

ENVIRONMENTAL IMPACT ASSESSMENT REPORT VOL II – APPENDICES

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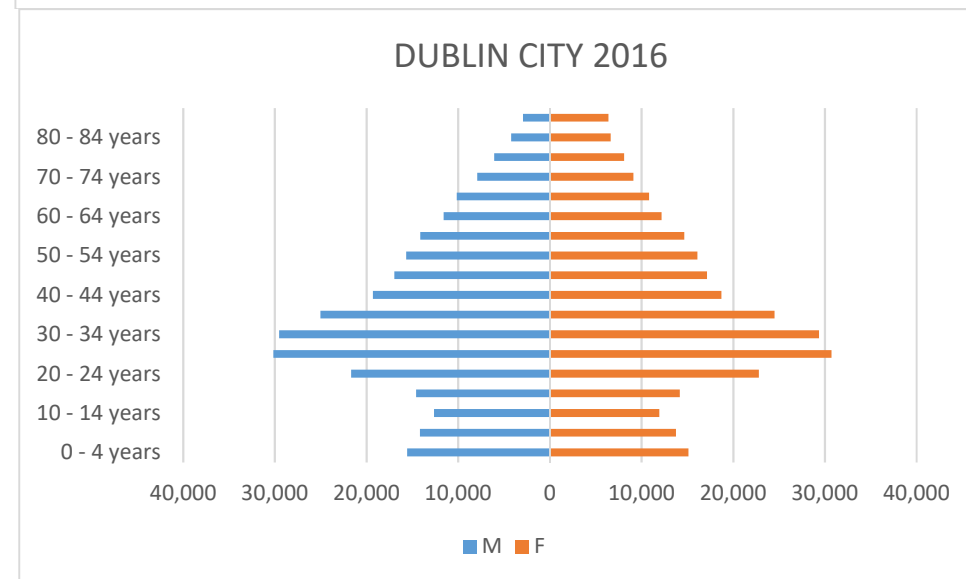
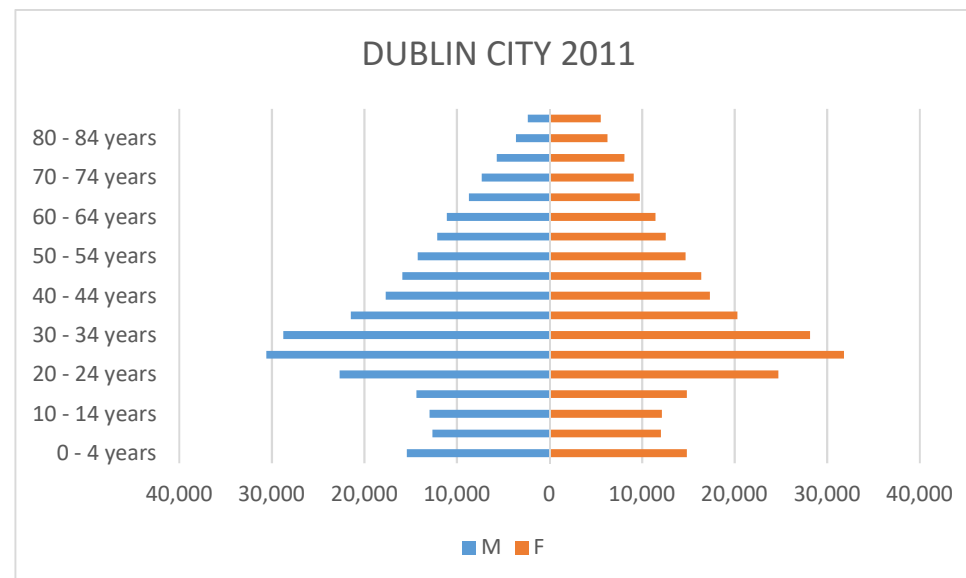
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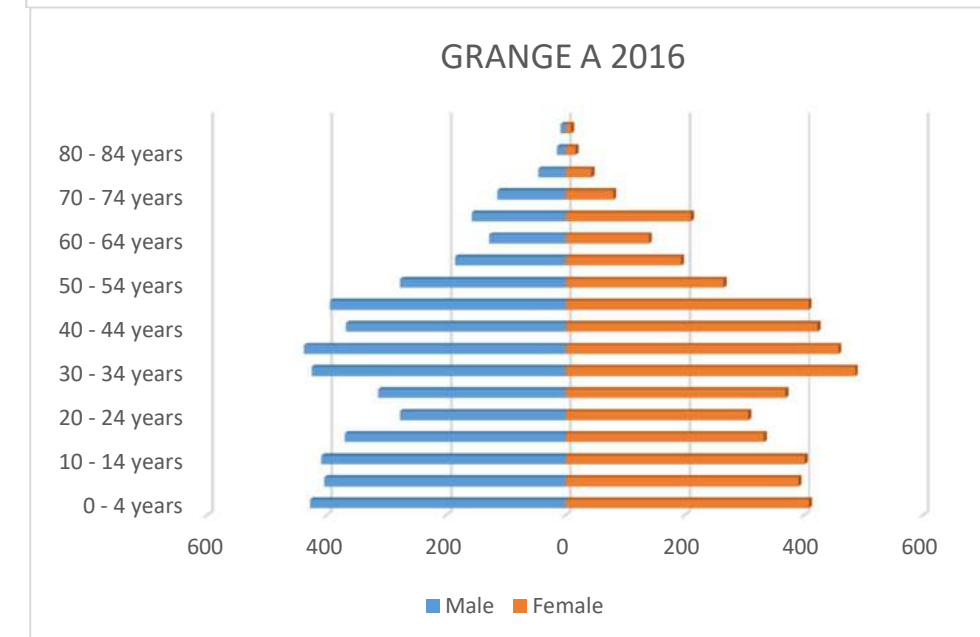
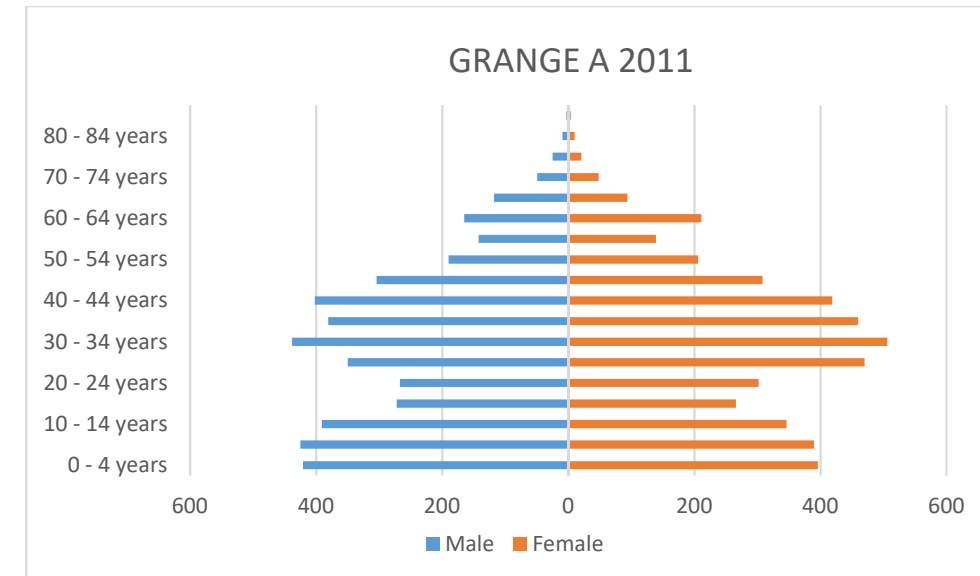
CHAPTER 4 POPULATION AND HUMAN HEALTH

APPENDIX 4.1- AGE SEX PYRAMID

Age Sex Pyramid for Dublin city



Age Sex Pyramid for Local ED



CHAPTER 6 LAND, SOIL AND GEOLOGY

APPENDIX 6.1 - **GROUND INVESTIGATION REPORT**



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Ground Investigations Ireland

Parkside Phase 4

Ground Investigation Report

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APPENDICES

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Appendix 3	Soakaway Test Results
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1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between May and June 2019 at the site of the proposed residential development in Balgriffin, Co. Dublin.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently occupied by a disused school and is on the Belmayne Road, Balgriffin, Co. Dublin. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 8 No. Trial Pits to a maximum depth of 3.1m BGL
- Carry out 2 No. Soakaway tests to determine a soil infiltration value to BRE digest 365
- Carry out 9 No. Window Sample Boreholes to recover soil samples
- Carry out 1 No. Slit trench to identify existing services
- Carry out 7 No. Cable Percussion boreholes to a maximum depth of 8.0m BGL
- Carry out 4 No. Rotary Core Follow-on Boreholes to a maximum depth of 16.1m BGL
- Installation of 4 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.

The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a 3.5T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Dando Terrier/Tecop Tec 10 percussion drilling rig. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by a Geotechnical Engineer/Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The window sample records are provided in Appendix 4 of this Report.

3.5. Slit Trenching

The slit trench was excavated at the location shown in the exploratory hole location plan in Appendix 1 to identify and locate existing services and to obtain a soil profile. The soil was excavated by slowly stripping the length of the excavation with a toothless bucket in order to avoid damaging any services that may be underlying. A spotter was also used to watch the trench while excavating to alert the driver when services were visible. The soils and services were then logged and photographed for each excavation by a Geotechnical Engineer/Engineering Geologist. The excavation was then backfilled and reinstated in

accordance with the project specification. The slit trench records with associated photos are provided in Appendix 5 of this Report.

3.6. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.

The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata. Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60° cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 6 of this Report.

3.7. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the "overshoot" recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or

water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary follow-on borehole logs are provided in Appendix 6 of this Report.

3.8. Surveying

The exploratory hole locations have been recorded using a Trimble R10 GNSS System which records the coordinates and elevation of the locations to ITM or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.9. Groundwater Monitoring Installations

Groundwater Monitoring Installations were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.10. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.

Environmental testing, including Waste Acceptance Criteria (WAC), pH and sulphate testing was carried out by Jones Environmental Laboratory in the UK.

Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer and California Bearing Ratio (CBR) tests were carried out in NMTL's Geotechnical Laboratory in Carlow.

Rock strength testing including Point Load (I_{s50}) and Unconfined Compressive Strength (UCS) testing was carried out in Trinity College Dublin's Geotechnical Laboratory

The results of the laboratory testing are included in Appendix 5 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

- Topsoil/Surfacing
- Made Ground
- Cohesive Deposits
- Granular Deposits
- Bedrock

TOPSOIL: Topsoil was encountered in most of the exploratory holes and was present to a maximum depth of 0.4m BGL. Tarmac or Cobblelock surfacing was present in the remaining exploratory holes typically to depths of between 0.08m BGL to 0.25m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil or from the surface and was present to depths of between 0.6m and 2.6m BGL. These deposits were described generally as *brown slightly sandy slightly gravelly CLAY with occasional cobbles and fragments of concrete, red brick, glass and plastic.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground or Topsoil and were described typically as *brown/grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders* overlying a *stiff dark grey/black slightly sandy slightly gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 2.0m BGL in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered within the cohesive deposits and were typically described as *Grey clayey sandy subangular to subrounded fine to coarse GRAVEL*. The secondary sand and clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.

BEDROCK: The rotary core boreholes recovered Medium strong or strong grey fine grained LIMESTONE with calcite veins. Rare visible pyrite veins were noted during logging which are typically present within the Calp Limestone.

The depth to rock varies from 3.8m BGL in BH05 to a maximum of 9.2m BGL in BH01 and BH02. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in BH01, BH02, BH05, BH07 to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 7 of this Report.

4.3. Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 20.6% and 33.9% generally with fines contents of 24.7%.

The CBR testing on remoulded samples gave results ranging between 1.67% and 3.38% for the cohesive deposits.

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

The results of the Waste Acceptance Criterial Test Suite are presented with the individual parameter limits for "Inert" "Non Hazardous" and "Hazardous" as outlined within European Council Directive 1999 131/EC Article 16 Annex II, "Criteria and procedures for the acceptance of waste at landfills". The intended disposal site should be consulted to ensure compliance with their specific requirements.

