT hammer has been calibrated and the energy ratio (Er) value is incorporated on the engineering logs. It is highlighted that the SPT N-Values reported on the engineering logs are uncorrected for energy ratio.

Descriptions of the soils encountered and samples recovered are presented on the borehole records in Appendix 2. Details of groundwater strikes and hard strata boring (i.e. chiselling) are also presented on the aforementioned records.

2.4 Rotary Open-Hole Drillholes

Rotary Open-Hole (holes denoted RC_) drilling was carried out at four locations on site. The holes were constructed using a tracked Casagrande top-drive drill rig. Symmetrex open-hole drilling was utilised within the overlying superficial deposits and extended to a depth of 12.0m bgl in each of the four holes.

Standard Penetration Tests (SPT's) were performed during overburden drilling and given the nature of the soils, a solid cone was used. It is noted that the SPT N-Values reported are the number of blows for 300mm increment penetration (e.g. RC01 at 3.0m where N=7). These exclude the seating



blow values, which represent the initial 150mm depth of penetration. Where partial penetration was achieved during testing, the number of blows is shown for the actual penetration depth achieved (e.g. RC03 at 9.0m where N=62/210mm). In accordance with Eurocode 7, the SPT hammer has been calibrated and the energy ratio (Er) value is incorporated on the engineering logs. It is highlighted that the SPT N-Values reported on the engineering logs are uncorrected for energy ratio.

Groundwater monitoring standpipes were installed in each of the four drillholes. The standpipes consisted of 50mm diameter HDPE pipework with proprietary 1mm slots and incorporated a pea gravel filter pack and cement / bentonite grout seal. Headwork covers were concreted in place. The drilling records are presented in Appendix 3.

2.5 Groundwater Monitoring

Groundwater monitoring was undertaken following rotary drilling works. Groundwater levels were measured using an electric dipmeter. The levels recorded are shown in Appendix 4.

2.6 Surveying of Exploratory Hole Locations

Following completion of the exploratory works, surveying was carried out using GPS techniques. Co-ordinates (x, y) were measured to Irish Transverse Mercator and ground levels (z) established to Staly County Council, Planning Dept. Inst Malin Head. The co-ordinates and ground levels are shown on the exploratory hole logs with locations shown on the exploratory hole plan in Appendix 7.



3. LABORATORY TESTING

Geotechnical laboratory testing was performed at IGSL's INAB-accredited laboratory in accordance with the methods set out in BS1377; British Standard Methods of Test for Soils for Civil Engineering Purposes; British Standards Institute:1990. Soils testing included moisture content and Atterberg Limit (Liquid / Plastic Limits) determination along with analysis of particle size distribution [PSD]. The results from geotechnical testing on selected borehole and trial pit soils are presented in Appendix 5.

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REFERENCES

- offering County County

Appendix 1





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23072

TRIAL PIT NO. TP1 CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **CO-ORDINATES** 648,518.96 E **DATE STARTED** 20/01/2021 **LOGGED BY** I.Reder 736,830.93 N DATE COMPLETED 20/01/2021 GROUND LEVEL (m) 80.03 **EXCAVATION** 8T tracked **CLIENT** Oxigen **METHOD** excavator **ENGINEER** Fehily Timoney & Company Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Legend Depth (m) Depth Type CONCRETE 0.12 79.91 (Dense) Grey sandy subrounded to subangular fine to coarse GRAVEL (FILL) 0.50 79.53 (Medium dense) Brownish grey silty/clayey sandy AA142155 Env 0.50-1.00 subangular to subrounded fine to coarse GRAVEL with some organic matter 1.0 1.10 78.93 (Medium dense) Grey very sandy subangular to subrounded fine to coarse GRAVEL with some AA142156 В 1.20 subrounded cobbles and occasional lenses of fine to medium sand 2.0 180 2.20 AA142457 В $\frac{1}{2}$ 3.0 0000 AA142158 В 3.20 3.50 76.53 End of Trial Pit at 3.50m 4.0 **Groundwater Conditions** Rapid water flow at 2.70m

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Stability

IGSL.GDT

GPJ

TP LOG

IGSL

Poor from 2.70m

General Remarks





REPORT NUMBER

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CON	TRACT	Oxigen Site at Derryarkin, Co.C	CO-ORDINA	TEQ	649 44	93.83 E		TRIAL P			et 1 of 1	
LOGO	GED BY	I.Reder			736,80	08.82 N		DATE ST	TARTED OMPLET		1/2021	
CLIEI	NT NEER	Oxigen Fehily Timoney & Company	GROUND LE	:VEL (M)	80.02			EXCAVA METHOI			racked avator	
									Samples		a)	neter
		Geotechnical Description	ו	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer
0.0		IL (MADE GROUND)			0.15	79.87			- 4			
1.0	plastic s	own gravelly organic CLAY with ra heeting and rubber tyre (MADE (n dense) Grey sandy subangular oarse GRAVEL	GROUND)		0.90	79.12		AA142151 AA142152	Env	0.50-0.90)	
2.0	line to c	odise Gnavel			,Ç	110	3	AA142153		2.00		
3.0	coarse (Grey sandy subangular to subro GRAVEL with many subrounded of	cobbles		2.50	77.52 77.02	(Rapid)	AA142154	. В	3.00		
4.0	- 05	rial Pit at 3.00m										
Rapio Stabi	d water flo	Conditions ow at 2.50m										
Gene	ral Rema	rks										
											Comhai Offaly C	irle Chantae U ounty Council NNING
											PL2 / 2	





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CON	TRACT	Oxigen Site at Derryarkin, Co.C	maly					TRIAL P SHEET		TP: She	et 1 of 1	
LOG	GED BY	I.Reder	CO-ORDINAT		736,78	02.48 E 88.50 N		DATE ST		20/0	01/2021	
CLIE	NT	Oxigen	GROUND LE	VEL (m)	80.14			EXCAVA METHOL	TION		racked avator	
ENGI	NEER	Fehily Timoney & Company			1	1		METHOL		ехса	avalor	
									Samples		a)	neter
		Geotechnical Description	1	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer
0.0	TOPSO	IL		<u> </u>	0.10	80.04						
	Soft dar organic	k brown to black mottled grey sar	idy very gravelly	- 70	i)		
,	(Dense)	Brown mottled dark brown and g andy subangular to subrounded t L with ogranic matter	rey slightly ine to coarse	% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.35	79.79		AA142159	Env	0.40-0.80	0	
							0					
1.0				000				AA142160	В	1.00		
	(Mediun	n dense) Grey gravelly fine to coa	rse SAND	0	1.20	78.94	2/					
				0	0			AA142161	В	1.80		
2.0				0	<i>)</i> \							
	(Dansa)	Grey sandy subangular to subro	unded fine to	80.00	2.20	77.94						
	coarse (Grey sandy subangular to subro GRAVEL with some subrounded	cobbles	0000								
				000								
				0000			★					
			0	900			(Moderate)	AA142162	В	2.80		
3.0				900		70.04						
	End of 7	Frial Pit at 3.20m			3.20	76.94						
		Trial Pit at 3.20m										
4.0		cid Co										
	-,013											
		Conditions		1	I	<u> </u>	<u> </u>					<u> </u>
Mode	erate wate	er flow at 2.80m										
Stabi Poor	ility from 2.80)m										
	eral Rema											
aene	лап пета	eni										
											Combai Offaly C PLA	rle Chantae U ounty Council
											PL2 / 2	





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TRIAL PIT NO. TP4 CONTRACT Oxigen Site at Derryarkin, Co.Offaly Sheet 1 of 1 SHEET **CO-ORDINATES** 648,531.75 E **DATE STARTED** 20/01/2021 **LOGGED BY** I.Reder 736,779.47 N DATE COMPLETED 20/01/2021 GROUND LEVEL (m) **EXCAVATION** 8T tracked **CLIENT** Oxigen **METHOD** excavator **ENGINEER** Fehily Timoney & Company Hand Penetrometer (KPa) Samples Vane Test (KPa) Water Strike Geotechnical Description Elevation Depth (m) Type CONCRETE 0.20 79.94 (Medium dense) Brown mottled grey sandy subangular to subrounded fine to coarse GRAVEL with occasional AA142167 Env 0.30-0.80 subrounded cobbles and organic matter (possible MADE GROUND) 0.90 79.24 (Medium dense) Grey slightly clayey fine to medium SAND with some subrounded gravel 1.0 AA142168 1.10 1.20 78.94 (Medium dense to dense) Grey sandy subangular to subrounded fine to coarse GRAVEL with some subrounded cobbles AA142169 1.80 В 2.0 AA142170 В 2.80 3.0 0000 3.50 76.64 End of Trial Pit at 3.50m 4.0 **Groundwater Conditions**

Moderate water flow at 3.20m

Stability

23072.GPJ

IGSL TP LOG

Slightly unstable from 3.20m

General Remarks





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CONT	11401	Oxigen Site at Derryarkin, Co.C	naiy					TRIAL P SHEET		TP5 Shee	et 1 of 1	
LOGG	ED BY	I.Reder	CO-ORDINAT			19.00 E 48.52 N		DATE ST	TARTED OMPLET	20/0	1/2021 1/2021	
CLIEN		Oxigen Fehily Timoney & Company	GROUND LE	VEL (m)	80.12			EXCAVA METHOL			acked vator	
			1						Samples		<u> </u>	neter
		Geotechnical Descriptio	n	Legend	Depth (m)	Elevation	Water Strike	Sample Ref	Туре	Depth	Vane Test (KPa)	Hand Penetrometer
	(MADE	gular gravel and cobbles (Possib GROUND)			0.15	79.97		AA142163	Env	0.20-0.70		
	and stee	rey sandy GRAVEL with rare corel wire (MADE GROUND)			0.70	79.42	1	1112100		0.20 0.70		
1.0	sandy si with occ natural (coarse GRAVEL		1.10	79.02	(Seepage)	AA142164	В	1.00		
	(Mediun	Plastic sheeting n dense to dense) Brownish grey ular to subrounded fine to coarse nal subrounded cobbles	clayey sandy GRAVEL with			110	2					
	(Mediun subroun gravelly	n dense) Grey very sandy subang ded fine to coarse GRAVEL (pos Sand)	gular to ssibly very		1.70	78.42		AA142165	5 B	2.00		
3.0	(Dense) coarse (Grey sandy subangular to subro	nunded fine to	30000000000000000000000000000000000000	2.60	77.52	2	AA142166	s В	3.00		
	End of T	Frial Pit at 3.50m		\$ 60 00 00 00 00 00 00 00 00 00 00 00 00	3.50	76.62	(Slow)					
4.0	00	Uity Con.										
		Conditions 70m; Slow water flow observed a	t 3.20m									
	ly unstab											
Gener	al Rema	rks								_		
												NNING
											PL2 / 2	



Trial Pit TP1 – 1 of 2



Trial Pit TP1 – 2 of 2



Trial Pit TP2 – 1 of 2



Trial Pit TP2 – 2 of 2



Trial Pit TP3 – 1 of 2



Trial Pit TP3 – 2 of 2



Trial Pit TP4 – 1 of 2



Trial Pit TP4 – 2 of 2



Trial Pit TP5 – 1 of 2



Trial Pit TP5 – 2 of 2



Appendix 2

Offally County Council, Planning Dept., Inspection Purposes Only

PL2 / 22 / 490 21 / 09 / 2022



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BOREHOLE NO. **BH01** CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,499.94 E DATE COMMENCED 20/01/2021 **BOREHOLE DIAMETER (mm)** 736,842.73 N 200 **DATE COMPLETED** 20/01/2021 **GROUND LEVEL (m AOD)** 80.07 **BOREHOLE DEPTH (m)** 6.50 SPT HAMMER REF. NO. P.Allan CLIENT Oxigen **BORFD BY ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Recovery Ref. Number Sample Field Test Legend Depth (Description Depth Depth (m) Results - 0 CONCRETE 0.20 79.87 Medium dense grey fine to coarse very sandy GRAVEL with some cobbles (Possibly very gravelly Sand) N = 22AA139284 В 1.00 (2, 3, 4, 6, 6, 6)N = 21 (2, 3, 6, 8, 3, 4) AA139285 В 2.00 2 N = 15В 3 AA139286 3.00 (2, 2, 3, 3, 4, 5) 8000 AA139287 N = 19В 4.00 0000 4 (3, 4, 6, 5, 4, 4)75.27 4.80 75.07 5.00 Grey SILT 0000 N = 53 (4, 6, 10, 12, 13, 18) AA139288 В 5.00 5 Dense fine to coarse grey sandy GRAVEL with some cobbles and occasional boulders 0 9000 N = 50/75 mmAA139289 В 6.00 6 (25, 50) 73.57 6.50 Obstruction End of Borehole at 6.50 m 8 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time From (m) To (m) Comments Comments Strike Depth То (h) Αt (min) 5.5 No 5.3 1.5 0.20 0.20 No 20 Seepage 6.5 2 1.10 20 6.3 1.80 1.80 Nο Moderate **GROUNDWATER PROGRESS** Hole Casing Depth to Water **INSTALLATION DETAILS** Comments Date Depth Depth Tip Depth RZ Top RZ Base Туре REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned Sample Legend

IGSL BH LOG 23072.GPJ IGSL.