The results from the completed laboratory testing is included in Appendix 8 of this report.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or

conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

Recommended allowable bearing capacities for conventional strip or pad foundations on the cohesive deposits at each borehole location are listed in the table below.

Allowable Bearing Capacity					
Hole ID	kN/m2	Depth	Hole ID	kN/m2	Depth
BH01	150	1.60	BH05	150	2.40
BH02	100	1.70	BH06	70	2.00
BH03	150	1.00	BH06	100	3.00
BH04 (A)	80	1.00	BH07	70	1.00
BH04 (A)	150	2.00	BH07	150	3.00
BH05	80	1.00			

In any part of the site, should part of the foundation be on rock we would recommend that all the foundations of the unit in question be lowered to the competent rock stratum to avoid differential settlement.

The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill.

The pH and sulphate testing completed on samples recovered from the trial pits indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendixes of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

Excavations in the upper cohesive and weathered rock deposits are expected to be excavatable with conventional excavation equipment, with zones of more intact bedrock below this depth requiring rock breaking techniques. Based on the fracture spacing, the rock strength testing and Pettifer & Fookes (1994) Revised Excavatability Graph, the Calp Limestone ranges from hard digging to hard ripping, however the zones recovered as non-intact should be easy to hard digging.

Any material to be removed off site should be disposed of to a suitably licenced landfill.

5.5. Soakaway Design

At the locations of SA01 and SA02 the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan

APPENDIX 2 – Trial Pit Records

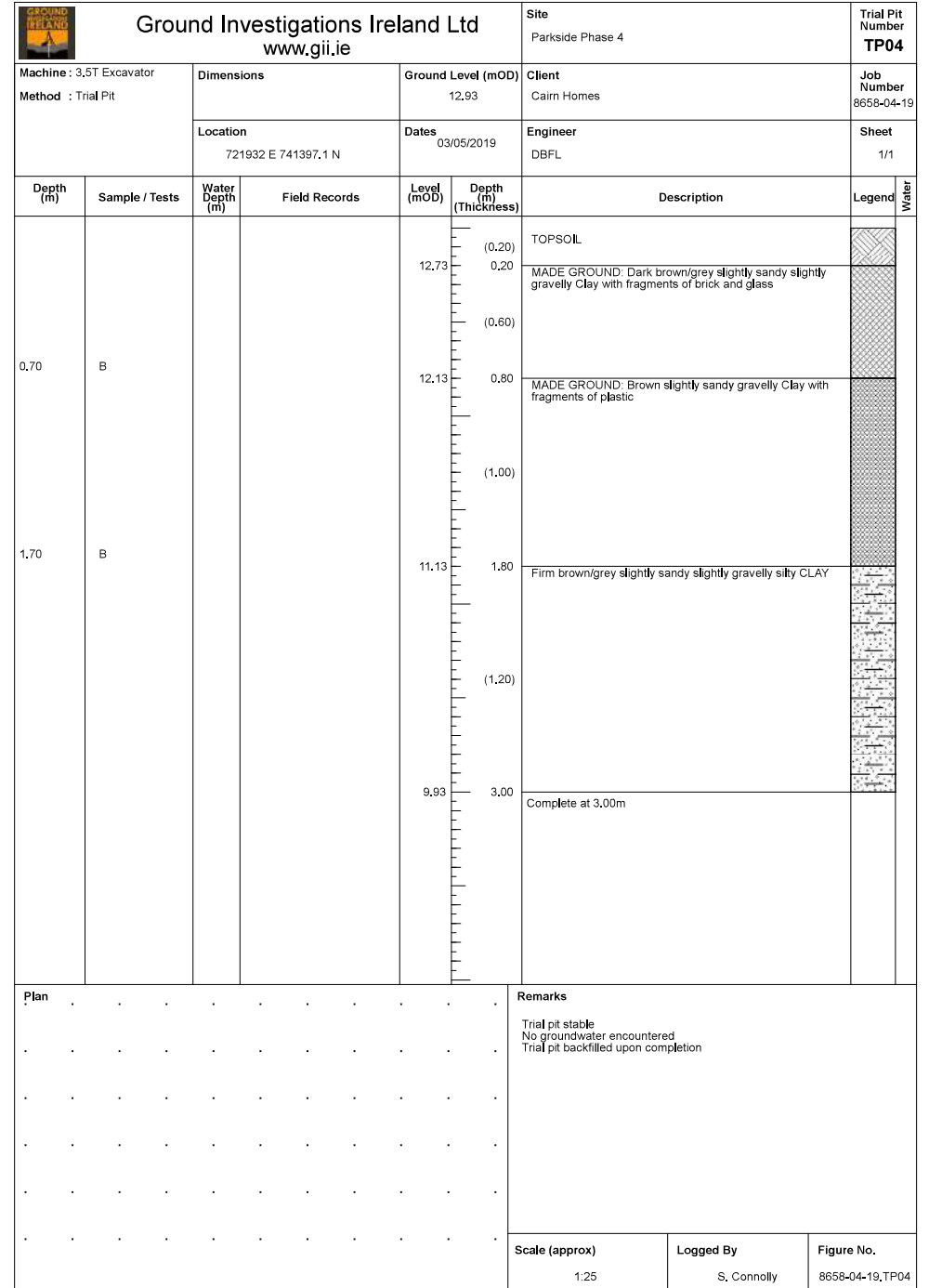
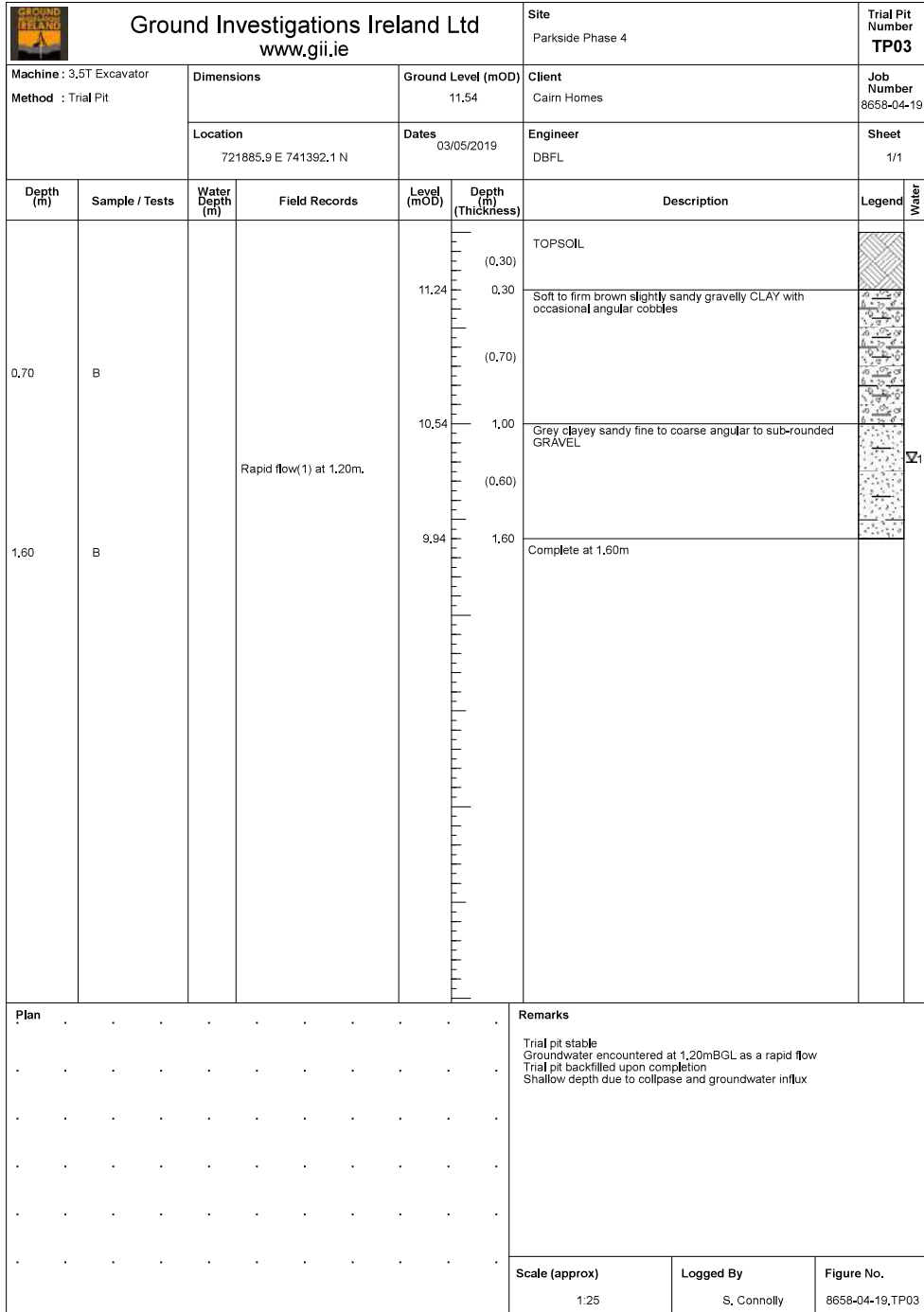


Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number SA01		
Machine : 3.5T Excavator Method : Trial Pit		Dimensions L x W x D 2,30 x 0,50 x 2,10m		Ground Level (mOD) 13.18		Client Cairn Homes		
Location 721835,4 E 741349,9 N		Dates 03/05/2019		Engineer DBFL		Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				13.08	(0,10) 0,10	TOPSOIL		
					(0,60)	MADE GROUND: Brown sandy gravelly Clay with fragments of plastic, concrete and wood		
				12.48	0,70	Soft to firm light brown slightly sandy gravelly CLAY		
					(1,40)			
				11.08	2,10	Complete at 2,10m		
Plan						Remarks		
						Trial pit stable No groundwater encountered Soakaway completed in pit Trial pit backfilled upon completion		
				Scale (approx)	Logged By	Figure No.		
				1:25	S, Connolly	8658-04-19,SA01		

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number SA02		
Machine : 3.5T Excavator Method : Trial Pit		Dimensions L x W x D 2,40 x 0,50 x 2,30m		Ground Level (mOD) 12.38		Client Cairn Homes		
Location 722023,4 E 741411,6 N		Dates 03/05/2019		Engineer DBFL		Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				12.18	(0,20) 0,20	TOPSOIL		
					(0,60)	MADE GROUND: Brown slightly sandy gravelly Clay with fragments of metal and brick		
				11.58	0,80	MADE GROUND: Dark brown slightly sandy slightly gravelly Clay with rare cobbles and fragments of concrete, plastic and metal		
					(1,50)			
				10.08	2,30	Complete at 2,30m		
Plan						Remarks		
						Trial pit stable No groundwater encountered Soakaway completed in pit Trial pit backfilled upon completion		
				Scale (approx)	Logged By	Figure No.		
				1:25	S, Connolly	8658-04-19,SA02		

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number TP01		
Machine : 3.5T Excavator Method : Trial Pit		Dimensions		Ground Level (mOD) 13.00		Client Cairn Homes		
		Location 721831.9 E 852354.6 N		Dates 03/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.70	B			12.70	0.30	TOPSOIL		
					0.30	MADE GROUND: Brown mottled grey slightly sandy gravelly Clay with fragments of plastic, wood and brick		
				11.90	1.10	MADE GROUND: Grey slightly clayey gravelly Sand with fragments of brick		
1.70	B			11.10	1.90	MADE GROUND: Grey slightly sandy silty Clay with fragments of brick. Strong organic odour		
				10.40	2.60	Complete at 2.60m		
Plan						Remarks		
						Trial pit stable No groundwater encountered Trial pit backfilled upon completion		
				Scale (approx)	1:25	Logged By	S. Connolly	Figure No.
								8658-04-19,TP01

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number TP02		
Machine : 3.5T Excavator Method : Trial Pit		Dimensions		Ground Level (mOD) 13.74		Client Cairn Homes		
		Location 721851.1 E 741318 N		Dates 03/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.70	B			13.54	0.20	TOPSOIL		
					0.20	MADE GROUND: Brown slightly sandy gravelly Clay with fragments of brick		
				13.24	0.50	MADE GROUND: Brown slightly sandy very gravelly Clay with frequent angular cobbles		
				12.64	1.10	Stiff brown sandy gravelly CLAY with frequent angular cobbles and rare boulders		
1.70	B			11.74	2.00	Complete at 2.00m		
Plan						Remarks		
						Trial pit stable No groundwater encountered CBR bag taken at 0.70mBGL Trial pit backfilled upon completion		
				Scale (approx)	1:25	Logged By	S. Connolly	Figure No.
								8658-04-19,TP02



Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number TP05	
Machine : 3.5T Excavator Method : Trial Pit		Dimensions		Ground Level (mOD) 12.39		Client Cairn Homes	
		Location 722008,5 E 741423,1 N		Dates 03/05/2019		Engineer DBFL	
						Job Number 8658-04-19	
						Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.70	B			12.09	0.30	TOPSOIL	
						MADE GROUND: Brown sandy slightly gravelly Clay with fragments of brick, glass and wood	
1.70	B			10.79	1.60	MADE GROUND: Brown/grey mottled black slightly sandy gravelly Clay with fragments of glass, wood and plastic. Slight organic odour	
				9.79	2.60	Complete at 2.60m	
Plan						Remarks	
						Trial pit stable No groundwater encountered Trial pit backfilled upon completion	
				Scale (approx)	1:25	Logged By	S. Connolly
						Figure No.	8658-04-19,TP05

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Trial Pit Number TP06	
Machine : 3.5T Excavator Method : Trial Pit		Dimensions		Ground Level (mOD) 12.51		Client Cairn Homes	
		Location 722026,7 E 741386,1 N		Dates 03/05/2019		Engineer DBFL	
						Job Number 8658-04-19	
						Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.70	B			12.31	0.20	TOPSOIL	
						MADE GROUND: Dark brown mottled black slightly sandy slightly gravelly Clay with occasional cobbles and fragments of brick	
1.70	B			11.11	1.40	Stiff brown slightly sandy gravelly CLAY with occasional angular cobbles	
				9.41	3.10	Complete at 3.10m	
Plan						Remarks	
						Trial pit stable No groundwater encountered Trial pit backfilled upon completion	
				Scale (approx)	1:25	Logged By	S. Connolly
						Figure No.	8658-04-19,TP06

Parkside Phase 4 – Trial Pit Photos



TP01



TP01



TP01



TP01



TP02



TP02



TP02



TP02



TP03



TP03



TP03



TP03



TP04



TP04



TP04



TP04



TP05



TP05



TP05



TP05



TP06



TP06



TP06



TP06

APPENDIX 3 – Soakaway Test Results

SA01

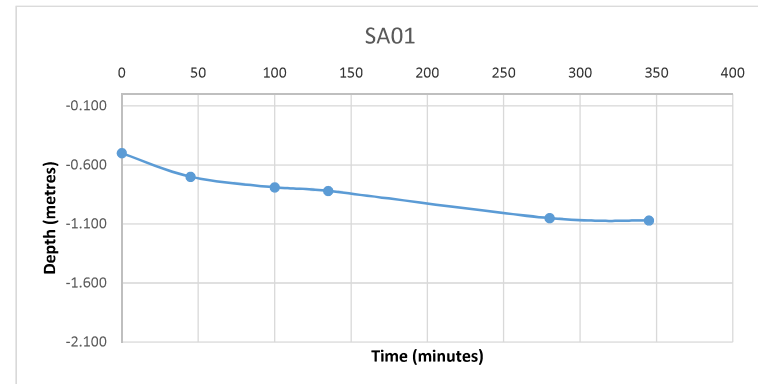
Soakaway Test to BRE Digest 365

Trial Pit Dimensions: 2.30m x 0.50m x 2.10m (L x W x D)

Date	Time	Water level (m bgl)
03/05/2019	0	-0.500
03/05/2019	45	-0.700
03/05/2019	100	-0.790
03/05/2019	135	-0.820
03/05/2019	280	-1.050
03/05/2019	345	-1.070

*Soakaway failed - Pit backfilled

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	2.100	1.600	0.9	1.7



SA02

Soakaway Test to BRE Digest 365

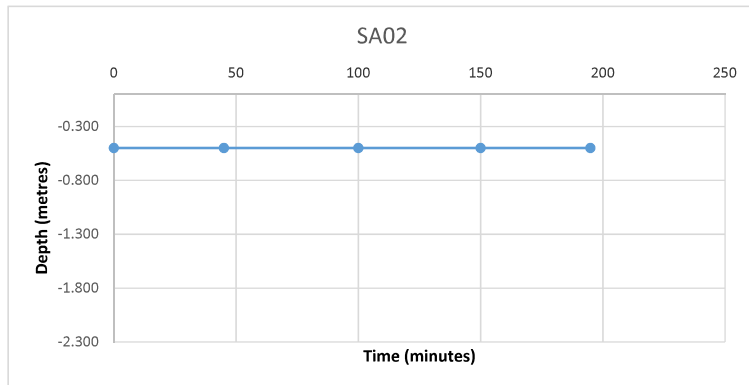
Trial Pit Dimensions: 2.40m x 0.50m x 2.30m (L x W x D)

Date	Time	Water level (m bgl)
03/05/2019	0	-0.500
03/05/2019	45	-0.500
03/05/2019	100	-0.500
03/05/2019	150	-0.500
03/05/2019	195	-0.500

*Soakaway failed - Pit backfilled

Start depth	Depth of Pit	Diff	75% full	25%full
0.50	2.300	1.800	0.95	1.85

APPENDIX 4 – Window Sample Records



Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-01		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 13.39		Client Cairn Homes		
		Location 721855,1 E 741335,4 N		Dates 09/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
0.70	EN			13.19	(0,20) 0.20	TOPSOIL		
					(0,80)	MADE GROUND: Grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional fragments of wood granite plastic shells and red brick.		
				12.39	1.00	MADE GROUND: Grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional fragments of red brick.		
				12.04	1.35	Dark brown clayey gravelly fine to coarse SAND.		
				11.79	1.60	Firm brownish grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
1.70	EN			11.39	2.00	Firm grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
					(1,00)			
				10.39	3.00	Firm grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
					(0,60)			
				9.79	3.60	No recovery		
					(0,40)			
				9.39	4.00	Complete at 4.00m		
Remarks							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-01	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-02		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12.85		Client Cairn Homes		
		Location 721906,1 E 741355,4 N		Dates 10/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
0.70	EN			12.77	(0,08) 0.08	COBBLELOCK		
					(0,16) 0.24	MADE GROUND: Multicoloured subangular to subrounded fine to coarse Gravel		
					(0,76)	MADE GROUND: Brownish grey slightly sandy slightly clayey subangular to subrounded fine to coarse Gravel with occasional fragments of red brick and concrete.		
				11.85	1.00	MADE GROUND: Grey sandy clayey subangular to subrounded fine to coarse Gravel with occasional fragments of concrete.		
					(0,30)			
				11.55	1.30	Complete at 1.30m		
Remarks Refusal at 1.30m							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-02	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-03		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 13.24		Client Cairn Homes		
Location 721913,8 E 741332,9 N		Dates 10/05/2019		Engineer DBFL		Job Number 8658-04-19		
Sheet 1/1		Depth (m)		Level (mOD)		Description		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0,70	EN			13,04	(0,20)	TARMACADAM		
					0,20	MADE GROUND: Light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional fragments of red brick cloth material and wood.		
					(0,60)			
					0,80	No recovery		
					(0,20)			
					1,00	MADE GROUND: Brownish grey mottled orange slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles and occasional fragments of granite wood and brick and rootlets		
					(0,40)			
					1,40	Firm grey mottled orange slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
					(0,40)			
1,70	EN			11,44	1,80	Firm light brown mottled orange slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
					(0,20)			
					2,00	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0,70)			
					2,70	Firm light brown slightly gravelly sandy CLAY with occasional subangular to subrounded cobbles.		
					(0,20)			
					2,90	No recovery		
					(0,10)			
					3,00	Firm grey sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					(0,70)			
					3,70	No recovery		
					(0,30)			
					4,00	Complete at 4,00m		
Remarks							Scale (approx) 1:25	Logged By PM
Figure No. 8658-04-19,WS-03								

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-04		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12,90		Client Cairn Homes		
Location 721931,6 E 741368,2 N		Dates 09/05/2019		Engineer DBFL		Job Number 8658-04-19		
Sheet 1/1		Depth (m)		Level (mOD)		Description		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0,70	EN			12,82	(0,08)	COBBLELOCK		
					0,08			
					0,16	MADE GROUND: Multicoloured subrounded to rounded fine to coarse Gravel		
					0,24			
					(0,36)	MADE GROUND: Grey sandy gravelly Clay with occasional subangular to subrounded cobbles and occasional fragments of red brick wood concrete and plastic.		
					0,60			
					(0,40)	MADE GROUND: Brown sandy clayey Gravel with occasional subangular to subrounded cobbles and occasional fragments of red brick concrete and rare metal fragments.		
					1,00			
					(1,00)	MADE GROUND: Grey sandy clayey Gravel with occasional subangular to subrounded cobbles and occasional fragments of red brick and concrete		
1,70	EN			11,90	2,00	Complete at 2,00m		
					(0,70)			
					10,90			
Remarks Refusal at 2,00m							Scale (approx) 1:25	Logged By PM
Figure No. 8658-04-19,WS-04								

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-05		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 13.34		Client Cairn Homes		
Location 721944,4 E 741339,8 N		Dates 09/05/2019		Engineer DBFL		Job Number 8658-04-19		
Sheet 1/1								
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0,70	EN			13,04	(0,30)	TOPSOIL		
					0,30	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
1,70	EN			12,34	(0,70)	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional rootlets		
					1,00	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional rootlets		
2,70	EN			11,94	(0,40)	Firm grey slightly silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
					1,40	Firm grey slightly silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles		
				11,34	(0,60)	Firm grey slightly silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional shell fragments		
				10,74	(0,40)	Firm grey slightly silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles and occasional shell fragments.		
				10,34	(0,40)	Firm grey slightly silty slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
				9,94	(0,60)	No recovery		
				9,34	(0,60)	Complete at 4,00m		
Remarks							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-05	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-06		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12,90		Client Cairn Homes		
Location 721951,2 E 741406 N		Dates 10/05/2019		Engineer DBFL		Job Number 8658-04-19		
Sheet 1/1								
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0,70	EN			12,75	(0,15)	TARMACADAM		
					0,15	MADE GROUND: Grey sandy clayey Gravel with occasional subangular to subrounded cobbles of concrete and occasional fragments of red brick and wood.		
				12,15	(0,60)	Complete at 0,75m		
					0,75	Complete at 0,75m		
Remarks Refusal at 0.75m							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-06	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-07		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12.74		Client Cairn Homes		
		Location 721961.5 E 741375.9 N		Dates 10/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
0.70	EN			12.49	(0,25)	TARMACADAM		
					0.25	MADE GROUND: Grey sandy clayey fine to coarse angular to subangular Gravel with occasional subangular to subrounded cobbles and occasional fragments of red brick and concrete.		
					(0,45)			
				12.04	0.70	Complete at 0.70m		
Remarks Refusal at 0.70m							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-07	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-08		
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12.78		Client Cairn Homes		
		Location 721998.4 E 741398.1 N		Dates 10/05/2019		Engineer DBFL		
						Job Number 8658-04-19		
						Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	
0.70	EN			12.53	(0,25)	TARMACADAM		
					0.25	MADE GROUND: Grey slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles and occasional fragments of red brick and wood.		
					(0,75)			
1.70	EN			11.78	1.00	Firm grey slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles.		
					(0,90)			
					10.88	1.90	No recovery	
2.70	EN			10.78	(0,10)	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					2.00			
					(0,90)			
				9.88	2.90	No recovery		
				9.78	(0,10)	Firm dark brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.		
					3.00			
					(0,45)			
				9.33	3.45	No recovery		
					(0,55)			
				8.78	4.00	Complete at 4.00m		
Remarks							Scale (approx) 1:25	Logged By PM
							Figure No. 8658-04-19,WS-08	