16/4/21

GDT.

location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Ja

al Sample (Jar + Vial + Tub)

UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample





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BOREHOLE NO. **BH02** CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,533.72 E DATE COMMENCED 22/01/2021 **BOREHOLE DIAMETER (mm)** 736,843.59 N 200 DATE COMPLETED 25/01/2021 **GROUND LEVEL (m AOD)** 80.01 **BOREHOLE DEPTH (m)** 6.30 SPT HAMMER REF. NO. P.Allan CLIENT Oxigen **BORFD BY ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Recovery Ref. Number Sample Field Test Legend Depth Description Depth Depth (m) Results - 0 CONCRETE 0.20 79.81 Medium dense grey fine to coarse very sandy GRAVEL with occasional cobbles (Possibly very AA139290 В 0.50 gravelly Sand) AA139291 В 1.00 N = 13(2, 3, 3, 4, 3, 3)77.91 N = 15 (6, 3, 4, 3, 3, 5) 2.10 AA139292 В 2.00 2 ھ) Medium dense large COBBLES 77.61 2.40 Medium dense grey fine to coarse very sandy GRAVEL with occasional cobbles (Possibly very gravelly Sand) N = 14В 3.00 -3 AA139293 (2, 2, 3, 3, 3, 5) 8000 76.01 4.00 AA139294 N = 37 (6, 5, 8, 7, 10, 12) В 4.00 4 Medium dense to dense grey fine to coarse sandy clayey GRAVEL with some cobbles 75.31 4.70 Dense grey fine to coarse GRAVEL with cobbles N = 37 (6, 8, 5, 8, 10, 14) AA139295 В 5.00 -5 8000 N = 50/75 mm-6 (25, 50) 73.71 6.30 Obstruction End of Borehole at 6.30 m 8 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Time Time Comments From (m) To (m) Comments (h) Depth At To (min) 2.1 2.4 1 No water strike 4.3 4.6 1 1.5 6.1 6.3 **GROUNDWATER PROGRESS** Depth to Hole Casing **INSTALLATION DETAILS** Comments Date Depth Depth Tip Depth RZ Top RZ Base Type REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned Sample Legend

IGSL BH LOG 23072.GPJ IGSL.

16/4/21

GDT.

location and hand dug inspection pit carried out.

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)

UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample





REPORT NUMBER

23072

BOREHOLE NO. **BH03** CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,543.44 E DATE COMMENCED 15/01/2021 **BOREHOLE DIAMETER (mm)** 736,808.91 N 200 18/01/2021 **DATE COMPLETED GROUND LEVEL (m AOD)** 79.90 **BOREHOLE DEPTH (m)** 7.30 SPT HAMMER REF. NO. CLIENT Oxigen **BORFD BY** P Allan **ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Recovery Ref. Number Sample Field Test Legend Depth (Depth Description Depth (m) Results - 0 MADE GROUND 79.40 0.50 AA141309 В 0.50 Grey very sandy SILT/CLAY with occasional gravel -XO-_ AA141310 В 1.00 78.70 1.20 N = 19Medium dense fine to coarse grey sandy GRAVEL (2, 3, 4, 5, 4, 6)with occasional cobbles N = 18 (3, 4, 5, 5, 4, 4) AA141311 В 2.00 2 N = 19В 3 8080 AA141312 3.00 (4, 4, 3, 6, 5, 5) AA141313 N = 19В 4.00 4 (3, 4, 4, 5, 5, 5) 75.20 4.70 Firm grey sandy SILT with some fine gravel ×°X N = 11 (1, 1, 2, 3, 2, 4) AA141314 В 5.00 -5 × × × × × × 73.90 6.00 0000 N = 28AA141315 В 6.00 -6 Dense fine to coarse grey sandy GRAVEL with some (6, 6, 9, 6, 5, 8) cobbles and occasional boulders 900 000 ૡૺૺૼૼ N = 50/75 mmAA141316 7.00 (15, 25, 50) 72.60 7.30 N = 50/75 mmObstruction (25, 50)End of Borehole at 7.30 m 8 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time Comments From (m) To (m) Comments Depth (h) At To (min) 3.7 3.9 16/4/21 No water strike 7.3 2 7.1 GDT **GROUNDWATER PROGRESS** Hole Casing Depth to Water **INSTALLATION DETAILS** Date Comments Depth Depth Date Tip Depth RZ Top RZ Base 19-01-21 Final Water Level Type 2.20 1.00 Nil REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned Sample Legend

IGSL. GPJ 23072. Log BH IGSL

location and hand dug inspection pit carried out.

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Same al Sample (Jar + Vial + Tub) UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample





REPORT NUMBER

23072

BOREHOLE NO. **BH04** CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,509.95 E DATE COMMENCED 26/01/2021 **BOREHOLE DIAMETER (mm)** 736,769.71 N 200 **DATE COMPLETED** 26/01/2021 **GROUND LEVEL (m AOD)** 80.11 **BOREHOLE DEPTH (m)** 5.20 SPT HAMMER REF. NO. P.Allan CLIENT Oxigen **BORFD BY ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Sample Type Recovery Ref. Number Field Test Legend Depth (Depth (Description Depth (m) Results - 0 CONCRETE 0.20 79.91 Medium dense to dense grey very sandy GRAVEL with some cobbles (Possibly very gravelly Sand) N = 29AA141317 В 1.00 (4, 6, 8, 9, 6, 6)N = 36 (3, 4, 6, 8, 10, 12) AA141318 В 2.00 2 N = 23В 3.00 3 AA141319 (3, 4, 5, 6, 6, 6) N = 20 (3, 4, 5, 5, 5, 5) AA141320 В 4.00 4 . S N = 50/150 mm (7, 9, 12, 38) 0.00 AA141321 В 5.00 5 74.91 5.20 Obstruction End of Borehole at 5.20 m Council, Plan 6 8 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Rise Time Time Comments From (m) To (m) Comments Depth То (h) At (min) 2.5 2.7 16/4/21 No water strike 0.75 3.7 4 5.2 5.1 1.5 GDT. IGSL. **GROUNDWATER PROGRESS** Hole Casing Depth to Water **INSTALLATION DETAILS** Comments Date Depth Depth Date Tip Depth RZ Top RZ Base Туре REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned

23072.GPJ BH LOG IGSL

location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Same al Sample (Jar + Vial + Tub) UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample





REPORT NUMBER

23072

BOREHOLE NO. **BH05** CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,550.02 E DATE COMMENCED 25/01/2021 **BOREHOLE DIAMETER (mm)** 736,769.68 N 200 **DATE COMPLETED** 26/01/2021 **GROUND LEVEL (m AOD)** 79.63 **BOREHOLE DEPTH (m)** 6.50 SPT HAMMER REF. NO. P.Allan CLIENT Oxigen **BORFD BY ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Sample Type Recovery Ref. Number Field Test Legend Depth (Depth (Description Depth (m) Results - 0 TOPSOIL (MADE GROUND) 0.20 79.43 MADE GROUND 79.13 0.50 Medium dense to dense grey fine to coarse very sandy GRAVEL with some cobbles (Possibly very gravelly Sand) N = 16 00000 AA116301 В 1.00 (2, 2, 3, 4, 5, 4)N = 18 (3, 4, 5, 6, 4, 3) AA116302 В 2.00 2 0000 N = 16В 3 AA116303 3.00 (2, 3, 3, 4, 5, 4) N = 18 (3, 4, 5, 4, 4, 5) AA116304 В 4.00 4 N = 31 (4, 6, 8, 7, 7, 9) AA116305 В 5.00 -5 9.80 N = 21AA116306 В 6.00 6 (4, 5, 5, 6, 5, 5) 73.13 6.50 Obstruction End of Borehole at 6.50 m 8 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Time Water Casing Sealed Rise Time Comments From (m) To (m) Comments Depth То (h) At (min) 5.5 5.3 16/4/21 No water strike 6.5 1.5 6.3 GDT. IGSL. **GROUNDWATER PROGRESS** Hole Casing Depth to Water **INSTALLATION DETAILS** Comments Date Depth Depth Date Tip Depth RZ Top RZ Base Туре REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned Sample Legend

GPJ 23072. BH LOG IGSL

location and hand dug inspection pit carried out.

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Same

al Sample (Jar + Vial + Tub)

UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample





REPORT NUMBER

23072

BOREHOLE NO. BH06 CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 1 **RIG TYPE** Dando 2000 **CO-ORDINATES** 648,510.62 E DATE COMMENCED 19/01/2021 **BOREHOLE DIAMETER (mm)** 736,728.93 N 200 **DATE COMPLETED** 20/01/2021 **GROUND LEVEL (m AOD)** 79.66 **BOREHOLE DEPTH (m)** 8.50 SPT HAMMER REF. NO. P.Allan CLIENT Oxigen **BORFD BY ENGINEER PROCESSED BY** Fehily Timoney & Company **ENERGY RATIO (%)** FC Samples Standpipe Details Ξ Ξ Elevation Sample Type Recovery Ref. Number Field Test Legend Depth (Depth Description Depth (m) Results - 0 TOPSOIL (MADE GROUND) 79.56 0.10 MADE GROUND 79.16 0.50 AA141317 В 0.50 Brrown very sandy SILT/CLAY with occasional gravel X N = 24AA141318 В 1.00 78.46 1.20 (2, 3, 6, 8, 5, 5)0000 Medium dense to dense fine to coarse grey very sandy GRAVEL (Possibly very gravelly Sand) 00000 N = 29 (4, 4, 6, 9, 8, 6) AA141319 В 2.00 2 N = 22В 3 AA141320 3.00 (2, 3, 6, 5, 5, 6) N = 50/150 mm (10, 15, 25, 25) AA141321 В 4.00 4 74.86 4.80 Medium dense fine to coarse grey silty sandy N = 14 (2, 2, 4, 3, 3, 4) AA141322 В 5.00 -5 GRAVEL with occasional cobbles 0 × 0 × N = 13 (2, 3, 2, 4, 2, 5) AA141323 В 6.00 6 AA141324 7.00 (2 2 3 4 5 5) 00 ^0.Q 71.66 8.00 N = 50/75 mm (15, 25, 50) AA141325 В 8 00 8 Very stiff grey sandy gravelly CLAY with occasional 0 cobbles 71.16 8.50 N = 50/75 mm (25, 50) Obstruction End of Borehole at 8.50 m 9 HARD STRATA BORING/CHISELLING WATER STRIKE DETAILS Water Casing Sealed Time Time From (m) To (m) Comments Comments Depth (h) At То (min) 4.1 4.4 1.5 No water strike 8.5 2 8.3 **GROUNDWATER PROGRESS** Depth to Water Hole Casing **INSTALLATION DETAILS** Comments Date Depth Depth Date Tip Depth RZ Top RZ Base Type REMARKS 1hr Erecting Covid 19 Safe Working Area. CAT scanned Sample Legend

IGSL. GPJ 23072. Log BH IGSL

16/4/21

GDT

location and hand dug inspection pit carried out.