Ground Investigations Ireland Ltd www.gii.ie				Site Parkside Phase 4		Number WS-09	
Excavation Method Drive-in Windowless Sampler		Dimensions		Ground Level (mOD) 12.94		Client Cairn Homes	
		Location 721966 E 741351.3 N		Dates 09/05/2019		Engineer DBFL	
						Job Number 8658-04-19	
						Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend
0.70	EN			12.74	(0,20) 0.20	TOPSOIL	[Symbol]
					(0,60)	MADE GROUND: Firm brownish grey slightly sandy slightly gravelly Clay with occasional subangular to subrounded cobbles and fragments of shells red brick and granite.	[Symbol]
				12.14	0.80	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.	[Symbol]
					(1,20)		[Symbol]
1.70	EN			10.94	2.00	Firm light brown slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.	[Symbol]
					(0,90)		[Symbol]
2.70	EN			10.04	2.90	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional subangular to subrounded cobbles.	[Symbol]
					(0,60)		[Symbol]
				9.44	3.50	Complete at 3.50m	[Symbol]
Remarks Refusal at 3.50m							Scale (approx) 1:25
							Logged By PM
							Figure No. 8658-04-19,WS-09

Parkside Phase 4 – Window Sample Photos



WS01



WS02



WS03



WS05



WS04



WS07



WS08



WS09

APPENDIX 5 – Slit Trench Records

Parkside Phase 4 – Slit Trench Photos

SLIT TRENCH RECORD - SLIT TRENCH ST-01

Contract No: 8850-01-16		Survey Point: A	
Client: Dept		E	
Site Address: Parkside Phase 4		171 22 216 221 224 - 224	
Date Commenced: 03/03/16		N	
Site Computer: 03/03/16		171 22 216 221 224 - 224	
Logged by: Baran Connolly		Ground Level: 13.915 13.640 (m OD)	

Trench Profile (m)		Notes	
Start of ST	0.00		
End of ST	1.50		
Max Depth	1.50		
Width of ST	0.30		

Pipe No.	ø (mm)	Colour / Material	Utility	Depth	Distance from zero	Angle

From (m)	To (m)	Description
0.00	0.30	TOPSOIL
0.30	0.90	CLAY (20% s.s.) Heavy sandy grey clay with fragments of shells
0.90	1.50	CLAY (20% s.s.) Dark brown heavy sandy grey clay with fragments of shells and stones

GROUND IRELAND



ST01



ST01



ST01



ST01



ST01



ST01



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ST01



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ST01



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ST01










ST01



ST01

APPENDIX 6 – Borehole Records

 Ground Investigations Ireland Ltd www.gii.ie						Site Parkside Phase 4		Borehole Number BH01		
Machine : Dando 2000 & Commacchio MC405P Method : Cable Percussion with Rotary Follow On		Casing Diameter 200mm cased to 4,90m 100mm cased to 12,30m		Ground Level (mOD) 12,04		Client Cairn Homes		Job Number 8658-04-19		
Location 721864,6 E 741375,6 N		Dates 24/05/2019-28/06/2019		Engineer DBFL		Sheet 1/2				
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.50	B					11,64 (0,40)	TOPSOIL			
1.00-1.45	SPT(C) N=7			1,2/1,2,2,2		0,40 (1,20)	Firm grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse. Gravel is subrounded fine to coarse			
1.60	B					10,44 1,60	Stiff dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse. Gravel is subrounded fine to coarse			
2.00-2.45	SPT(C) N=30			4,4/5,7,7,11						
2.50	B									
3.00-3.45	SPT(C) N=50			4,6/9,10,12,19						
3.50	B									
4.00-4.31	SPT(C) 50/155			9,12/18,26,6						
4.40	B			25/50 50/0 SPT(C) 25*/0						
4.80	B			Water strike(1) at 4,80m, rose to 4,72m in 20 mins.		7,24 4,80	Very stiff grey slightly sandy gravelly CLAY with many subangular cobbles. Sand is fine to coarse. Gravel is subangular fine to coarse			
4.90-4.90	TCR									
4.90	SCR									
4.90	RQD									
5.00	FI									
	20									
6.00										
	14									
7.10										
	56									
8.00						4,04 8,00	Very stiff dark grey slightly sandy gravelly CLAY with occasional subangular to subrounded cobbles. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse			
	73									
9.10										
9.20						2,84 9,20	Strong grey very fine to fine grained fossiliferous LIMESTONE with many calcite veins. Partially weathered with some oxide staining on fractures 9,20-10,20 - One fracture set, F1. Widely spaced sub-horizontal to 10 degrees, undulating rough			
	100	90	86	4						
Remarks Cable percussion refusal at 4,90mBGL Groundwater monitoring standpipe installed Chiselling from 4,80m to 4,90m for 1 hour.								Scale (approx) 1:50	Logged By MMC	
								Figure No. 8658-04-19,BH01		

Ground Investigations Ireland Ltd www.gii.ie						Site Parkside Phase 4		Borehole Number BH01			
Machine : Dando 2000 & Commacchio Flush : MC405P Water Core Dia: 68 mm		Casing Diameter 200mm cased to 4,90m 100mm cased to 12,30m		Ground Level (mOD) 12,04		Client Cairn Homes		Job Number 8658-04-19			
Method : Cable Percussion with Rotary Follow On		Location 721864,6 E 741375,6 N		Dates 24/05/2019-28/06/2019		Engineer DBFL		Sheet 2/2			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10,20								10,20-11,20 - Two fracture sets, F1: Widely spaced sub-horizontal to 10 degrees, undulating rough, F2: Widely spaced sub-vertical to 85 degrees, undulating rough			
10,70				4			(3,10)				
11,20	98	81	81					11,20-12,30 - Two fracture sets, F1: Widely spaced sub-horizontal to 10 degrees, undulating rough, F2: Widely spaced sub-vertical to 85 degrees, undulating rough			
12,30				4				Complete at 12,30m			
Remarks										Scale (approx) 1:50	Logged By MMC
Figure No. 8658-04-19,BH01											

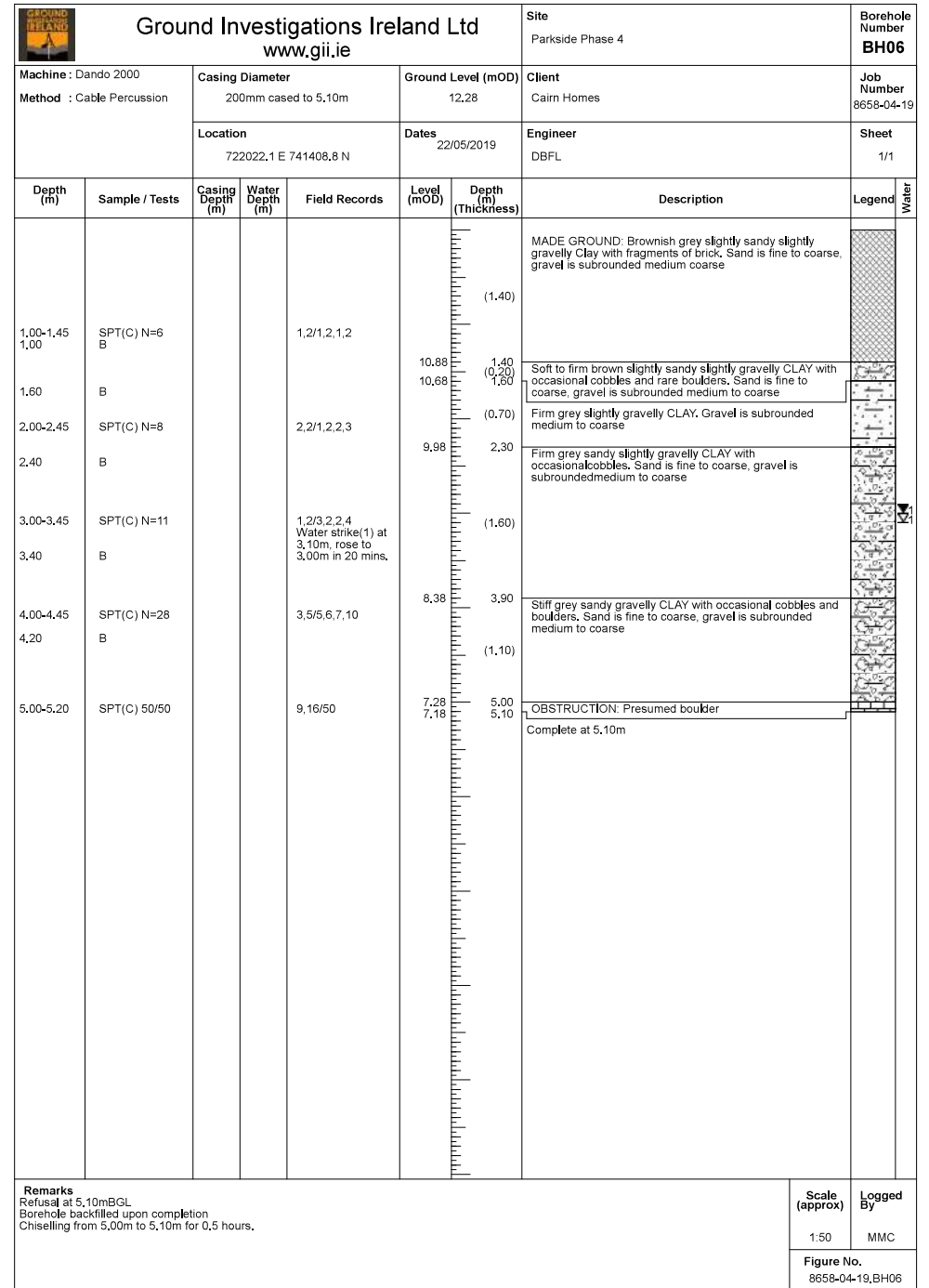
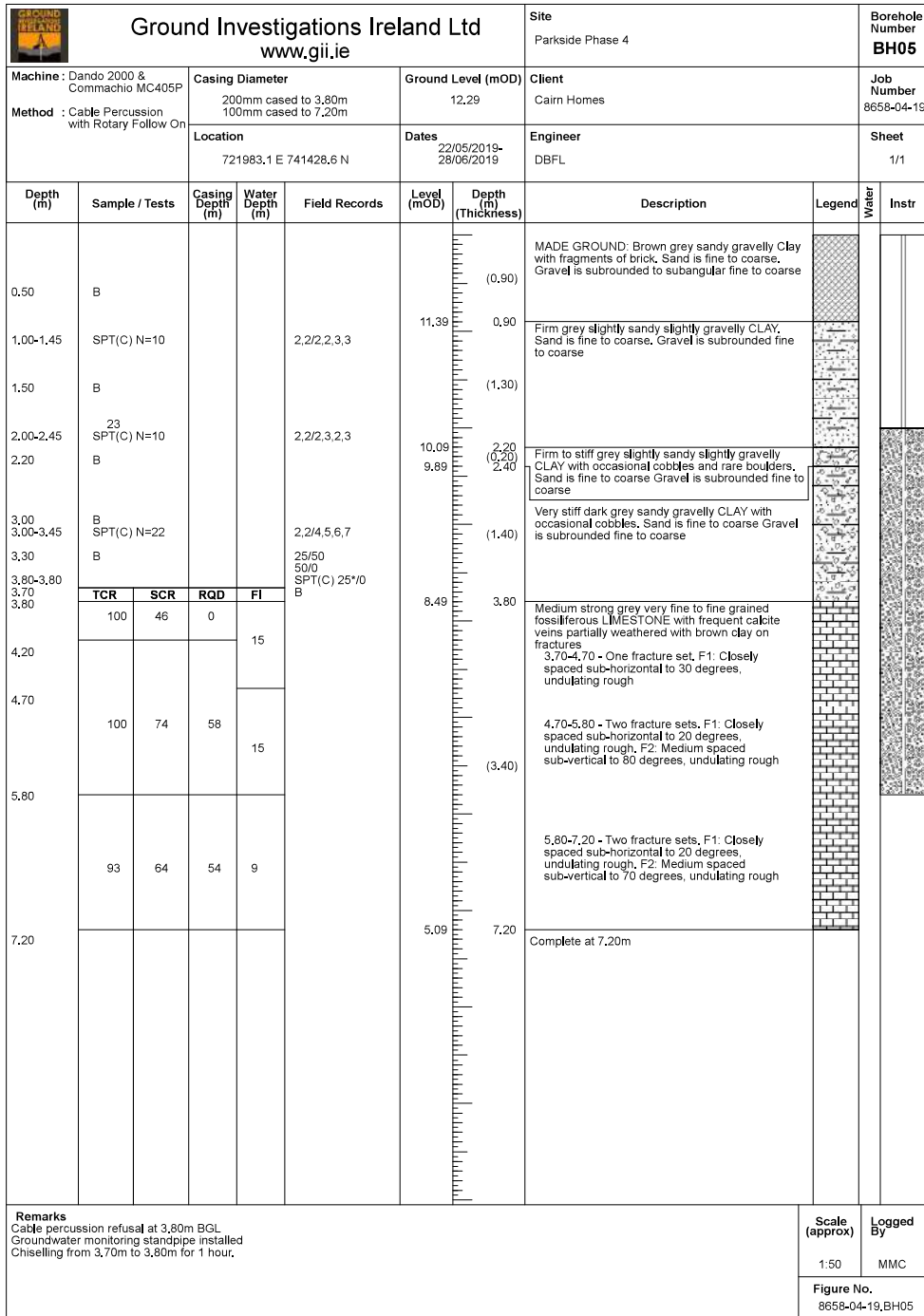
Ground Investigations Ireland Ltd www.gii.ie						Site Parkside Phase 4		Borehole Number BH02			
Machine : Dando 2000 & Commacchio MC405P		Casing Diameter 200mm cased to 8,00m 100mm cased to 16,10m		Ground Level (mOD) 13,48		Client Cairn Homes		Job Number 8658-04-19			
Method : Cable Percussion with Rotary Follow On		Location 721882,9 E 741323,3 N		Dates 28/05/2019-01/07/2019		Engineer DBFL		Sheet 1/2			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr	
						(0,20)	TOPSOIL				
						0,20	MADE GROUND: Brownish grey sandy gravelly Clay				
0,80	B					(0,40)					
1,00-1,45	SPT(C) N=10			3,2/2,3,2,3		12,88	Firm brownish grey slightly sandy slightly gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse, Gravel is subrounded fine to coarse				
1,70	B					11,88	Firm to stiff brownish grey sandy gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse Gravel is subrounded fine to coarse				
2,00-2,45	SPT(C) N=13			3,2/3,2,3,5		(1,25)					
2,50	B					10,63	Dense brownish grey/dark grey gravelly fine to coarse SAND with occasional cobbles, Gravel is subrounded fine to coarse				
3,40	B					(1,25)					
3,00-3,45	SPT(C) N=40			Water strike(1) at 3,00m, rose to 2,92m in 20 mins, 9,8/10,10,10,10		9,38	Stiff dark grey slightly sandy gravelly CLAY with occasional cobbles and boulders, Sand is fine to coarse, Gravel is subrounded fine to coarse				
4,00-4,40	SPT(C) 50/250			5,9/12,13,14,11		(1,10)					
4,10	B					8,28	Stiff dark grey very sandy slightly gravelly CLAY with occasional cobbles, Sand is fine to coarse, Gravel is subrounded fine to coarse				
4,60	B					7,58	Stiff dark grey sandy slightly gravelly CLAY with occasional cobbles, Sand is fine to coarse, Gravel is subrounded fine to coarse				
5,40	B					(0,70)					
5,00-5,45	SPT(C) N=41			Water strike(2) at 5,00m, rose to 4,10m in 20 mins, 9,8/8,9,12,12		6,48	Stiff brownish grey slightly sandy gravelly CLAY with occasional cobbles and boulders, Sand is fine to coarse, Gravel is subrounded fine to coarse				
6,10	B					5,68	Very stiff greyish brown slightly sandy gravelly CLAY with occasional angular cobbles, Sand is fine to coarse, Gravel is angular fine to coarse				
6,50-6,85	SPT(C) 50/200			11,14/16,16,18		4,28	Weak light grey very fine to fine grained LIMESTONE with frequent calcite veins, Residual weathering				
6,80	B					(0,60)					
7,50	B					3,68	Weak light grey very fine to fine grained				
8,00	TCR	SCR	RQD	FI							
	43	-									
9,20	100	-									
9,50	100	19	19	NI							
Remarks										Scale (approx) 1:50	Logged By SC & MMC
Cable percussion refusal at 8,00m BGL Groundwater monitoring standpipe installed Chiselling from 7,30m to 7,40m for 0,5 hours, Chiselling from 7,90m to 8,00m for 0,5 hours.										Figure No. 8658-04-19,BH02	