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Samp

al Sample (Jar + Vial + Tub)

UT - Undisturbed 100 Sample P - Undisturbed Pisto W - Water Sample



Appendix 3

Offally Country Council, Planning Dept., Inspection Purposes Only PL2 / 22 / 490 21 / 09 / 2022



REPORT NUMBER

23072

	ত্য	<u> </u>																
СО	NTR	ACT	0	xige	n Site	at Derry	arkin	, Co.Offal	у				DRIL SHE	LHOLE FT	NO	RC()1 et 1 of :	2
	-ORE				736,	485.73 851.16	N		RIG TYI	DE		Casagrar	DATI	E DRILL		08/0	2/2021	
	OUN	D LE				80	.30			ATION (deg)		-90	DAII	E LOGG	ED	09/0	2/2021	
	GINE	ER		xige ehily		ey & Cor	npany	,		DIAMETER (mn	n)	78	DRIL	LED BY	<u>'</u>	IG	SL	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(wm) was been been with the control of the control	0	Fracture Spacing Log (mm)	F S puedend		Desc	Depth (m)	Elevation	Standpipe Details	SPT (N Value)			
1	1.50	0	0	0						SYMMETRIX by driller as r	CDRILLING eturns of Cl	; No recov _AY	very, obser	ved	3/			N = 5
2	3.00	0	0	0								Insi	Secr		3.00			(1, 0, 1, 2, 1, 1)
4	4.50	0	0	0						SYMMETRIX by driller as r	DRILLING eturns of cla	; No recov ayey GRA	very, obser VEL	ved	3.00			N = 7 (2, 1, 2, 1, 1, 3)
5	6.00	0	0	0						INO.								N = 20 (3, 3, 2, 5, 7, 6)
7	7.50	0	0	0		JU		11										N = 27 (3, 5, 7, 7, 5, 8)
8	9.00	0	0	0													0 0 0	N = 37/60 mm (3, 37, 37)
	MAR	0	0	0											10/07			N = 39 (7, 5, 8, 11, 7, 13)
Roc	k and s	oil des	criptio	ns are	based o	n examinat	tion of c	Irilling returns	s. These	Water		Sealed	Rise	Time	Τ.			DE I AILO
frag poss cond	ments sible. S dition/s	of 2 to imilarly tructure	3 mm a /, it is r e.	are rec not pos	covered. ssible to a	Accurate d accurately	escripti assess	ons are not, t soil stratifica	therefore,	Strike	Depth	At	Го	To (min) Comments No water strike recor				
HOIG	e caseo	ı U.U-12	∠.um. (Jovia 1	is safe 2	Zone erecti	ori - 1hi											
13.10	.	A	ON: =							5 .	Hole	Casing	Depth to	2 2			VATER	DETAILS
	TAL Date				ILS RZ To	p RZ E	Base	Тур	oe	Date	Depth	Depth	Water	Com	ment	S		
	-02-2		12.0		1.80			50mn									~	Comhairle Chontae Ulbh Fhailli Offaly County Council PLANNING

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СС	NTR	ACT	C	xige	n Site a	t Derry	/arkin	, Co.Offa	ly			DRILLHOLE NO			01			
	-ORE		TES	(mOl	736,8	185.73 351.16	E N 0.30		RIG TYF	PΕ		Casagran	DATE	DRILL		08/0	et 2 of 2/2021 2/2021	
CL	IENT GINE		С	xige				/		ATION (deg) NAMETER (mn	1)	-90 78	DRILL	ED BY	,	IG	iSL	4
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(um) xeW Fracture Spacing	0	Fracture Spacing Log (mm)	Puegend			cription			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 10	10.50									SYMMETRIX by driller as r	DRILLING eturns of cla	; No recov ayey GRA'	very, observ VEL <i>(contin</i>	ed <i>ued)</i>				N 45
11	12.00	0	0	0									e Cil	50	12.00			N = 45 (4, 7, 9, 12, 12, 12)
12	12.00									End of E	Borehole at	12.00 m			12.00	68.30	_ □	
-												10,						
- 13 -											~.							
14										06	9							
										60 De								
15																		
									9									
16								X										
17																		irle Chontae Uibh Fhaill Dunly Council NNING
F "																F	-	22 / 490 9 / 2022
18					U													
			S															
19		O,	J.															
GDT 16/4/21																		
RE Roc	MAR k and s	soil des	scriptio	ns are	based on	examina	tion of o	drilling return	s. These	Water	0	Sealed	Rise	Time		TER ST		DETAILS
frag	ments	of 2 to similarly	3 mm : y, it is r	are rec	covered. A	ccurate o	descript	a loss of fine ions are not, soil stratifica	s. Typical therefore, ation or rock	Strike	Depth	At	То	(min)	+			e recorded
23072				Covid 1	19 Safe Z	one erect	ion - 1h	r										
로											Hole	Cacina	Dantis to		GRO	OUNDV	VATEF	DETAILS
E INS			ON D			י בח	Desi	т.	100	Date	Depth	Casing Depth	Depth to Water		ment		Card C	
1GSL RC OPEN HOLE 23072.	Date Tip Depth RZ Top RZ Base Type 09-02-21 12.00 1.80 12.00 50mm SP						09-02-21	12.00	12.00	11.50	Water drilling		corded 5	mins aft	er end of			



REPORT NUMBER

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/।वश्रा															
CONTRACT	Oxi	gen Site	at Derry	arkin, Co.	Offaly	/ 				DRIL	LHOLE	NO	RC0)2 et 1 of 2	2
CO-ORDINA GROUND LE		736	3,543.11 5,850.60 79			RIG TYP	E		Casagrar	DATE	DRILLE		09/02	2/2021 2/2021	
CLIENT ENGINEER	Oxiç Feh	_	ney & Cor	mpany			TION (deg) AMETER (mn		-90 78	DRIL	LED BY		IG	SL	•
Downhole Depth (m) Core Run Depth (m) T.C.R.%	S.C.R.%	R.Q.D.% Fracture Zones (m)	(mm) xev bracture Spacing	Fract Spac Log (mr	eing g n) ₅₀₀			Description							SPT (N Value)
0 0	0	0					SYMMETRIX by driller as re	DRILLING eturns of CL	, No recov ₋ AY	very, observ	70	1.50			
1.50	0	0					SYMMETRIX by driller as re	DRILLING eturns of gra	No recovavelly CLA	very, observ	/ed	3.00	78.27		N = 7 (1, 2, 1, 1, 2, 3)
0	0	0					SYMMETRIX by driller as re	DRILLING eturns of cla	; No recov ayey GRA	very, observ VEL		0.00	76.77		N = 26 (3, 5, 5, 7, 9, 5)
4.50	0	0)\3								,		N = 34 (2, 4, 7, 7, 9, 11)
0	0	0	JI	il '									,		N = 23 (4, 4, 4, 7, 7, 5)
7.50	0	0											,		N = 44 (9, 11, 9, 8, 12, 15)
0 REMARKS	0	0										WAT	ı	RIKE	N = 46 (7, 8, 11, 11, 11, 13)
Rock and soil de samples can be le fragments of 2 to possible. Similarle condition/structure Hole cased 0.0-1	neavily dis 3 mm are y, it is not re.	turbed and recovered possible to	fragmented Accurate d accurately	I, with a loss of lescriptions ar assess soil st	of fines. re not, th	Typical nerefore,	Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Со	mment	s	recorded
INSTALLATI	ON DET	ΓAILS					Date	Hole Depth	Casing Depth	Depth to Water	Com	GR0 ments		/ATER	DETAILS
Date 10-02-21	Tip Dep 12.00	th RZ T	op RZ E 0 12		Typ 50mm			2000						Q	Comhairle Chontae Ulbh Fhaili Offsly County Council PLANNING

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23072

CONTRACT Oxigen Site at Derryarkin, Co.Offaly										ıly				DRILLHOLE NO SHEET						
ŀ	CO.	ORI	DINA.	TES		648 5	43.11	F		Τ							et 2 of			
					m∩l	736,8	50.60	N		R	IG TYPI	E		Casagran		E DRILL E LOGG			2/2021 2/2021	
ı		ENT		VEL (xiger		78).77		IN	ICLINA	TION (deg)		-90						
		GINE			-	Timone	& Cor	npany	/	н	OLE DI	AMETER (mr	n)	78	DRIL	LED B	<u> </u>	IG	iSL	•
	Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(mm) xev e sind control (mm) x	0	Fracture Spacing Log (mm)	500	Legend			scription			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
	10	10.50									0-0-0-	SYMMETRIX by driller as r	CDRILLING eturns of c	G; No recov	ery, obser	ved nued)				
	11	10.50 12.00	0	0	0										وكنا		12.00			N = 45 (5, 8, 11, 10, 11, 13)
	12												Borehole a	(2)				67.77		N = 47 (9, 8, 11, 12, 9, 15)
	14											70 De	36,							
	15								01	S										
	16								X											
	17												P	Combains Chanter Montes Montes PLANNING PL2 / 22 / 21 / 09 / 20	490					
	18); ``	3									217 077 20	22					
10,4,61	19	C																		
5		WAR and s		cription	is are	based on	examina	tion of a	drilling return	ns. Th	hese	Water	Casing	Sealed	Rise	Time				DETAILS
23072.GFJ 1GS	samp fragn poss cond	oles ca nents (ible. S lition/s	an be h of 2 to similarly tructur	eavily of 3 mm a y, it is no e.	disturb are rec ot pos	ed and fra overed. A	gmented curate d curately	d, with a lescripti assess	a loss of fine ions are not, soil stratifica	s. Ty	pical efore,	Strike	Depth	At	To	(min)		mmen o wate		e recorded
																	GRO	DUNDV	VATER	RDETAILS
	INS	TAL	LATI	ON DI	ETAI	LS						Date	Hole Depth	Casing Depth	Depth to Water	Con	nment	S		
25		Date -02-2		Γip De 12.00		RZ Top 1.00		Base .00	Ty 50mi	rpe m S	SP SP	10-02-21	12.00	12.00	10.80	Water		corded 5	mins aft	er end of
2													1							