Ground Investigations Ireland Ltd www.gii.ie						Site Parkside Phase 4		Borehole Number BH02			
Machine : Dando 2000 & Commacchio Flush : MC405P Water Core Dia: 68 mm		Casing Diameter 200mm cased to 8,00m 100mm cased to 16,10m		Ground Level (mOD) 13.48		Client Cairn Homes		Job Number 8658-04-19			
Method : Cable Percussion with Rotary Follow On		Location 721882.9 E 741323.3 N		Dates 28/05/2019-01/07/2019		Engineer DBFL		Sheet 2/2			
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10,30				NI			(1,50)	LIMESTONE with frequent calcite veins. Distinct to destructed weathering with oxide staining 9,80-11,30 - Non Intact			
11,30	100	0	0			2,18	11,30	Medium strong light grey very fine to fine grained LIMESTONE with frequent calcite veins partially weathered with oxide staining			
11,90				10			(1,40)	11,30-12,70 - Two fracture sets, F1: Closely spaced sub-horizontal to 45 degrees, undulating rough, F2: Closely spaced sub-vertical to 85 degrees, undulating rough			
12,70	58	13	13		CAVITY	0,78	12,70 (0,40)	CAVITY: Driller notes, open cavity			
13,10						0,38	13,10	Medium strong light grey very fine to fine grained LIMESTONE with frequent calcite veins partially weathered with oxide staining			
14,30	92	73	73	4			(3,00)	13,10-14,30 - Two fracture sets, F1: Medium spaced sub-horizontal to 20 degrees, undulating rough, F2: Widely spaced sub-vertical to 90 degrees, undulating rough			
14,70	100	20	0					14,30-15,30 - Two fracture sets, F1: Closely spaced sub-horizontal to 25 degrees, undulating rough, F2: Closely spaced sub-vertical to 70 degrees, undulating rough			
15,30	100	64	30					15,30-16,10 - Two fracture sets, F1: Closely spaced sub-horizontal to 25 degrees, undulating rough, F2: Closely spaced sub-vertical to 70 degrees, undulating rough			
16,10						-2,62	16,10	Complete at 16,10m			
Remarks									Scale (approx) 1:50	Logged By SC & MMC	Figure No. 8658-04-19,BH02

Ground Investigations Ireland Ltd www.gii.ie						Site Parkside Phase 4		Borehole Number BH03			
Machine : Dando 2000 Method : Cable Percussion		Casing Diameter 200mm cased to 5,40m		Ground Level (mOD) 11,15		Client Cairn Homes		Job Number 8658-04-19			
		Location 721920,7 E 741402,9 N		Dates 23/05/2019		Engineer DBFL		Sheet 1/1			
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water		
0,30	B					11,05 (0,50)	TOPSOIL				
0,90-1,00-1,45	B SPT(C) N=18			3,5/6,4,4,4		10,55	Stiff grey slightly sandy slightly gravelly CLAY. Sand is fine to coarse, gravel is subrounded medium to coarse				
1,40	B						Stiff brown slightly sandy slightly gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse, gravel is subrounded medium coarse				
2,00-2,45	SPT(C) N=27 B			3,4/5,8,6,8		(3,90)					
2,50	B										
3,00-3,45	SPT(C) N=26			3,3/5,6,7,8							
3,50	B			Water strike(1) at 3,40m, rose to 3,30m in 20 mins.							
4,00-4,45	SPT(C) N=34 B			4,10/6,6,9,13		6,65					
4,60	B					4,50 (0,80)	Very dense brown fine to coarse SAND with frequent angular cobbles				
5,00-5,20	SPT(C) 50/50 B			10,6/7,10,11,22		5,85					
5,00						5,75	OBSTRUCTION: Presumed boulder Complete at 5,40m				
Remarks									Scale (approx) 1:50	Logged By MMC	Figure No. 8658-04-19,BH03

Ground Investigations Ireland Ltd www.gii.ie					Site Parkside Phase 4		Borehole Number BH04		
Machine : Dando 2000 Method : Cable Percussion		Casing Diameter 200mm cased to 1,00m		Ground Level (mOD) 13.18		Client Cairn Homes		Job Number 8658-04-19	
		Location 721966 E 741351.3 N		Dates 01/05/2019		Engineer DBFL		Sheet 1/1	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
12.98						(0,20) 0,20	TOPSOIL		
						(0,70)	Brownish grey slightly sandy slightly gravelly CLAY with occasional cobbles		
12.28					0,90	1,00	OBSTRUCTION: Presumed boulder		
12.18							Complete at 1,00m		
Remarks Refusal at 1,00mBGL Borehole backfilled and moved 1,00m								Scale (approx) 1:50	Logged By MMC
Figure No. 8658-04-19,BH04									

Ground Investigations Ireland Ltd www.gii.ie					Site Parkside Phase 4		Borehole Number BH04(A)		
Machine : Dando 2000 Method :		Casing Diameter 200mm cased to 5,70m		Ground Level (mOD)		Client Cairn Homes		Job Number 8658-04-19	
		Location		Dates 20/05/2019		Engineer DBFL		Sheet 1/1	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0,17) 0,17	TOPSOIL		
0.50	B						Firm brown slightly sandy slightly gravelly CLAY with occasional cobbles. Sand is fine to coarse, gravel is subrounded medium to coarse		
1.00-1.45	SPT(C) N=10			2,2/3,3,2,2		(2,08)			
1.50	B								
2.00-2.45	SPT(C) N=20			2,4/6,5,4,5		2,25			
2.40	B						Stiff dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse, gravel is subrounded medium to coarse		
3.00-3.45	SPT(C) N=25			3,4/6,6,6,7		(2,75)			
3.50	B								
4.00-4.38	SPT(C) 50/233			4,6/12,15,15,8					
4.50	B								
5.00-5.38	SPT(C) 50/230			Water strike(1) at 4,94m. 3,7/14,15,16,5 Water strike(2) at 4,96m.		5,00 (0,60)	Very stiff dark greyish brown sandy gravelly CLAY with occasional cobbles and rare boulders. Sand is fine to coarse, gravel is subrounded medium to coarse		
5.70-5.90	SPT(C) 50/50			25/50		5,60 5,70	OBSTRUCTION: Presumed boulder		
							Complete at 5,70m		
Remarks Refusal at 5,70mBGL Borehole backfilled upon completion Chiselling from 4,30m for 0,5 hours. Chiselling from 5,70m for 0,66 hours.								Scale (approx) 1:50	Logged By MMC
Figure No. 8658-04-19,BH04(A)									



Ground Investigations Ireland Ltd www.gii.ie					Site Parkside Phase 4		Borehole Number BH07		
Machine: Dando 2000 & Commacchio MC405P		Casing Diameter 200mm cased to 5,00m 100mm cased to 7,90m		Ground Level (mOD) 12.51		Client Cairn Homes		Job Number 8658-04-19	
Method: Cable Percussion with Rotary Follow On		Location 722034.8 E 741373.4 N		Dates 21/05/2019		Engineer DBFL		Sheet 1/1	
Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Instr
0.50	B					(1.40)	MADE GROUND- Brownish grey slightly sandy slightly gravelly Clay with occasional cobbles and fragments of brick, Sand is fine to coarse, Gravel is subrounded fine to coarse		
1.00 1.00-1.45	B SPT(C) N=9			1,2/2,2,2,3		11.11 1.40	Firm greyish brown sandy gravelly CLAY with occasional cobbles and rare boulders, Sand is fine to coarse Gravel is subrounded fine to coarse		
2.00 2.00-2.45	B SPT(C) N=9			2,1/2,2,2,3		(1.50)			
2.60	B					9.61 2.90	Stiff dark grey very sandy slightly gravelly CLAY with occasional cobbles and rare boulders, Sand is fine to coarse, Gravel is subrounded fine to coarse		
3.00-3.45	SPT(C) N=29			5,5/7,7,7,8					
3.50	B								
4.00-4.38	SPT(C) 50/230			4,8/13,15,17,5		(2.10)			
4.20	B								
5.00-5.00	TCR	SCR	RQD	FI		7.51 5.00	Medium strong light grey very fine to fine grained fossiliferous LIMESTONE with frequent calcite veins and some pyrite filled vugs partially weathered with some clay smearing on fractures 4.90-5.90 - Two fracture sets, F1: Closely spaced sub-horizontal to 15 degrees, undulating rough, F2: Medium spaced sub-vertical to 60 degrees, undulating rough		
5.00				17					
5.90	100	57	42						
6.30				12		(2.90)	5.90-6.90 - Two fracture sets, F1: Closely spaced sub-horizontal to 20 degrees, undulating rough, F2: Widely spaced sub-vertical to 70 degrees, undulating rough		
6.90	100	73	68				6.90-7.90 - One fracture set, F1: Medium spaced sub-horizontal to 5 degrees, undulating rough		
7.90				8		4.61 7.90	Complete at 7.90m		
Remarks Refusal at 5.00mBCL Wavin installed for rotary follow on Chiselling from 4,90m to 5,00m for 0,5 hours.								Scale (approx) 1:50	Logged By MMC
								Figure No. 8658-04-19,BH07	