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7		<u> </u>																
СО	NTR	ACT	С	xige	n Site	at Derry	/arkin	, Co.Offaly					DRIL SHE	.LHOLE ET	NO	RC She	03 et 1 of	2
	-ORE		TES	(mO	736,	493.94 788.74 80			RIG TYPE	E		Casagran	.	E DRILL E LOGG			2/2021 2/2021	
	IENT GINE	ER		xige ehily		ey & Co	mpan			ΓΙΟΝ (deg) AMETER (mm	n)	-90 78	DRIL	LED BY	′	IC	SL	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(ww) xew Spacing Spacing	0	Fracture Spacing Log (mm)			Des	cription			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 0	1.50	0	0	0						SYMMETRIX by driller as re				ved	1.50			
2	3.00	0	0	0					0.0.0.0.0	SYMMETRIX by driller as re	DRILLING eturns of g	G; No recov ravelly cob	ery, obser oly SAND	ved	3.00	78.51		N = 53/225 mm (5, 12, 14, 14, 25)
- 3	4.50	0	0	0						SYMMETRIX by driller as re	DRILLING eturns of s	a; No recov andy GRA\	ery, obser /EL	ved	5.00	77.01		N = 40 (4, 7, 9, 9, 12, 10)
5	6.00	0	0	0				018							6.00			N = 41 (3, 7, 9, 10, 11, 11)
- 6 - - - - - - 7	7.50	0	0	0		NU,	Ö	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		SYMMETRIX by driller as re				ved		74.01		N = 35 (5, 6, 7, 7, 9, 12)
8	9.00	0	0	0	C	J					PL2 /	halric Chontae Ubh Phalli ly Courty Council ANNING 22 / 490 09 / 2022						N = 32/41 mm (3, 32)
9	C	0	0	0											\\\\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	TED 6		N = 62/210 mm (10, 5, 12, 21, 29)
_	MAR k and s		scrintin	ns are	based o	n examina	tion of	drilling returns.	These	Water	Casing	Sealed	Rise	Time				DETAILS
sam fragr poss cond	ples ca ments o sible. S dition/s	an be I of 2 to similar tructui	neavily 3 mm : ly, it is r re.	disturb are rec not pos	ped and for covered. A ssible to a	ragmented Accurate d	d, with a lescript assess	a loss of fines. ions are not, the soil stratification	Typical erefore,	Strike 9.50	Depth 9.50	At N/S	To	(min)		Slow		
INS											11515	0			GRO	OUND	VATEF	RDETAILS
			ON D							Date	Hole Depth	Casing Depth	Depth to Water	Com	nment	S		
_	Date -02-2		Tip D 12.0		2.00	p RZ 1 12	3ase .00	Typ 50mm										



REPORT NUMBER

СО	NTR	ACT	INATES 648,493.94 E											LHOLE ET	NO	RC(03 et 2 of	2
			TES VEL	(mOl	736,	788.74	E N).01	ı	RIG TYP	E		Casagran		E DRILL E LOGG			2/202 ⁻ 2/202 ⁻	
	ENT GINE	ER		xigei ehily		y & Con	npany			TION (deg) IAMETER (mm	1)	-90 78	DRIL	LED BY	′	IG	SL	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(mm) say by Spacing Spacing	S 0	racture Spacing Log (mm)	,			cription			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
- 10 -	10.50								0-0	SYMMETRIX by driller as re	DRILLING eturns of c	a; No recov layey GRA	ery, obser VEL <i>(conti</i>	rved Inued)	2/		0 0	
- 11	10.00	0	0	0									ci ⁱ	on on	12.00			N = 58 (10, 11, 12, 15, 17, 14)
12	12.00										Borehole at	105			12.00	68.01		N = 53/187 mm (8, 12, 11, 15 27)
- 14	- 13 - 14									000	,Q.T.							
15								6/5					ſ					
- 17						JUC		, 1			PL2 / 2	12 / Apg (1997) (2007) (1997)						
- 18 - 18 - 19		0	S.C.	3														
-	MAR									100	0	0	D:-	T:	WA	TER ST	RIKE	DETAILS
sam frag pos con	k and soil descriptions are based on examination of drilling return ples can be heavily disturbed and fragmented, with a loss of fine ments of 2 to 3 mm are recovered. Accurate descriptions are not sible. Similarly, it is not possible to accurately assess soil stratific dition/structure.								ypical erefore,	Water Strike 9.50	Casing Depth 9.50	Sealed At N/S	Rise To	Time (min)	Co	Slow	ts	
								_	_						GR	OUND	VATE	R DETAILS
	Date		ΟΝ D Γίρ Do	epth		p RZ E		Type 50mm		Date 11-02-21	Hole Depth 12.00	Casing Depth	Depth to Water				mins aft	er end of
'	UL-2	- '	12.0	,,,	2.00	12.	.50	JUILLI	J1									



REPORT NUMBER

23072

DRILLHOLE NO RC04 CONTRACT Oxigen Site at Derryarkin, Co.Offaly SHEET Sheet 1 of 2 **CO-ORDINATES** 648,525.52 E **DATE DRILLED** 11/02/2021 736,728.88 N **RIG TYPE** Casagrande **DATE LOGGED** 12/02/2021 **GROUND LEVEL (mOD)** 79.80 **INCLINATION** (deg) -90 CLIENT Oxigen **DRILLED BY IGSL ENGINEER** Fehily Timoney & Company **HOLE DIAMETER (mm)** 78 (E (H Fracture Zones (m) Standpipe Details Downhole Depth Fracture Spacing Run Depth T.C.R.% R.Q.D.% S.C.R.% Fracture SPT (N Value) Spacing Description Log Depth (m) Elevation (mm) Legend Min Core Avg Max 250 500 (mm) 0 SYMMETRIX DRILLING; No recovery, observed 0. -00 by driller as returns of sandy GRAVEL 00 0 0 0 000 1.50 1.50 N = 15(1, 2, 3, 3, 2, 7) 0 SYMMETRIX DRILLING; No recovery, observed 78.30 by driller as returns of gravelly SAND 2 0 0 0 0 0 3.00 76.80 3 000 SYMMETRIX DRILLING; No recovery, observed N = 18 (3, 4, 3, 4, 6, 5) by driller as returns of sandy GRAVEL 00 0 0 0 000 4.50 4 50 N = 37 (2, 5, 7, 9, 9, 12) SYMMETRIX DRILLING; No recovery, observed 75.30 by driller as returns of CLAY 5 0 0 0 6 N = 37 (5, 7, 7, 9, 9, 12) 0 0 0 N = 33 (4, 4, 7, 9, 9, 8) 8 0 0 0 9 00 9 N = 49 (2, 7, 11, 11, 12, 15) 16/4/21 0 0 0 GDT REMARKS WATER STRIKE DETAILS Water Casing Sealed Rise Time Rock and soil descriptions are based on examination of drilling returns. These Comments samples can be heavily disturbed and fragmented, with a loss of fines. Typical fragments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, possible. Similarly, it is not possible to accurately assess soil stratification or rock Strike Depth At То (min) 23072.GPJ possible. Similarly, condition/structure No water strike recorded Hole cased 0.0-12.0m. Covid 19 Safe Zone erection - 1hr RC OPEN HOLE **GROUNDWATER DETAILS** Hole Casing Depth to Water **INSTALLATION DETAILS** Date Comments Depth Depth Date Tip Depth RZ Top RZ Base Туре 12-02-21 12.00 2.00 12.00 50mm SP PLANNING IGSL

PL2 / 22 / 490 21 / 09 / 2022



REPORT NUMBER

СО	Oxigon one at Benyamin, co.onary								LLHOL	E NO	RC								
CO	-ORI	DINA	TES		648	525.52	F							SHE				et 2 of	
			VEL	(mOl	736,	728.88	N 9.80		R	IG TYPE			Casagra		E DRIL E LOG			2/2021 2/2021	
	IENT			xige					IN	ICLINAT	ION (deg)		-90	DD!			10	NOI	
EN	GINE	ER	F	ehily	Timone	ey & Co	mpan	у	Н	OLE DIA	AMETER (mn	n)	78	DRII	LLED E	5 Y	10	iSL 	
Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Zones (m)	(wm) say Fracture Spacing	0	Fracture Spacing Log (mm)	500	Legend			cription			Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50)									SYMMETRIX by driller as r	CDRILLING eturns of C	a; No reco LAY <i>(cont</i>	very, obse tinued)	rved	b'			
- 11		0	0	0										a Cil	Or			0 0	N = 34 (3, 5, 5, 8, 10, 11)
12	12.00)			-						End of E	Borehole at	12.00 m	5		12.00	67.80		N = 44 (7, 8, 9, 11, 14, 10)
13 - 14 - 15 - 16 - 17	MAR	KS						Q\'				PL2	mahairis Chimisa Likhi Phaili My Channy Chand ANNING 1 22 / 490 09 / 2022	0		WA	TER ST	FRIKE	DETAILS
Roc	k and s	soil des an be l	neavily	disturb	ed and fi	ragmente	d, with a	drilling return	s. Ty	pical	Water Strike	Casing Depth	Sealed At	Rise To	Tim (mir	e Co	mmen		
frag poss cond	pments of 2 to 3 mm are recovered. Accurate descriptions are not, therefore, sisble. Similarly, it is not possible to accurately assess soil stratification or rock idition/structure. le cased 0.0-12.0m. Covid 19 Safe Zone erection - 1hr								ther	efore,	Juine	Берит	Л	10	(11111	N			e recorded
INIC	TAI	I ATI	ON D	FTA	II Q						Date	Hole	Casing	Depth t Water	0 0	mment		WAIEF	DETAILS
12	STALLATION DETAILS Date Tip Depth RZ Top RZ Base Type 2-02-21 12.00 2.00 12.00 50mm SI									P	12-02-21	12.00	12.00	7.30		er level re		i mins aft	er end of
ś																			

Appendix 4

Ottaty Council, Planning Dept., Inspection Purposes Only Ottaty Council, Planning Dept., Inspection Purposes Only PL2 / 22 / 490 21 / 09 / 2022

			Groundwa	ter Monitori	ng	S					
Site Location		Oxigen Site at Derryark	in, County Offaly		, di	0					
Project No.		23072					IGSL				
Client		Oxigen					Ltd.				
Engineer		Fehily Timoney & Comp	oany Consultants								
	Elevation			Date of	of Reading						
	(m OD)	13/04	4/2021		0						
		m bgl	m OD	m bgl	m OD	m bgl	m OD				
RC01	80.295	3.09	77.205								
RC02	79.772	2.72	77.052								
RC03	80.009	3.00	77.009	<u> </u>							
RC04	79.797	3.00	76.797	<u> </u>							
				O							
				<u> </u>							
NOTES											
		S	cil, Pla		2 P. b	<u></u>					
PL2/22/490 21/09/2022											

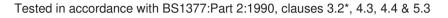
Appendix 5

Offah County Council, Planning Dept. Inspection Purposes Only Comhairle Chontae Ulb Offsily County Council PLANNING PL2 / 22 / 490 21 / 09 / 2022

IGSL Ltd Materials Laboratory Unit J5, M7 Business Park Newhall, Naas Co. Kildare 045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits





Report No. R119171 Contract No. 23070 Contract Name: Oxigen Development Sites - Site 3 Derryarkin

Customer Oxigen / Fehily Timoney & Company Consulting

Samples Received: 01/02/21 Date Tested: 11/02/21

											7		
BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample		Liquid	Plastic	Plasticity		Preparation	Liquid Limit	Classification (BS5930)	Description
				Type	Content %	Limit %	Limit %	Index	<425μm		Clause	(500000)	
BH03	AA141314	5.0	A21/0748	В	5.8	17	NP	NP	36	WS	4.4		Brown silty, sandy, GRAVEL with some cobbles
BH06	AA141325	8.0	A21/0753	В	8.5	19	NP	NP	68	WS	4.4		Brown slightly sandy, gravelly, SILT
								×					
								0					
								-01					
										1			
						7/0							
						$\langle \cdot \rangle$							
	1				• \	<u> </u>							
			1			1							

Notes: Preparation: WS - Wet sieved Sample Type: B - Bulk Disturbed Remarks:

AR - As received U - Undisturbed Results apply to the sample as received.

NP - Non plastic NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014

Liquid Limit 4.3 Cone Penetrometer definitive method Opinions and interpretations are outside the scope of accreditation.

Clause: 4.4 Cone Penetrometer one point method The results relate to the specimens tested. Any remaining material will be retained for one month.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports

H Byrne (Laboratory Manager)

 Approved by
 Date
 Page

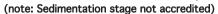
 01/03/21
 1 of 1



R119171.Pl.xls Tmp: Pl.II Rev 02/10

Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5



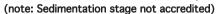


Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%		Contract No.	23070	Report No	. R119340		5	
size	passing		Contract Nam	ne: Oxigen Devel	opment Sit	e - Site 3 Derryarkir	97.		
75	100	COBBLES	BH/TP:	TP01			00		
63	100	CODDLLO	Sample No.	AA142158	Lab. Samp	ole No.	A21/0740		
50	96		Sample Type:	В		. (
37.5	91		Depth (m)	2.20	Customer	: Oxigen / Fehily	Timoney & Com	npany Consulting	
28	85		Date Received			ing started	11/02/2021		
20	74		Description:	Brown slightly	y clayey/sil	lty, very sandy, GRA	VEL		
14	64	GRAVEL				1021			
10	57	0101122	Remarks	Note: Clause 9.2 and Clause 9.5 c	of BS1377:Part 2:1990 have	been superseded by ISO17892-4:2016 . Results a	pply to sample as received.		
6.3	47				*	63	0.3 1.425 0.6 1.18	3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	τ.
5	42		100 -		-0/	0.063	0.3 0.425 0.6 1.18	2 3.3 3.3.3 20 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	37. 50. 53. 53.
3.35	38				70				
2	33		90						
1.18	28		80					 	
0.6	18		© 70 					 	
0.425	12	SAND	Dercentage passing (%) 00 00 00 00 00 00 00 00 00						
0.3	6		50						
0.15	3		t dg + 0 + 1 dg						
0.063	3		92 30 						
			20						
		SILT/CLAY	10						
			0				-		'
<u> </u>			0.0001	0.001	0.01	0.1	1	10	100
Combatile Contact Mail Flags (Total Contact Mail Flags (Total Contact Mail Flags (Total Contact Mail Contact		4	JII	CLAY	SILT	Sieve size (mm)	SAND	<i>GRAVEL</i>	
G COURT FRANK		ICCI I	al Makadiala Labaret			Approved by:		Date:	Page no:
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Determination of Particle Size Distribution

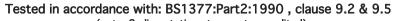


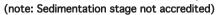




partio	cle %			Contract No.	23070	Report No	o. R119341		3	
size	<u> </u>		1	Contract Name:	Oxigen Devel	lopment Sit	e - Site 3 Derryark	in (Y		
75		COBBLES		BH/TP:	TP02			00		
63				Sample No.	AA142154	Lab. Sam	ple No.	A21/0741		
50				Sample Type:	В		* .	O_{I}		
37.5				Depth (m)	3.00	Customer		y Timoney & Con	npany Consulting	
28				Date Received			ting started	11/02/2021		
20				Description:	Grey slightly	clayey/silt	y, very sandy, GRA	VEL with some co	obbles	
14		GRAVEL					102,			
10				Remarks	Note: Clause 9.2 and Clause 9.5	of B\$1377:Part 2:1990 have	e been superseded by ISO17892-4:2016 . Result	s apply to sample as received.		
6.3						×	0.15	3 25 5 5 18	2 3.35 6.3 10 20	75
5	35		100 -				0.063	0.3 0.425 0.6 1.18	2 3.3	28 37. 50. 53.
3.3						40,				
2	25		90 -							
1.18			୍ଦିତ ଚ		1(9)					
0.6			<u>\$</u> 70 -							
0.42		SAND	Percentage passing (%) - 00 - 00 - 00 - 00 - 00 - 00 - 00 -							
0.3			<u>g</u> 20 -							
0.15			- 04 tag							<u> </u>
0.06	53 1		2 30 -							
			20 -							
		SILT/CLAY	10 -							
			0 -		.04					
P 🔊			0.0	0.0	1001	0.01	0.1	1	10	100
Combatine Counted Water Frankling PLANNING PL2 / 22 / 490					CLAY	SILT	Sieve size (mm)	SAND	GRAVEL	
ntae Ukhi Fha	•	ICCI I	d Mataria	la Labaratar			Approved by:		Date:	Page no:
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Determination of Particle Size Distribution







portiolo	%	I	Contract No.	23070 Report No	o. R119277	15		·
particle				•		:00		
size 75	passing 100		Contract Name:	Oxigen Development Sit	te - Site 3 Derryarkin			
		COBBLES	BH/TP:	TP03	1	101/07/0		
63	100		Sample No.	AA142161 Lab. Sam	ple No.	A21/0742		
50	100		Sample Type:	В				
37.5	97		Depth (m)	1.80 Customer		Timoney & Company	Consulting	
28	90		Date Received	01/02/2021 Date Tes		11/02/2021		
20	83		Description:	Brown slightly clayey/s	ilty, very gravelly, SA	IND		
14	79	GRAVEL			102,			
10	74		Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have	ve been superseded by ISO17892-4:2016 . Results a	oply to sample as received.		
6.3	69			*	63	0.3 1.425 0.6 1.18 2	5.3 10 14 20 28 37.5	
5	67		100		0.063	0.425 0.6 0.6 1.18 2 3.35	5 6.3 10 14 20 28 37.	508
3.35	67		100					
2	63		90					
1.18	56		80 + + + + + + + + + + + + + + + + + + +					
0.6	36		70					
0.425	21	SAND	is 60					
0.3	9		sed 50					
0.15	4		40 tage 40					
0.063	4		ent 40					
			Dercentage bassing (%) 70					
			20					
		CILT/CLAV	10					
		SILT/CLAY	0					
			0.0001 0.0	0.01	0.1	1	10	100
3			(1)					
Combainte Ch Offsty County				CLAY SILT	Sieve size (mm)	SAND	GRAVEL	
2 40					A so so so al levis	Data	Dan	

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IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
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Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990, clause 9.2 & 9.5

(note: Sedimentation stage not accredited)



Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%			Contract No.	23070	Report No.			5	
size	passing		1	Contract Name:	Oxigen Dev	elopment Site	- Site 3 Derryark	dn (
75	100	COBBLES		BH/TP:	TP04			00		
63	100			Sample No.	AA142169	Lab. Sampl	e No.	A21/0743		
50	94			Sample Type:	В		•	0//		
37.5	85			Depth (m)	1.80	Customer:	Oxigen / Fehi	ly Timoney & Con	npany Consulting	
28	80			Date Received		21 Date Testir	_	11/02/2021		
20	68			Description:	Brown sligh	ntly clayey/silt	y, very sandy, GR	RAVEL		
14	55	GRAVEL					1721			
10	49	GIVAVEL		Remarks	Note: Clause 9.2 and Clause	9.5 of B\$1377:Part 2:1990 have be	een superseded by ISO17892-4:2016 . Resu	ults apply to sample as received.		
6.3	40					<u>.</u>	5 53	8 27.0	ις. 	75
5	37		400			0,	0.063	0.3 0.425 0.6 1.18	2 3.35 5.3 6.3 10 14	28 37.5 50 63
3.35	30		100			401				
2	24		90							##/###
1.18	19		80							
0.6	11		<u>%</u> 70						 	
0.425	7	SAND	is 60							
0.3	4		bas 50		⊘					
0.15	3		tage 40							
0.063	3		Sent							
			Percentage passing (%) 00 00 00 00 00 00 00 00 00 00 00 00 00							
			20							
		SILT/CLAY	10	+011111111						
! »		OIL 17 OL7 (1	0							
Comaha Offsy C			0.0	0.0	01	0.01	0.1	1	10	100
Combains Chantas Liu.			10,		CLAV	CILT	Ciova sina (m)	CAND	CDANEL	
Combants Channel Libes Facility Charles Channel Libes Facility Charles					CLAY	S/LT :	Sieve size (mm)	SAND	GRAVEL	
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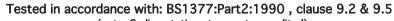
Determination of Particle Size Distribution

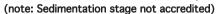




particle	%		Contract No.	23070	Report No.	R119278		5				
size	passing		Contract Nam	ne: Oxigen Deve	lopment Site	- Site 3 Derryark	in 🔇					
75	100	COBBLES	BH/TP:	TP05								
63	100	CODDLLS	Sample No.	AA142165	Lab. Sample	e No.	A21/0744					
50	95		Sample Type:	В		•						
37.5	95		Depth (m)	2.00	Customer:	Oxigen / Fehil	y Timoney & Con	npany Consulting				
28	92		Date Received	d 01/02/2021	Date Testin	g started	11/02/2021					
20	80		Description:	Brown slightl	ly clayey/silty	y, very sandy, GR	AVEL					
14	68	GRAVEL				1,00						
10	58	GIVAVEL	Remarks	Note: Clause 9.2 and Clause 9.5	of BS1377:Part 2:1990 have been	en superseded by ISO17892-4:2016 . Result	s apply to sample as received.					
6.3	46				•	5 53	8 22	Ω.	τύ			
5	41		100		-O _j .	0.063	0.3 0.425 0.6 1.18	2 3.35 6.3 10 20 20	37.5 37.5 53 53			
3.35	34		100		401							
2	26		90									
1.18	20		80									
0.6	11		70					 				
0.425	7	SAND	ig 60 +									
0.3	5		50									
0.15	3		08 bercentage passing (%) 09 00 00 00 00 00 00 00 00 00 00 00 00									
0.063	3		30									
			Per 20									
			20									
		SILT/CLAY	10									
			0					<u> </u>				
			0.0001	0.001	0.01	0.1	1	10	100			
				CLAY	SILT S	Sieve size (mm)	SAND	GRA VEL				
		100:				Approved by:		Date:	Page no:			
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	Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)											

Determination of Particle Size Distribution



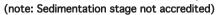




ра	article	%			Contract No.	23070	Report No	0.	R119279		0	
:	size	passing			Contract Name:	Oxigen Devel	opment Sit	te - :	Site 3 Derryark	in		
	75	100	COBBLES		BH/TP:	BH01				On.		
	63	91	CODDLES		Sample No.	AA139285	Lab. Sam	ple 1	No.	A21/0745		
	50	66			Sample Type:	В						
3	37.5	38			Depth (m)	2.00	Customer	r:	Oxigen / Fehil	y Timoney & Cor	npany Consulting	
	28	25			Date Received	01/02/2021	Date Tes	ting	started	11/02/2021		
	20	9			Description:	Brown slightly	y sandy, G	RAV	EL with some o	obbles		
	14	5	GRAVEL						201			
	10	3	GRAVEL		Remarks	Note: Clause 9.2 and Clause 9.5 c	of B\$1377:Part 2:1990 hav	ve been sup	perseded by ISO17892-4:2016 . Resul	ts apply to sample as received.		
	6.3	2							5 33	8 8	Ω	2
	5	1						•	0.063	0.3 0.425 0.6 1.18	2 3.35 5.3 6.3 10 14	28 37. 50 53 53
3	3.35	1		100 -			AOT					
	2	1		90 -								++++
1	1.18	1		80 -								
	0.6	0		<u>%</u> 70 -								
0.	.425	0	SAND	sing 60 -								
	0.3	0		50 -								
C	0.15	0		ll g								
0.	.063	0		en ta - 04								
				<u>5</u> 30 -								
				20 -								4 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +
			SILT/CLAY	10 -								
			SIL I / CLA I	0 -								
	.			0.0	0.00)1	0.01		0.1	1	10	100
Complete Control Unit Paul PLANNING PL2 / 22 / 490 21 / 09 / 2022				MUr,	C	CLAY	SILT	Sie	eve size (mm)	SAND	GRAVEL	
Comhairte Choestas U Offsty County County PLANNING PLANNING 1 22 / 2 / 22 /			ICCI		da Labanat				Approved by:		Date:	Page no:
/ 49			IGSL Lt	a Materia	als Laboratory				A Byene		01/03/21	1 of 1
0							Persons :	autho	orised to approve	report: J Barrett (Duality Manager) H Byrne (Laboratory Manager)