Parkside Phase 4
Rotary Core Photographs
BH01



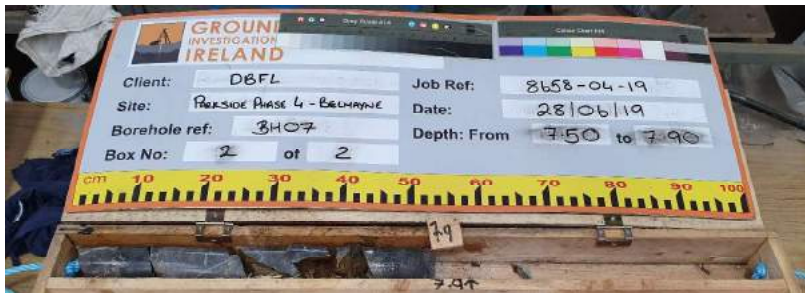
BH02



BH05



BH07



APPENDIX 7 – Groundwater Monitoring

Parkside Phase 4**GROUNDWATER MONITORING:**

BOREHOLE	DATE	GROUNDWATER (mBGL)	COMMENT
BH01	02/08/2019	0.66	
BH02	02/08/2019	2.88	
BH05	02/08/2019	2.60	
BH07	02/08/2019	2.72	

APPENDIX 8 – Laboratory Testing



Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
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Ground Investigations Ireland
Catherinstown House
Hazelhatch Road
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Ireland

Tel: +44 (0) 1244 833780
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Attention : Barry Sexton
Date : 24th May, 2019
Your reference : 8658-04-19
Our reference : Test Report 19/7764 Batch 1
Location : Parkside Site
Date samples received : 14th May, 2019
Status : Final report
Issue : 1

Twenty samples were received for analysis on 14th May, 2019 of which twenty were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Senior Project Manager

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-01	WS-01	WS-01	WS-02	WS-03	WS-03	WS-03	WS-04	WS-04	WS-05			
Depth	0.70	1.70	2.70	0.70	0.70	1.70	2.70	0.70	1.70	0.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
Antimony	2	3	4	1	2	2	3	2	1	3	<1	mg/kg	TM30/PM15
Arsenic [†]	12.0	24.6	11.2	9.1	12.7	7.3	12.7	10.0	7.2	15.5	<0.5	mg/kg	TM30/PM15
Barium [†]	105	149	163	146	110	187	57	96	80	140	<1	mg/kg	TM30/PM15
Cadmium [†]	1.7	2.2	2.0	1.2	2.4	0.8	2.2	0.8	0.6	2.4	<0.1	mg/kg	TM30/PM15
Chromium [†]	23.6	27.7	18.4	22.7	23.2	40.3	17.8	19.3	17.1	28.9	<0.5	mg/kg	TM30/PM15
Copper [†]	35	30	29	19	27	13	25	19	15	34	<1	mg/kg	TM30/PM15
Lead [†]	49	53	48	14	29	22	17	28	26	50	<5	mg/kg	TM30/PM15
Mercury [†]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum [†]	2.5	3.0	4.4	2.5	3.2	2.3	4.3	0.9	0.8	3.3	<0.1	mg/kg	TM30/PM15
Nickel [†]	33.4	39.7	43.8	28.4	38.8	30.4	37.9	17.9	17.6	44.5	<0.7	mg/kg	TM30/PM15
Selenium [†]	3	2	2	2	2	2	2	<1	<1	2	<1	mg/kg	TM30/PM15
Zinc [†]	117	117	84	66	93	82	73	67	54	138	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [†]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [†]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [†]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [†]	0.16	0.26	<0.03	0.13	0.25	<0.03	<0.03	0.33	0.29	0.25	<0.03	mg/kg	TM4/PM8
Anthracene [†]	<0.04	0.12	<0.04	0.04	0.07	<0.04	<0.04	0.12	0.09	0.07	<0.04	mg/kg	TM4/PM8
Fluoranthene [†]	0.31	1.29	<0.03	0.37	0.46	<0.03	<0.03	0.87	0.50	0.43	<0.03	mg/kg	TM4/PM8
Pyrene [†]	0.26	1.12	<0.03	0.33	0.40	<0.03	<0.03	0.80	0.39	0.37	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [†]	0.23	0.80	<0.06	0.21	0.35	<0.06	<0.06	0.45	0.24	0.30	<0.06	mg/kg	TM4/PM8
Chrysene [†]	0.20	0.83	<0.02	0.17	0.26	<0.02	<0.02	0.42	0.21	0.25	<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene [†]	0.38	1.87	<0.07	0.26	0.47	<0.07	<0.07	0.78	0.35	0.43	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [†]	0.19	0.93	<0.04	0.15	0.25	<0.04	<0.04	0.40	0.16	0.23	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [†]	0.14	0.70	<0.04	0.09	0.16	<0.04	<0.04	0.26	0.12	0.15	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [†]	<0.04	0.13	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [†]	0.13	0.68	<0.04	0.08	0.16	<0.04	<0.04	0.26	0.13	0.14	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	0.12	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total [†]	1.15	5.47	<0.22	0.95	1.50	<0.22	<0.22	2.57	1.26	1.38	<0.22	mg/kg	TM4/PM8
PAH 17 Total	2.00	8.91	<0.64	1.83	2.83	<0.64	<0.64	4.79	2.54	2.62	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.27	1.35	<0.05	0.19	0.34	<0.05	<0.05	0.56	0.25	0.31	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.11	0.52	<0.02	0.07	0.13	<0.02	<0.02	0.22	0.10	0.12	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<0.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	90	93	79	97	88	83	60 ^{SV}	95	93	98	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	53	<30	<30	<30	79	54	<30	<30	mg/kg	TM5/PM8/PM15

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-01	WS-01	WS-01	WS-02	WS-03	WS-03	WS-03	WS-04	WS-04	WS-05			
Depth	0.70	1.70	2.70	0.70	0.70	1.70	2.70	0.70	1.70	0.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	18	14	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	53	<7	<7	<7	61	40	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26	53	<26	<26	<26	79	55	<26	<26	mg/kg	TM5/PM8/PM16
>C6-C10	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	0.8 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10	<10	<10	<10	37	27	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10	42	<10	<10	<10	44	30	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	10	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	23	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	43	77	<7	<7	<7	<7	<7	128	29	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	14	13	<7	<7	<7	<7	<7	17	36	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	57	90	<26	<26	<26	<26	<26	178	65	<26	<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics(C5-40)	57	90	<52	53	<52	<52	<52	257	120	<52	<52	mg/kg	TM5/PM8/PM16
>EC6-EC10 #	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10	<10	<10	<10	<10	62	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	39	59	<10	<10	<10	<10	<10	95	32	<10	<10	mg/kg	TM5/PM8/PM16
MTBE #													
Benzene #	<5 ^{SV}	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	ug/kg	TM31/PM12
Toluene #	<5 ^{SV}	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5 ^{SV}	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5 ^{SV}	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	ug/kg	TM31/PM12
o-Xylene #	<5 ^{SV}	<5	<5 ^{SV}	<5 ^{SV}	<5 ^{SV}	<5	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	ug/kg	TM31/PM12
PCB 28 #													
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-01	WS-01	WS-01	WS-02	WS-03	WS-03	WS-03	WS-04	WS-04	WS-05			
Depth	0.70	1.70	2.70	0.70	0.70	1.70	2.70	0.70	1.70	0.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
Natural Moisture Content	19.3	45.1	14.7	10.1	24.5	27.1	10.8	10.1	15.4	19.0	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	16.2	31.1	12.8	9.1	19.7	21.4	9.7	9.2	13.3	16.0	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	23.6	27.7	18.4	22.7	23.2	40.3	17.8	19.3	17.1	28.9	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	2.12	3.39	0.80	0.70	1.06	0.53	0.45	0.48	0.59	1.76	<0.02	%	TM21/PM24
pH #	8.21	7.93	8.78	11.14	8.52	8.17	8.92	11.56	12.10	8.62	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1138	0.1333	0.1031	0.1033	0.1119	0.1162	0.0992	0.1042	0.1063	0.1096		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-05	WS-05	WS-06	WS-07	WS-08	WS-08	WS-08	WS-09	WS-09	WS-09			
Depth	1.70	2.70	0.70	0.70	0.70	1.70	2.70	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
Antimony	3	3	3	2	3	2	3	3	3	3	<1	mg/kg	TM30/PM15
Arsenic [#]	12.0	10.3	14.1	10.7	16.3	12.6	10.3	15.4	11.0	11.5	<0.5	mg/kg	TM30/PM15
Barium [#]	124	65	147	217	280	172	87	103	64	89	<1	mg/kg	TM30/PM15
Cadmium [#]	1.8	1.9	1.2	0.4	3.4	1.7	1.8	2.2	1.7	4.3	<0.1	mg/kg	TM30/PM15
Chromium [#]	35.5	21.4	22.2	13.8	39.9	45.2	18.4	26.6	22.3	31.3	<0.5	mg/kg	TM30/PM15
Copper [#]	19	26	21	9	32	26	26	44	26	30	<1	mg/kg	TM30/PM15
Lead [#]	24	17	29	17	35	27	18	67	16	42	<5	mg/kg	TM30/PM15
Mercury [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum [#]	3.7	2.5	1.3	0.6	3.2	2.4	3.0	2.4	2.6	4.0	<0.1	mg/kg	TM30/PM15
Nickel [#]	33.8	38.5	25.2	13.5	52.2	44.3	36.4	35.4	37.0	41.4	<0.7	mg/kg	TM30/PM15
Selenium [#]	1	<1	2	<1	2	1	<1	<1	<1	6	<1	mg/kg	TM30/PM15
Zinc [#]	103	75	102	50	159	132	72	131	77	102	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	<0.03	<0.03	0.15	0.33	0.06	<0.03	<0.03	0.14	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	0.11	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	<0.03	<0.03	0.26	0.71	0.06	<0.03	<0.03	0.31	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene [#]	<0.03	<0.03	0.24	0.61	0.06	<0.03	<0.03	0.28	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	<0.06	<0.06	0.18	0.33	<0.06	<0.06	<0.06	0.19	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene [#]	<0.02	<0.02	0.17	0.33	0.04	<0.02	<0.02	0.20	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(k)fluoranthene [#]	<0.07	<0.07	0.26	0.63	<0.07	<0.07	<0.07	0.34	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	0.13	0.33	<0.04	<0.04	<0.04	0.18	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	<0.04	<0.04	0.08	0.23	<0.04	<0.04	<0.04	0.13	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(a,h)anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	0.08	0.21	<0.04	<0.04	<0.04	0.13	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total [#]	<0.22	<0.22	0.81	2.11	<0.22	<0.22	<0.22	1.09	<0.22	<0.22	<0.22	mg/kg	TM4/PM8
PAH 17 Total [#]	<0.64	<0.64	1.55	3.82	<0.64	<0.64	<0.64	1.90	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	0.19	0.45	<0.05	<0.05	<0.05	0.24	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	0.07	0.18	<0.02	<0.02	<0.02	0.10	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	95	130	95	96	91	92	82	95	94	93	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	52	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-05	WS-05	WS-06	WS-07	WS-08	WS-08	WS-08	WS-09	WS-09	WS-09			
Depth	1.70	2.70	0.70	0.70	0.70	1.70	2.70	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
TPH CWG													
Aliphatics													
>C5-C6 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 [#]	<4	<4	<4	10	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 [#]	<7	<7	<7	42	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26	52	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
>C6-C10	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	14	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10	35	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 [#]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 [#]	<7	<7	<7	11	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 [#]	<7	<7	42	41	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	11	14	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	53	66	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics(C5													

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-05	WS-05	WS-06	WS-07	WS-08	WS-08	WS-08	WS-09	WS-09	WS-09			
Depth	1.70	2.70	0.70	0.70	0.70	1.70	2.70	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
Natural Moisture Content	22.8	12.4	14.3	10.7	28.8	39.1	11.5	19.7	13.8	10.4	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	18.6	11.0	12.5	9.7	22.3	28.1	10.3	16.4	12.1	9.4	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	35.5	21.4	22.2	13.8	39.9	45.2	18.4	26.6	22.3	31.3	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.65	0.35	0.72	0.36	1.05	1.22	0.38	2.56	0.38	0.59	<0.02	%	TM21/PM24
pH #	7.39	8.81	11.30	11.28	8.52	8.02	8.89	7.95	8.81	8.65	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1102	0.0999	0.0953	0.0982	0.1165	0.1259	0.1019	0.1113	0.1031	0.1011		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Site
Contact: Barry Sexton
JE Job No.: 19/7764

Report : CEN 10:1 Batch
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	Please see attached notes for all abbreviations and acronyms		
Sample ID	WS-01	WS-01	WS-01	WS-02	WS-03	WS-03	WS-03	WS-04	WS-04	WS-05			
Depth	0.70	1.70	2.70	0.70	0.70	1.70	2.70	0.70	1.70	0.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	09/05/2019	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	LOD/LOR	Units	Method No.
Dissolved Antimony #	<0.002	0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	0.0029	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	0.029	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.022	0.019	0.059	0.023	0.010	0.010	0.007	0.027	0.159	0.010	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.22	0.19	0.59	0.23	0.10	0.10	0.07	0.27	1.59	0.10	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	0.0082	<0.0015	<0.0015	<0.0015	0.0121	0.0223	<0.0015	<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	0.082	<0.015	<0.015	<0.015	0.121	0.223	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	0.008	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	0.08	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.008	0.014	0.026	0.005	0.008	0.002	0.006	0.003	0.006	0.009	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.08	0.14	0.26	0.05	0.08	0.02	0.06	0.03	0.06	0.09	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	0.003	0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	0.03	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVA# #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVA# #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	4	<3	<3	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	16.4	1.4	5.6	49.9	14.7	21.2	7.1	39.5	11.9	5.1	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	164	14	56	499	147	212	71	395	119	51	<5	mg/kg	TM38/PM0
Chloride #	<0.3	1.4	0.5	0.7	0.3	0.6	<0.3	1.1	2.9	<0.3	<0.3	mg/l	TM38/PM0
Chloride #	<3	14	5	7	<3	6	<3	11	29	<3	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	4	13	3	<2	4	3	<2	2	2	3	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	40	130	30	<20	40	30	<20	<20	<20	30	<20	mg/kg	TM60/PM0
pH	7.74	7.49	7.43	11.38	8.12	7.62	7.60	11.64	12.12	8.20	<0.01	pH units	TM73/PM0
Total Dissolved Solids #	142	176	77	183	81	56	41	216	448	111	<35	mg/l	TM20/PM0
Total Dissolved Solids #	1419	1760	770	1830	810	560	410	2159	4479	1110	<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Site
 Contact: Barry Sexton
 JE Job No.: 19/7764

Report: EN12457_2
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60						
Sample ID	WS-05	WS-05	WS-06	WS-07	WS-08	WS-08	WS-08	WS-09	WS-09	WS-09						
Depth	1.70	2.70	0.70	0.70	0.70	1.70	2.70	0.70	1.70	2.70						
COC No / misc											Please see attached notes for all abbreviations and acronyms					
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	09/05/2019	09/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	10/05/2019	09/05/2019	09/05/2019	09/05/2019						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1						
Date of Receipt	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	14/05/2019	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon*	0.65	0.35	0.72	0.36	1.05	1.22	0.38	2.56	0.38	0.59	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025 ^{SV}	<0.025 ^{SV}	<0.025 ^{SV}	<0.025	<0.025	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs*	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	52	<30	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TUS/MS/MS
PAH Sum of 6 *	<0.22	<0.22	0.81	2.11	<0.22	<0.22	<0.22	1.09	<0.22	<0.22	-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	1.55	3.82	<0.64	<0.64	<0.64	1.90	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic*	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium*	0.10	0.06	0.32	0.20	0.29	0.07	0.16	0.24	0.04	0.05	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium*	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium*	<0.015	<0.015	0.058	0.029	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper*	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM51/PM0
Molybdenum*	<0.02	0.15	<0.02	<0.02	0.08	<0.02	0.14	0.05	0.04	0.11	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel*	<0.02	<0.02	<0.02	0.03	0.03	<0.02	<0.02	0.03	<0.02	<0.02	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead*	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony*	<0.02	<0.02	<0.02	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc*	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids*	970	1061	2789	2760	1561	960	890	1590	890	660	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	<20	<20	70	120	<20	100	<20	<20	500	800	1000	<20	mg/kg	TM20/PM0
Mass of raw test portion	0.1102	0.0999	0.0953	0.0982	0.1165	0.1259	0.1019	0.1113	0.1031	0.1011	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	81.3	90.5	94.1	91.9	77.3	71.4	88.5	81.2	87.3	89.4	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.879	0.891	0.894	0.892	0.874	0.864	0.888	0.879	0.887	0.889	-	-	-		l	NONE/PM17
Eluate Volume	0.64	0.75	0.8	0.84	0.65	0.71	0.78	0.75	0.7	0.75	-	-	-		l	NONE/PM17
pH*	7.39	8.81	11.30	11.28	8.52	8.02	8.89	7.95	8.81	8.65	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	4	<3	<3	-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4*	211	77	372	662	99	<5	34	116	32	18	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride*	4	<3	11	<3	10	7	<3	9	<3	<3	800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Site
 Contact: Barry Sexton

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
19/7764	1	WS-01	0.70	1-3	Possible trace PAH's & Naturally occurring compounds
19/7764	1	WS-01	1.70	4-6	Possible PAH's & Naturally occurring compounds
19/7764	1	WS-01	2.70	7-9	No interpretation possible
19/7764	1	WS-02	0.70	10-12	Lubricating oil & Naturally occurring compounds
19/7764	1	WS-03	0.70	13-15	No interpretation possible
19/7764	1	WS-03	1.70	16-18	No interpretation possible
19/7764	1	WS-03	2.70	19-21	No interpretation possible
19/7764	1	WS-04	0.70	22-24	Possible trace Degraded diesel , lubricating oil, PAH's & Naturally occurring compounds
19/7764	1	WS-04	1.70	25-27	Possible trace Degraded diesel , lubricating oil, PAH's & Naturally occurring compounds
19/7764	1	WS-05	0.70	28-30	No interpretation possible
19/7764	1	WS-05	1.70	31-33	No interpretation possible
19/7764	1	WS-05	2.70	34-36	No interpretation possible
19/7764	1	WS-06	0.70	37-39	Naturally occurring compounds
19/7764	1	WS-07	0.70	40-42	Possible trace Degraded diesel , lubricating oil & Naturally occurring compounds
19/7764	1	WS-08	0.70	43-45	No interpretation possible
19/7764	1	WS-08	1.70	46-48	No interpretation possible
19/7764	1	WS-08	2.70	49-51	No interpretation possible
19/7764	1	WS-09	0.70	52-54	No interpretation possible
19/7764	1	WS-09	1.70	55-57	No interpretation possible
19/7764	1	WS-09	2.70	58-60	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Site
Contact: Barry Sexton

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
 Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/7764	1	WS-01	0.70	2	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-01	1.70	5	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-01	2.70	8	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-02	0.70	11	18/05/2019	General Description (Bulk Analysis)	Soil/Stone
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-03	0.70	14	18/05/2019	General Description (Bulk Analysis)	Soil/Stone
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-03	1.70	17	18/05/2019	General Description (Bulk Analysis)	Soil/Stone
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-03	2.70	20	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Site
Contact: Barry Sexton

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/7764	1	WS-03	2.70	20	18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-04	0.70	23	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
19/7764	1	WS-04	1.70	26	18/05/2019	Asbestos Level Screen	NAD
					18/05/2019	General Description (Bulk Analysis)	Soil/Stone
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
19/7764	1	WS-04	1.70	26	18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Fibres	NAD
19/7764	1	WS-05	0.70	29	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-05	1.70	32	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-05	2.70	35	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-06	0.70	38	18/05/2019	General Description (Bulk Analysis)	Soil/Stone
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-07	0.70	41	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-08	0.70	44	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD
					18/05/2019	Asbestos ACM	NAD
					18/05/2019	Asbestos Type	NAD
					18/05/2019	Asbestos Level Screen	NAD
19/7764	1	WS-08	1.70	47	18/05/2019	General Description (Bulk Analysis)	soil-stones
					18/05/2019	Asbestos Fibres	NAD

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/7764

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

JE Job No.: 19/7764

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Please include all sections of this report if it is reproduced

All solid results are expressed on a dry weight basis unless stated otherwise.

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/7764

Leachate tests	
10l/kg, 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometric methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amounts of acid or base needed to cover the pH range
Notes:	
*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS	
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180	
***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.	

Exova Jones Environmental

Method Code Appendix

JE Job No: 19/7764

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Effa TOC Analyzer/Analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SCM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/7764

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phase High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID on-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID on-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 10923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 10923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analyses except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

JE Job No: 19/7764

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM00	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 8060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7513, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM65.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11466 and BS1377.			AR	

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/8807

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

QF-PM 3.1.9 v34

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

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Exova Jones Environmental

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/8807						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

QF-PM 3.1.11 v3

Please include all sections of this report if it is reproduced

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ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble ion analysis using Dicterie Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (p-Phosphate), 363.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of air received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AD	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrom automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No

Ground Investigations Ireland
 Catherinstown House
 Hazelhatch Road
 Newcastle
 Co. Dublin
 Ireland



Attention : Barry Sexton
Date : 27th June, 2019
Your reference : 8658-04-19
Our reference : Test Report 19/9756 Batch 1
Location : Parkside Phase 4
Date samples received : 17th June, 2019
Status : Final report
Issue : 1

Three samples were received for analysis on 17th June, 2019 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
 All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
 Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton
EMT Job No: 19/9756

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9									LOD/LOR	Units	Method No.
	Sample ID	BH01	BH01	BH01										
Depth	0.50	1.60	2.50											
COC No / misc														
Containers	V J T	V J T	V J T											
Sample Date	12/06/2019	12/06/2019	12/06/2019											
Sample Type	Soil	Soil	Soil											
Batch Number	1	1	1											
Date of Receipt	17/06/2019	17/06/2019	17/06/2019											
Antimony	2	2	2									<1	mg/kg	TM30/PM15
Arsenic [#]	14.9	7.6	9.6									<0.5	mg/kg	TM30/PM15
Barium [#]	213	48	76									<1	mg/kg	TM30/PM15
Cadmium [#]	2.7	1.3	2.0									<0.1	mg/kg	TM30/PM15
Chromium [#]	50.4	31.5	28.7									<0.5	mg/kg	TM30/PM15
Copper [#]	34	19	20									<1	mg/kg	TM30/PM15
Lead [#]	42	16	21									<5	mg/kg	TM30/PM15
Mercury [#]	<0.1	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Molybdenum [#]	3.2	3.2	3.7									<0.1	mg/kg	TM30/PM15
Nickel [#]	53.5	28.7	28.8									<0.7	mg/kg	TM30/PM15
Selenium [#]	2	2	2									<1	mg/kg	TM30/PM15
Zinc [#]	156	72	78									<5	mg/kg	TM30/PM15
PAH MS														
Naphthalene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	0.07	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	0.13	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.10	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	0.10	<0.06	<0.06									<0.06	mg/kg	TM4/PM8
Chrysene [#]	0.08	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene [#]	0.13	<0.07	<0.07									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	0.07	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
PAH 6 Total [#]	0.33	<0.22	<0.22									<0.22	mg/kg	TM4/PM8
PAH 17 Total	0.68	<0.64	<0.64									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.09	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.04	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1									<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	90	75	71									<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30									<30	mg/kg	TM5/PM8/PM15