Determination of Particle Size Distribution



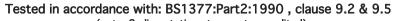


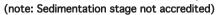


Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%			Contract No.	23070	Report No		R119280		0	
size	passing		1	Contract Name:	Oxigen Devel	lopment Sit	te - :	Site 3 Derryark	in		
75	100	COBBLES		BH/TP:	BH01				00		
63	83			Sample No.	AA139289	Lab. Sam	ple 1	No.	A21/0746		
50	69			Sample Type:	В			*.	$O_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_{I_$		
37.5	40			Depth (m)	6.00	Customer	:	Oxigen / Fehily	y Timoney & Cor	npany Consulting	
28	19			Date Received	01/02/2021		_		11/02/2021		
20	10			Description:	Grey slightly	sandy, GRA	AVEL	L with some col	obles		
14	7	GRAVEL						12,			
10	6	GIVAVEL		Remarks	Note: Clause 9.2 and Clause 9.5	of BS1377:Part 2:1990 hav	e been sup	perseded by ISO17892-4:2016 . Result	s apply to sample as received.	Sample size did not meet the requirements of BS137	77
6.3	5							5 5	8 27.2	ιΩ	rċ
5	4					0	•	0.063	0.3 0.425 0.6 1.18	2 3.3.3 6.3 10 14 20	28 37. 50 53
3.35	3		100			ACT					
2	2		90								
1.18	2		_ 80								
0.6	1		%) bassing (%) 60 50								
0.425	1	SAND	sing 60								
0.3	0		bag 50								
0.15	0		age 40								
0.063	0		04 enta								
			Percentage 30								
			20								
		SILT/CLAY	10								
		SIL1/CLA1	0								
			0.0	0.00)1	0.01		0.1	1	10	100
3 >			My,	(CLAY	SILT	Sie	eve size (mm)	SAND	GRAVEL	
Comhadris Chowtas UII								Approved by:		Date:	Page no:
ontae UBh F		IGSL Lt	d Materia	als Laboratory				A Regene	_	01/03/21	1 of 1
om										Quality Manager) H Byrne	

Determination of Particle Size Distribution







Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%			Contract No.	23070	Report No	0.	R119343		0	
size	passing		-	Contract Name:	Oxigen Deve	lopment Si	te - :	Site 3 Derryark	in (
75	100	COBBLES		BH/TP:	BH03				00,		
63	74	COBBLES		Sample No.	AA143132	Lab. Sam	ple 1	No.	A21/0747		
50	64			Sample Type:	В						
37.5	52			Depth (m)	3.00	Custome	r:	Oxigen / Fehil	y Timoney & Cor	npany Consulting	
28	44			Date Received	01/02/2021	1 Date Tes	ting	started	11/02/2021		
20	38			Description:	Brown slightl	ly clayey/s	ilty,	sandy, GRAVEL	with many cobb	oles	
14	33	GRAVEL						5			
10	30	GRAVEL		Remarks	Note: Clause 9.2 and Clause 9.5	of BS1377:Part 2:1990 hav	ve been sup	perseded by ISO17892-4:2016 . Resul	ts apply to sample as received.	Sample size did not meet the requirements of BS13	377
6.3	27							5 33	8 8	Ω	72
5	25						*	0.063	0.3 0.425 0.6 1.18	23.3.3.10	28 37. 50. 53.
3.35	22		100								
2	18		90	+ + + + + + + + + + + + + + + + + + + +							
1.18	13		80								-
0.6	6		§ 70								
0.425	3	SAND	Percentage passing (%) 00 00 00 00 00 00 00 00 00 00 00 00 00								
0.3	1		bass 50								
0.15	1		age 40								
0.063	1		04 enta								
			30								
			20	+							
		CILT/CLAY	10								
		SILT/CLAY	0								
			0.0	0.00)1	0.01		0.1	1	10	100
Combate Contest Utah Phatil PLANNING			ILIF,	(CLAY	SILT	Sie	eve size (mm)	SAND	<i>GRAVEL</i>	
Comhairte Chontas Ul Offsty Courty Courty								Approved by:		Date:	Page no:
ontae Ulbh A		IGSL Lt	td Materia	als Laboratory				A Ryane		01/03/21	1 of 1
on and an		- ++-								Quality Manager) H Byrne	

Determination of Particle Size Distribution







Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%			Contract No.	23070	•		R119281		0	
size	passing		Ī	Contract Name:	_	lopment Sit	te - S	Site 3 Derryarki	n		
75	87	COBBLES		BH/TP:	BH03				00		
63	87			Sample No.	AA141314	Lab. Sam	ple N	lo.	A21/0748		
50	83			Sample Type:	В			* . (
37.5	67			Depth (m)	5.00	Customer	r:	Oxigen / Fehily	Timoney & Cor	mpany Consulting	
28	66			Date Received	01/02/202		_		11/02/2021		
20	63			Description:	Brown silty,	sandy, GRA	VEL	with some cob	bles		
14	58	GRAVEL						201			
10	53	GRAVEL		Remarks	Note: Clause 9.2 and Clause 9.5	of B\$1377:Part 2:1990 hav	ve been supe	erseded by ISO17892-4:2016 . Results	apply to sample as received.	Sample size did not meet the requirements of BS1377	,
6.3	45					<u> </u>		ю rv	8 2	72	
5	41						*	0.063	0.3 0.425 0.6 1.18	2 3.3 5.3 6.3 10 10 20	28 37. 50 63
3.35	31		100 -								
2	24		90 -								
1.18	21		80 -								
0.6	16		8 70 -								
0.425	15	SAND	70 - 60 - 50 - 50 - 50 - 50 - 50 - 50 - 5								
0.3	13		oass C								
0.15	12		g 50 -								
0.063	11		Percentage - 04 - 05 - 06 - 06 - 06 - 06 - 06 - 06 - 06								
			<u>5</u> 30 -								
			20 -							1	
			10 -								
		SILT/CLAY	0 -								
			0.0	0.00	01	0.01		0.1	1	10	100
				0.00	· .	0.01		0.1	•		100
S Comb					CLAY	SILT	Sie	ve size (mm)	SAND	<i>GRA VEL</i>	
Comhaiste Chontae UII Olisiy Coursy Course	•	ICSI I +	d Materia	ls Laboratory				Approved by:		Date:	Page no:
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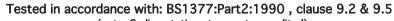
Determination of Particle Size Distribution





particle	%		(Contract No.	23070	Report N	ο.	R11928	31		0	
size	passing		-	Contract Name:	Oxigen Deve	lopment Si	te -	Site 3 De	erryark	in 😯		
75	90	COBBLES		BH/TP:	BH04					00,		
63	90	CODDLES		Sample No.	AA141319	Lab. Sam	iple I	No.		A21/0749		
50	69			Sample Type:	В				•			
37.5	41			Depth (m)	3.00	Custome	r:	Oxigen	/ Fehil	Timoney & Cor	npany Consulting	
28	24			Date Received	01/02/2021					11/02/2021		
20	13			Description:	Grey slightly	sandy, GR	AVEI	L with so	me co	obles		
14	8	GRAVEL						72				
10	5	GRAVLL		Remarks	Note: Clause 9.2 and Clause 9.5	of B\$1377:Part 2:1990 hav	ive been su	perseded by ISO1789	2-4:2016 . Resul	s apply to sample as received.		
6.3	3							33	2	8 22	ις	2
5	3						•	0.063	0.15	0.3 0.425 0.6 1.18	2 3.3.3 10 10 10 20	28 37. 50 53
3.35	2		100 T									
2	2		90 +									
1.18	1		80 +									
0.6	1		8 70 +									
0.425	1	SAND	ing 60 +									
0.3	0		50 +									
0.15	0		ll ge									$\parallel \parallel $
0.063	0		+ 04 enta									
			30 +									
			20 +									4
		SILT/CLAY	10 –									
		SIL 1/CLA1	0 +									
			0.00	0.00	01	0.01		0.	1	1	10	100
3			Mr,	(CLAY	SILT	Sie	eve size (mm)	SAND	GRAVEL	
Comhairte Chontae Ui	1							Approv	ed by:		Date:	Page no:
tae Uibh Fhail		IGSL Lt	d Material	s Laboratory				AB	1 sue		01/03/21	1 of 1
						Porcens	autha				<u> </u> 	Laborator (Mai

Determination of Particle Size Distribution

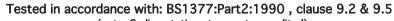


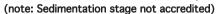
(note: Sedimentation stage not accredited)



particle	%			Contract No.	23070	Report N	0.	R119283		5	
size	passing		=	Contract Name:	Oxigen Deve	lopment Si	te - :	Site 3 Derryarki	n (
75	100	COBBLES		BH/TP:	BH05				00,		
63	81	COBBLES		Sample No.	AA116303	Lab. Sam	ple 1	No.	A21/0750		
50	52			Sample Type:	В			•			
37.5	40			Depth (m)	3.00	Custome	r:	Oxigen / Fehily	Timoney & Con	npany Consulting	
28	30			Date Received	01/02/2021	1 Date Tes	ting	started	11/02/2021		
20	22			Description:	Grey slightly	sandy, GRA	AVEL	L with some col	bles		
14	17	GRAVEL						12/2/			
10	14	GRAVEL		Remarks	Note: Clause 9.2 and Clause 9.5	of B\$1377:Part 2:1990 hav	ve been sup	perseded by IS017892-4:2016 . Results	apply to sample as received.	Sample size did not meet the requirements of BS137	7
6.3	10					<u> </u>		5 5	8 27 2	Ω.	-υ <u>.</u>
5	9						•	0.063	0.3 0.425 0.6 1.18	2 3.3.1 10 10 20	28 37. 50 63
3.35	7		100			ABY					
2	5		90	+ + + + + + + + + + + + + + + + + + + +							
1.18	3		80	+							
0.6	1		<i>∞</i> 70	+							
0.425	1	SAND	sing 60	 							
0.3	0		sed 50								
0.15	0		g								
0.063	0		- enta								
			<u>5</u> 30								/
			20	†							
		SILT/CLAY	10	+07							
		JIL 17 CLAT	0							<u> </u>	
			0.0	0.00)1	0.01		0.1	1	10	100
PL Com			Mr.	(CLAY	SILT	Sie	eve size (mm)	SAND	GRAVEL	
Combaths Chestas U	1	1001						Approved by:		Date:	Page no:
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						Persons	autho	orised to approve r	enort: Rarrett ((Juality Manager) H Byrne	(Laboratory Many

Determination of Particle Size Distribution

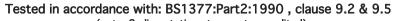


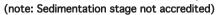




p	article	%				Contract	No.	230	70	F	Report N	No.	R1	1934	4					O									
	size	passing		_		Contract	Name:	Oxiç	gen De	velo	oment S	Site	- Site	3 De	erryar	kin													
	75	100	COBBLES			BH/TP:		BH0)6									2	7.	•									
	63	87	COBBLES			Sample N	No.	AA1	4131	9 I	Lab. Sar	mple	e No.				A21.	/07	51										
	50	87				Sample 7	Гуре:	В																					
	37.5	63				Depth (n	n)	2.00	О	(Custome	er:	Oxi	gen .	/ Feh	ily T	imor	ney	& Co	mpa	ny C	ons	ultin	g					
	28	48				Date Red	ceived	01/	02/20)21 I	Date Te	stir	ıg star	ted			11/	02/	/202	1									
	20	35				Descripti	ion:	Grey	y sand	y, GR	RAVEL w	vith	some	cobl	oles														
	14	30	CD AV/FI											5															
	10	26	GRAVEL			Remarks		Note: Clau	ise 9.2 and Clau	se 9.5 of BS	51377:Part 2:1990	have bee	en superseded b	y ISO17892	-4:2016 . Re	sults apply	y to sample	as receiv	ed.	Samp	ele size did r	not meet t	he requiren	ments of BS	31377				
	6.3	20									<u> </u>	•	ç	2	2		-5.		∞		2					2			
	5	18									\circ	·.		0.00	0.15	0.3	0.425	9.0	<u></u>	2	3.3	5.3	10	4 6	207	37.	53 53	-	
	3.35	16			100 -												Ĭ			\top					П		ПИ	\prod	
	2	13			90 -			-+									₩	+	+	+		+		+	++	\mathbb{H}	₩	\mathbb{H}	
	1.18	10			80 -			-+									$+\!\!+\!\!\!+$		#	+		+		+	++	$+\!\!+\!\!/$	Ш	Н	
	0.6	5		8)	70 -																			4	$\perp \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$	₩!	Ш	Щ	
).425	2	SAND	passing (%)	60 -																						Ш		
	0.3	1		pass	50 -																					/ !	i III		
	0.15	0		lge l																							i		
	0.063	0		Percentage	40 -																			+	/ /			Ħ	
				erce	30 -			-+												+				\neq	+	\mathbb{H}	Ш	Н	
					20 -												-							+	++		Ш	+	
					10 -												\parallel			4				4			Ш	Щ	
			SILT/CLAY		0 -			$oldsymbol{\bot}$											\prod				Ш			Ш	Ш	Щ	
					0.0	001	0.0	01		(0.01			0.	1				1				10)				100	
, D ,					(1)																								
Combattle Chandes (Julia Amilia PLANNING PL2 / 22 / 490 21 / 09 / 2022								CLAY			SILT		Sieve s				SAN	<i>D</i>				GRA	VEL						
PLANNING 2 / 22 / 1 / 09 / 20			ICCI I	-d M	otorio	مام ا مام	orotor	,							ed by					Da	ate:					Page	e no	:	
' 49 (IGSL Lt	.u Ma	ateria	as Labo	oratory						_1	AB	yen						(01/0)3/2	.1			1	of 1	
											Persons	s au	thorised	to a	onrove	ren	ort:	J Ba	rrett	(Oual	itv Ma	anage	er) H	Byrn	ne (1 :	abora	torv	Mana	aner)

Determination of Particle Size Distribution



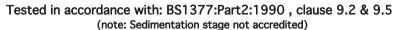




Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

particle	%		Contract No.	23070 Report No	o. R119345	0	
size	passing		Contract Name:	Oxigen Development Sit	e - Site 3 Derryarkin		
75	78	COBBLES	BH/TP:	BH06	ON		
63	67	CODDLLO	Sample No.	AA141323 Lab. Sam	ple No. A21/0752		
50	61		Sample Type:	В	. 01		
37.5	61		Depth (m)	6.00 Customer	: Oxigen / Fehily Timoney & Cor	npany Consulting	
28	58		Date Received	01/02/2021 Date Test			
20	55		Description:	Brown slightly sandy, gr	avelly, SILT/CLAY with many cobbl	es	
14	52	GRAVEL					
10	50	GRAVEL	Remarks	Note: Clause 9.2 and Clause 9.5 of B\$1377:Part 2:1990 have	e been superseded by ISO17892-4:2016 . Results apply to sample as received.	Sample size did not meet the requirements of BS1377	
6.3	48			.	8 7 7 8	ις	72
5	46				0.063 0.15 0.3 0.425 0.6	2 3.3 3.3 6.3 6.3 20	28 37. 50 53
3.35	44		100				
2	41		90 + + + + + + + + + + + + + + + + + + +				
1.18	40		80 + + + + + + + + + + + + + + + + + + +				
0.6	37		8 70				
0.425	36	SAND	gnis 60				
0.3	34		8 50 50				
0.15	30		96 36 BB 40				
0.063	26		g 40				
			08				
			20				
		SILT/CLAY	10				
		SIL I / CLA I	0				
			0.0001 0.00	0.01	0.1 1	10	100
3			Mr.	CLAY SILT	Sieve size (mm) SAND	GRAVEL	
Comhairte Chontas L	I	1001			Approved by:	Date:	Page no:
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Determination of Particle Size Distribution





particle	%		Contract No.	23070 Report	No. R119674
size	passing		Contract Name:	Oxigen Development	Site - Site 3 Derryarkin
75	100	COBBLES	BH/TP:	BH06	
63	100	CODDLLO	Sample No.	AA141325 Lab. Sa	ample No. A21/0753
50	100		Sample Type:	В	
37.5	95		Depth (m)	8.00 Custom	ner: Oxigen / Fehily Timoney & Company Consulting
28	93		Date Received	01/02/2021 Date Te	esting started 11/02/2021
20	86		Description:	Brown slightly sandy,	gravelly, SILT
14	78	GRAVEL			
10	74	GRAVEL	Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:199	90 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377
6.3	69				δ σ δ σ σ σ
5	67			Ó	0.063 0.425 0.6 0.6 1.18 1.18 2 2 5.5 5.3 3.35 5.3 5.3 5.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5 9.5
3.35	63		100		
2	59		90 + + + + + + + + + + + + + + + + + + +		
1.18	55		80		
0.6	51		§ 70 		
0.425	49	SAND	giris 60 +		
0.3	46		sed 50		
0.15	41				
0.063	35		gt 40		
			30		
			20		
		CII T (CL A)	10		
		SILT/CLAY	0		<u> </u>
			0.0001 0.00	0.01	0.1 1 10 10
) >			$C_{f,j}$		
Committee			N.	CLAY SIL7	
Comhable Chowtae Ui		ICSI I +	d Materials Laboratory		Approved by: Date: Page no:
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Appendix 6

Ottaly County Council, Planning Dept. Inspection Purposes Only PL2 / 22 / 490 21 / 09 / 2022





Chemtest
Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL

Tel: 01638 606070 Email: info@chemtest.com

Final Report

Report No.: 21-04127-1

Initial Date of Issue: 20-Feb-2021

Client IGSL

Client Address: M7 Business Park

Naas

County Kildare

Ireland

Contact(s): Darren Keogh

Project 23070 Oxigen Development Sites - Site

3 Derryarkin Offaly

Quotation No.: Q20-21693 Date Received: 11-Feb-2021

Order No.: Date Instructed: 11-Feb-2021

No. of Samples: 7

Turnaround (Wkdays): 7 Results Due: 19-Feb-2021

Date Approved: 20-Feb-2021

Approved By:

Offally County

Details: Glynn Harvey, Technical Manager

Results - Leachate

<u>Project: 23070 Oxigen Development Sites - Site 3 Derryarkin</u> Offaly

Client: IGSL			Che	mtest Jo	ob No.:	21-04127	21-04127	21-04127	21-04127
Quotation No.: Q20-21693		(Chemte	st Sam	ple ID.:	1140116	1140119	1140120	1140121
Order No.:			Clie	nt Samp	le Ref.:	142151	142163	143130	116301
			Sa	ample Lo	ocation:	TP2	TP5	BH3	BH5
				Sampl	е Туре:	SOIL	SOIL	SOIL	SOIL
				Top Dep	oth (m):	0.50	0.20	1.00	0.50
			Bot	ttom De	oth (m):	0.90	0.70	1.00	0.50
Determinand	Accred.	SOP	Type	Units	LOD				
рН	U	1010	10:1		N/A	8.5	8.9	8.4	8.7
Ammonium	U	1220	10:1	mg/l	0.050	0.55	0.12	0.52	0.18
Ammonium	N	1220	10:1	mg/kg	0.10	6.4	1.7	5.9	2.4
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20
Benzo[j]fluoranthene	N	1800	10:1	μg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010

PL2 / 22 / 490
21 / 09 / 2022

Results - Soil

Project: 23070 Oxigen Development Sites - Site 3 Derryarkin Offaly

Client: IGSL		Ch	emtest .	Job No.:	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127
Quotation No.: Q20-21693		Chem	test Sar	nple ID.:	1140116	1140117	1140118	1140119	1140120	1140121	1140122
Order No.:				ple Ref.:	142151	142163	124167	142163	143130	116301	141317
			Sample I	Location:	TP2	TP3	TP4	TP5	BH3	BH5	BH6
			Samp	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Do	epth (m):	0.50	0.40	0.30	0.20	1.00	0.50	0.50
		В	ottom D	epth (m):	0.90	0.80	0.80	0.70	1.00	0.50	0.50
			Asbes	stos Lab:	DURHAM			DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD					C		
ACM Type	U	2192		N/A	-			-	-	-	
Asbestos Identification	U	2192		N/A	No Asbestos Detected			No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	
ACM Detection Stage	U	2192		N/A	-			-		-	
Moisture	N	2030	%	0.020	9.1	9.7	9.2	7.0	16	8.2	8.5
pH (2.5:1)	N	2010	Ì	4.0		[A] 8.9	[A] 9.0	C	K		[A] 8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.42			[A] < 0.40	[A] 0.42	[A] < 0.40	1
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010	[A] < 0.010				[A] < 0.010
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010	[A] 0.14				[A] < 0.010
Total Sulphur	U	2175	%	0.010		[A] 0.026	[A] 0.030 w				[A] 0.032
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] 7.6		0	[A] 2.7	[A] < 1.0	[A] < 1.0	
Chloride (Water Soluble)	U	2220	g/l	0.010		[A] < 0.010	[A] < 0.010				[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010		0.017	0.019				< 0.010
Cyanide (Total)	U	2300	mg/kg	0.50	[A] < 0.50			[A] < 0.50	[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 2.8			[A] 2.4	[A] 5.0	[A] 4.7	
Ammonium (Water Soluble)	U	2120	g/l	0.01		< 0.01	< 0.01				< 0.01
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.011	[A] 0.012	[A] 0.023	[A] < 0.010	[A] 0.022	[A] < 0.010	[A] < 0.010
Arsenic	U	2450	mg/kg	1.0	21			29	12	21	
Barium	U	2450	mg/kg	10	21			20	18	19	
Cadmium	U	2450	mg/kg	0.10	0.27	<i>J</i>		0.51	0.36	0.42	
Chromium	U	2450	mg/kg	1.0	6.0			11	6.0	8.9	
Molybdenum	U	2450	mg/kg	2.0	< 2.0			< 2.0	< 2.0	< 2.0	
Antimony	N	2450	mg/kg	2.0	< 2.0			< 2.0	< 2.0	< 2.0	
Copper	U	2450	mg/kg	0.50	4.7			9.1	47	4.0	
Mercury	U	2450	mg/kg	0.10	< 0.10			< 0.10	< 0.10	< 0.10	
Nickel	U	2450	mg/kg	0.50	9.1			18	7.7	12	
Lead	U	2450	mg/kg	0.50	3.5			6.0	6.4	5.8	
Selenium	U	2450	mg/kg	0.20	< 0.20			< 0.20	< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.50	20			31	15	24	
Chromium (Trivalent)	N	2490	mg/kg	1.0	6.0			11	6.0	8.9	
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50			< 0.50	< 0.50	< 0.50	
Mineral Oil	N	2670	mg/kg	10	< 10			< 10	< 10	< 10	
Aliphatic TPH >C5-C6	N.	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	



Results - Soil

Project: 23070 Oxigen Development Sites - Site 3 Derryarkin Offaly

Client: IGSL				Job No.:	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127
Quotation No.: Q20-21693		Chem	test Sar	nple ID.:	1140116	1140117	1140118	1140119	1140120	1140121	1140122
Order No.:		Cli	ent Sam	ple Ref.:	142151	142163	124167	142163	143130	116301	141317
				ocation:	TP2	TP3	TP4	TP5	BH3	BH5	BH6
			Sam	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top D	epth (m):	0.50	0.40	0.30	0.20	1.00	0.50	0.50
		В	ottom D	epth (m):	0.90	0.80	0.80	0.70	1.00	0.50	0.50
			Asbes	stos Lab:	DURHAM	Ì	Ì	DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD							
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0			[A] < 5.0	[A] < 5.0	[A] < 5.0	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0 《	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0		5	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0	[A] < 1.0		0	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0		0.7	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0			[A] < 5.0	[A] < 5.0	[A] < 5.0	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	Ì		[A] < 10	[A] < 10	[A] < 10	
Benzene	U	2760	μg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Toluene	U	2760	μg/kg	1.0	[A] < 1.0)	[A] < 1.0	[A] < 1.0	[A] < 1.0	
Ethylbenzene	U	2760	μg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
m & p-Xylene	U	2760	μg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
o-Xylene	U	2760	μg/kg	1.0	[A] < 1.0			[A] < 1.0	[A] < 1.0	[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	μg/kg	1.0	[A] < 1.0	<i>J</i>		[A] < 1.0	[A] < 1.0	[A] < 1.0	
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Phenanthrene	N	2800	mg/kg	0.010	[A] 0.28			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Fluoranthene	N	2800	mg/kg	0.010	[A] 0.22			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Pyrene	N	2800	mg/kg	0.010	[A] 0.26			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] 0.15			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Chrysene	N	2800	mg/kg	0.010	[A] 0.11			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Benzo[a]pyrene	N.	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	
Coronene	N	2800	mg/kg	0.010	[A] < 0.010			[A] < 0.010	[A] < 0.010	[A] < 0.010	



Results - Soil

Project: 23070 Oxigen Development Sites - Site 3 Derryarkin Offaly

Client: IGSL		Ch	emtest .	Job No.:	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127	21-04127
Quotation No.: Q20-21693		Chem	test Sar	nple ID.:	1140116	1140117	1140118	1140119	1140120	1140121	1140122
Order No.:		Cli	ent Sam	ple Ref.:	142151	142163	124167	142163	143130	116301	141317
			Sample l	Location:	TP2	TP3	TP4	TP5	BH3	BH5	BH6
			Samı	ole Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top D	epth (m):	0.50	0.40	0.30	0.20	1.00	0.50	0.50
		Bottom Depth (m):				0.80	0.80	0.70	1.00	0.50	0.50
			Asbe	stos Lab:	DURHAM			DURHAM	DURHAM	DURHAM	
Determinand	Accred.	SOP	Units	LOD					<u>.</u>		
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] 1.0			[A] < 0.20	[A] < 0.20	[A] < 0.20	
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010			[A] < 0.0010	[A] < 0.0010	[A] < 0.0010	
Total Phenols	U	2920	mg/kg	0.30	< 0.30		<u> </u>	< 0.30	< 0.30	< 0.30	

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Results - Single Stage WAC

Chemtest Job No:	21-04127				Landfill Waste Acceptance Criteria		e Criteria
Chemtest Sample ID:	1140116				Limits		
Sample Ref: Sample ID:	142151					Stable, Non- reactive	
Sample Location: Top Depth(m):	TP2 0.50				Inert Waste	hazardous waste in non-	Hazardous Waste
Bottom Depth(m):	0.90				Landfill	hazardous	Landfill
Sampling Date:						Landfill	
Determinand	SOP	Accred.	Units				_
Total Organic Carbon	2625	U	%	[A] 0.89	3	5	6
Loss On Ignition	2610	U	%	2.8			10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6		
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500		
Total Of 17 PAH's	2800	N	mg/kg	[A] 1.0	100		
рН	2010	U		9.1		>6	
Acid Neutralisation Capacity	2015	N	mol/kg	0.029		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate		for compliance I	
			mg/l	mg/kg	using B	S EN 12457 at L/S	6 10 l/kg
Arsenic	1450	U	0.0027	< 0.050	0.5	2	25
Barium	1450	U	0.0070	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0033	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0017	< 0.050	0.5	10	30
Nickel	1450	U	0.0012	< 0.050	0.4	10	40
Lead	1450	U	0.0012	0.012	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.011	< 0.50	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
luonuc			T T		1000		
	1220	U	< 1.0	< 10	1000	20000	50000
Sulphate	1220 1020	U N	< 1.0 78	< 10 780	4000	60000	100000
Sulphate Total Dissolved Solids Phenol Index							

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.1

1610

Waste Acceptance Criteria

Dissolved Organic Carbon

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

110

800

1000

Results - Single Stage WAC

Chemtest Job No:	21-04127				Landfill Waste Acceptance Criteria		e Criteria
Chemtest Sample ID:	1140119				Limits		
Sample Ref:	142163					Stable, Non-	
Sample ID:						reactive	
Sample Location:	TP5					hazardous	Hazardous
Top Depth(m):	0.20				Inert Waste	waste in non-	Waste
Bottom Depth(m):	0.70				Landfill	hazardous	Landfill
Sampling Date:						Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	[A] 0.68	3	5	6
Loss On Ignition	2610	U	%	1.2			10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6		
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	V 1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500		
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100		
pH	2010	U		9.0		>6	
Acid Neutralisation Capacity	2015	N	mol/kg	0.032		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance I	eaching test
-			mg/l	mg/kg	using B	S EN 12457 at L/S	6 10 l/kg
Arsenic	1450	U	0.0011	< 0.050	0.5	2	25
Barium	1450	U	0.0054	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0015	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0095	< 0.50	4	50	200
	4000	U	1.2	12	800	15000	25000
Chloride	1220	U					
	1220	U	0.096	< 1.0	10	150	500
Fluoride				< 1.0 < 10	10 1000	150 20000	500 50000
Chloride Fluoride Sulphate Total Dissolved Solids	1220	Ü	0.096				
Fluoride Sulphate	1220 1220	U	0.096 < 1.0	< 10	1000	20000	50000

Solid Information)
Dry mass of test portion/kg	0.090
Moisture (%)	7.0

1610

Waste Acceptance Criteria

Dissolved Organic Carbon

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

6.1

800

1000

Results - Single Stage WAC

Chemtest Job No:	21-04127				Landfill Waste Acceptance Criteria		e Criteria
Chemtest Sample ID:	1140120					Limits	
Sample Ref:	143130					Stable, Non-	
Sample ID:						reactive	
Sample Location:	BH3					hazardous	Hazardous
Top Depth(m):	1.00				Inert Waste	waste in non-	Waste
Bottom Depth(m):	1.00				Landfill	hazardous	Landfill
Sampling Date:						Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	[A] 0.89	3	5	6
Loss On Ignition	2610	U	%	2.9			10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6		
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500		
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100		
рН	2010	U		8.6		>6	
Acid Neutralisation Capacity	2015	N	mol/kg	0.061		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance I	eaching test
			mg/l	mg/kg	using B	S EN 12457 at L/S	6 10 l/kg
Arsenic	1450	U	0.0023	< 0.050	0.5	2	25
Barium	1450	U	0.010	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0023	< 0.050	0.5	10	70
Copper	1450	U	0.0034	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0028	< 0.050	0.5	10	30
Nickel	1450	U	0.0034	< 0.050	0.4	10	40
Lead	1450	U	0.0016	0.016	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0012	0.012	0.1	0.5	7
Zinc	1450	U	0.011	< 0.50	4	50	200
Chloride	1220	U	2.0	20	800	15000	25000
Fluoride	1220	U	0.15	1.5	10	150	500
	4000	U	< 1.0	< 10	1000	20000	50000
Sulphate	1220	U	\ 1.0	\ 10	1000	20000	30000
	1020	N N	85	840	4000	60000	100000
Sulphate Total Dissolved Solids Phenol Index							

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

1610

Waste Acceptance Criteria

Dissolved Organic Carbon

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

22

220

500

800

Results - Single Stage WAC

Chemtest Job No:	21-04127				Landfill V	Vaste Acceptanc	e Criteria
Chemtest Sample ID:	1140121				Limits		
Sample Ref:	116301	116301				Stable, Non-	
Sample ID:						reactive	
Sample Location:	BH5					hazardous	Hazardous
Top Depth(m):	0.50				Inert Waste	waste in non-	Waste
Bottom Depth(m):	0.50				Landfill	hazardous	Landfill
Sampling Date:						Landfill	
Determinand	SOP	Accred.	Units				
Total Organic Carbon	2625	U	%	[A] < 0.20	3	5	6
Loss On Ignition	2610	U	%	0.96			10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6		
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1		
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500		
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100		
pH	2010	U		8.9		>6	
Acid Neutralisation Capacity	2015	N	mol/kg	0.026		To evaluate	To evaluate
Eluate Analysis			10:1 Eluate	10:1 Eluate	Limit values	for compliance I	eaching test
-			mg/l	mg/kg	using B	S EN 12457 at L/S	6 10 l/kg
Arsenic	1450	U	0.0015	< 0.050	0.5	2	25
Barium	1450	U	0.040	< 0.50	20	100	300
Cadmium	1450	U	0.00035	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0055	0.055	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	0.0021	< 0.050	0.4	10	40
Lead	1450	U	0.013	0.13	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0012	0.012	0.1	0.5	7
Zinc	1450	U	0.010	< 0.50	4	50	200
Chloride	1220	U	1.6	16	800	15000	25000
Fluoride	1220	U	0.16	1.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	72	710	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1		

Solid Information)
Dry mass of test portion/kg	0.090
Moisture (%)	8.2

1610

Waste Acceptance Criteria

Dissolved Organic Carbon

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

13

130

500

800

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request. The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1140116	142151		TP2		А	Amber Glass 250ml
1140116	142151		TP2		A	Plastic Tub 500g
1140117	142163		TP3		A	Amber Glass 250ml
1140117	142163		TP3		A	Plastic Tub 500g
1140118	124167		TP4		A	Amber Glass 250ml
1140118	124167		TP4	C	A	Plastic Tub 500g
1140119	142163		TP5		А	Amber Glass 250ml
1140119	142163		TP5	•	А	Plastic Tub 500g
1140120	143130		BH3		А	Amber Glass 250ml
1140120	143130	•. •	ВН3		А	Plastic Tub 500g
1140121	116301	ann	BH5		А	Amber Glass 250ml
1140121	116301	Q lo	BH5		А	Plastic Tub 500g
1140122	141317		ВН6		А	Amber Glass 250ml
1140122	141317		BH6		А	Plastic Tub 500g

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Test Methods

SOP	Title	Parameters included	Method summary	
1010	pH Value of Waters	рН	pH Meter	
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter	
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.	44
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).	O,,
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation	
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters by GC-MS	Acenaphthene; Acenaphthylene; Anthracene; Benzo[a]Anthracene; Benzo[a]Pyrene; Benzo[b]Fluoranthene; Benzo[ghi]Perylene; Benzo[k]Fluoranthene; Chrysene; Dibenz[ah]Anthracene; Fluoranthene; Fluorene; Indeno[123cd]Pyrene; Naphthalene; Phenanthrene; Pyrene	Pentane extraction / GCMS detection PL2 /	nederic Cheedee Ubh Pheili ht County Council ANNING 1 22 / 490 09 / 2022
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.	
2010	pH Value of Soils	рН	pH Meter	
2015	Acid Neutralisation Capacity	Acid Reserve	Titration	
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.	
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930	
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES	
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.	
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection	
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry	ı
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.	
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.	
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.	
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.	
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.	
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.	

Test Methods

SOP	Title	Parameters included	Method summary
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5-C6, >C6-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44Aromatics: >C5-C7, >C7-C8, >C8-C10, >C10-C12, >C12-C16, >C16-C21, >C21-C35, >C35-C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1- Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key	
U	UKAS accredited
M	MCERTS and UKAS accredited
Ν	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
Τ	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

Comments or interpretations are beyond the scope of UKAS accreditation

The results relate only to the items tested

Uncertainty of measurement for the determinands tested are available upon request

None of the results in this report have been recovery corrected

All results are expressed on a dry weight basis

The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols

For all other tests the samples were dried at < 37°C prior to analysis

All Asbestos testing is performed at the indicated laboratory

Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

- A Date of sampling not supplied
- B Sample age exceeds stability time (sampling to extraction)
- C Sample not received in appropriate containers
- D Broken Container
- E Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt All water samples will be retained for 14 days from the date of receipt Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to: <u>customerservices@chemtest.com</u>



Appendix 7

OHAW County Council, Planning Dept., Inspection Purposes Only PL2 / 22 / 490 21 / 09 / 2022