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton
EMT Job No: 19/9756

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9																			
Sample ID	BH01	BH01	BH01																			
Depth	0.50	1.60	2.50																			
COC No / misc																						
Containers	V J T	V J T	V J T																			
Sample Date	12/06/2019	12/06/2019	12/06/2019																			
Sample Type	Soil	Soil	Soil																			
Batch Number	1	1	1																			
Date of Receipt	17/06/2019	17/06/2019	17/06/2019																			
																				LOD/LOL	Units	Method No.
Please see attached notes for all abbreviations and acronyms																						
TPH CWG																						
Aliphatics																						
>C5-C6 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12								<0.1	%	PM4/PM0
>C6-C8 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12								<0.1	%	PM4/PM0
>C8-C10	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>C10-C12 [#]	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5PMB/PM16										
>C12-C16 [#]	<4	<4	<4							<4	mg/kg	TM5PMB/PM16										
>C16-C21 [#]	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
>C21-C35 [#]	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
>C35-C40	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
Total aliphatics C5-40	<26	<26	<26							<26	mg/kg	TM5PMB/PM16										
>C6-C10	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>C10-C25	<10	<10	<10							<10	mg/kg	TM5PMB/PM16										
>C25-C35	<10	<10	<10							<10	mg/kg	TM5PMB/PM16										
Aromatics																						
>C5-EC7 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>EC7-EC8 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>EC8-EC10 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>EC10-EC12 [#]	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5PMB/PM16										
>EC12-EC16 [#]	<4	<4	<4							<4	mg/kg	TM5PMB/PM16										
>EC16-EC21 [#]	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
>EC21-EC35 [#]	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
>EC35-EC40	<7	<7	<7							<7	mg/kg	TM5PMB/PM16										
Total aromatics C5-40	<26	<26	<26							<26	mg/kg	TM5PMB/PM16										
Total aliphatics and aromatics(C5-40)	<52	<52	<52							<52	mg/kg	TM5PMB/PM16										
>EC6-EC10 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}							<0.1	mg/kg	TM36/PM12										
>EC10-EC25	<10	<10	<10							<10	mg/kg	TM5PMB/PM16										
>EC25-EC35	<10	<10	<10							<10	mg/kg	TM5PMB/PM16										
MTBE [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
Benzene [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
Toluene [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
Ethylbenzene [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
m/p-Xylene [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
o-Xylene [#]	<5	<5 ^{SV}	<5 ^{SV}							<5	ug/kg	TM31/PM12										
PCB 28 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 52 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 101 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 118 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 138 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 153 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
PCB 180 [#]	<5	<5	<5							<5	ug/kg	TM17/PM8										
Total 7 PCBs [#]	<35	<35	<35							<35	ug/kg	TM17/PM8										

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton
EMT Job No: 19/9756

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9																				
Sample ID	BH01	BH01	BH01																				
Depth	0.50	1.60	2.50																				
COC No / misc																							
Containers	V J T	V J T	V J T																				
Sample Date	12/06/2019	12/06/2019	12/06/2019																				
Sample Type	Soil	Soil	Soil																				
Batch Number	1	1	1																				
Date of Receipt	17/06/2019	17/06/2019	17/06/2019																				
																				LOD/LOL	Units	Method No.	
Please see attached notes for all abbreviations and acronyms																							
Natural Moisture Content	41.2	14.2	12.3																		<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	29.2	12.5	10.9																		<0.1	%	PM4/PM0
Hexavalent Chromium [#]	<0.3	<0.3	<0.3																		<0.3	mg/kg	TM38/PM20
Chromium III	50.4	31.5	28.7																		<0.5	mg/kg	NONE/NONE
Total Organic Carbon [#]	1.53	0.57	0.48																		<0.02	%	TM21/PM24
pH [#]	8.12	8.69	8.43																		<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1156	0.1	0.1024																			kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09																			kg	NONE/PM17

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/9756

Report : CEN 10:1 1 Batch
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	Please see attached notes for all abbreviations and acronyms	LOD/LOR	Units	Method No.
	Sample ID	Depth	COC No / misc				
	BH01	BH01	BH01				
	0.50	1.60	2.50				
	V J T	V J T	V J T				
	12/06/2019	12/06/2019	12/06/2019				
	Soil	Soil	Soil				
	1	1	1				
	17/06/2019	17/06/2019	17/06/2019				
Dissolved Antimony [#]	<0.002	<0.002	<0.002		<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) [#]	<0.02	<0.02	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Arsenic [#]	<0.0025	<0.0025	<0.0025		<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) [#]	<0.025	<0.025	<0.025		<0.025	mg/kg	TM30/PM17
Dissolved Barium [#]	0.011	0.016	0.046		<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) [#]	0.11	0.16	0.46		<0.03	mg/kg	TM30/PM17
Dissolved Cadmium [#]	<0.0005	<0.0005	<0.0005		<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) [#]	<0.005	<0.005	<0.005		<0.005	mg/kg	TM30/PM17
Dissolved Chromium [#]	<0.0015	<0.0015	<0.0015		<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) [#]	<0.015	<0.015	<0.015		<0.015	mg/kg	TM30/PM17
Dissolved Copper [#]	<0.007	<0.007	<0.007		<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) [#]	<0.07	<0.07	<0.07		<0.07	mg/kg	TM30/PM17
Dissolved Lead [#]	<0.005	<0.005	<0.005		<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) [#]	<0.05	<0.05	<0.05		<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum [#]	0.003	0.028	0.013		<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) [#]	0.03	0.28	0.13		<0.02	mg/kg	TM30/PM17
Dissolved Nickel [#]	<0.002	<0.002	<0.002		<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) [#]	<0.02	<0.02	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Selenium [#]	<0.003	0.007	0.010		<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) [#]	<0.03	0.07	0.10		<0.03	mg/kg	TM30/PM17
Dissolved Zinc [#]	<0.003	<0.003	<0.003		<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) [#]	<0.03	<0.03	<0.03		<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVA [#]	<0.00001	<0.00001	<0.00001		<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVA [#]	<0.0001	<0.0001	<0.0001		<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01		<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1		<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3		<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3		<3	mg/kg	TM173/PM0
Sulphate as SO ₄ [#]	5.5	9.4	51.6		<0.5	mg/l	TM38/PM0
Sulphate as SO ₄ [#]	55	94	516		<5	mg/kg	TM38/PM0
Chloride [#]	1.3	0.5	<0.3		<0.3	mg/l	TM38/PM0
Chloride [#]	13	5	<3		<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	5	2	<2		<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50	20	<20		<20	mg/kg	TM60/PM0
pH	7.98	8.09	8.08		<0.01	pH units	TM73/PM0
Total Dissolved Solids [#]	108	80	143		<35	mg/l	TM20/PM0
Total Dissolved Solids [#]	1079	800	1431		<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/9756

Report : EN12457_2
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	Please see attached notes for all abbreviations and acronyms	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
	Sample ID	Depth	COC No / misc							
	BH01	BH01	BH01							
	0.50	1.60	2.50							
	V J T	V J T	V J T							
	12/06/2019	12/06/2019	12/06/2019							
	Soil	Soil	Soil							
	1	1	1							
	17/06/2019	17/06/2019	17/06/2019							
Solid Waste Analysis										
Total Organic Carbon [#]	1.53	0.57	0.48		3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 ^{SV}	<0.025 ^{SV}		6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs [#]	<0.035	<0.035	<0.035		1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30		500	-	-	<30	mg/kg	TM6/PM11
PAH Sum of 6 [#]	0.33	<0.22	<0.22		-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	0.68	<0.64	<0.64		100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate										
Arsenic [#]	<0.025	<0.025	<0.025		0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium [#]	0.11	0.16	0.46		20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium [#]	<0.005	<0.005	<0.005		0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium [#]	<0.015	<0.015	<0.015		0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper [#]	<0.07	<0.07	<0.07		2	50	100	<0.07	mg/kg	TM30/PM17
Mercury [#]	<0.0001	<0.0001	<0.0001		0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum [#]	0.03	0.28	0.13		0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel [#]	<0.02	<0.02	<0.02		0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead [#]	<0.05	<0.05	<0.05		0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony [#]	<0.02	<0.02	<0.02		0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium [#]	<0.03	0.07	0.10		0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc [#]	<0.03	<0.03	<0.03		4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids [#]	1079	800	1431		4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	50	20	<20		500	800	1000	<20	mg/kg	TM60/PM0
Mass of raw test portion	0.1156	0.1	0.1024		-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	77.9	89.8	87.9		-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.874	0.89	0.888		-	-	-		l	NONE/PM17
Elate Volume	0.55	0.75	0.76		-	-	-		l	NONE/PM17
pH [#]	8.12	8.69	8.43		-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1		1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3		-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO ₄ [#]	55	94	516		1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride [#]	13	5	<3		800	15000	25000	<3	mg/kg	TM38/PM0

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

EMT Job No: 19/9756

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometric methods after distillation)* (BY HPLC - EMT)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amounts of acid or base needed to cover the pH range
Notes:	
*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS	
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180	
***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.	

Element Materials Technology

Method Code Appendix

EMT Job No: 19/9756

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS) ANAS	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11469 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required. Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required. Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TMS/TM36	please refer to TMS and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1999 Determination of Total Organic Carbon or Total Carbon by combustion in an ETOC TOC analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

Element Materials Technology

Method Code Appendix

EMT Job No: 19/9756

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS) ANAS	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analyses except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

Ground Investigations Ireland
 Catharinestown House
 Hazelhatch Road
 Newcastle
 Co. Dublin
 Ireland



Element Materials Technology

Method Code Appendix

EMT Job No: 19/9756

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM00	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 8050, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM65.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NDNE	No Method Code	NDNE	No Method Code			AD	Yes
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NDNE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

QF-PM 3.1.10 v14

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15 of 15

Attention : Barry Sexton
Date : 1st July, 2019
Your reference : 8658-04-19
Our reference : Test Report 19/9762 Batch 1
Location : Parkside Phase 4
Date samples received : 17th June, 2019
Status : Final report
Issue : 1

Eight samples were received for analysis on 17th June, 2019 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:



Bruce Leslie
 Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/9762

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	LOD/LOR	Units	Method No.
	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06			
Sample ID	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06	Please see attached notes for all abbreviations and acronyms		
Depth	1.70	0.70	1.70	0.70	1.70	0.70	1.70	0.70			
COC No / misc											
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1			
Date of Receipt	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019			
Antimony	2	3	2	2	2	2	2	2	<1	mg/kg	TM30/PM15
Arsenic [#]	12.6	27.2	9.7	13.3	13.3	15.9	13.9	12.3	<0.5	mg/kg	TM30/PM15
Barium [#]	137	264	85	133	187	119	126	112	<1	mg/kg	TM30/PM15
Cadmium [#]	1.7	2.5	1.8	1.7	3.1	2.1	2.3	1.9	<0.1	mg/kg	TM30/PM15
Chromium [#]	69.5	89.1	48.6	36.8	60.3	60.4	69.2	45.7	<0.5	mg/kg	TM30/PM15
Copper [#]	27	30	23	28	31	35	34	33	<1	mg/kg	TM30/PM15
Lead [#]	25	32	14	30	36	192	43	41	<5	mg/kg	TM30/PM15
Mercury [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum [#]	5.4	13.7	5.1	4.3	4.0	6.3	5.8	4.6	<0.1	mg/kg	TM30/PM15
Nickel [#]	43.0	52.0	27.1	37.3	39.8	39.5	41.1	34.2	<0.7	mg/kg	TM30/PM15
Selenium [#]	1	2	3	4	3	2	1	1	<1	mg/kg	TM30/PM15
Zinc [#]	114	120	67	102	141	160	125	112	<5	mg/kg	TM30/PM15
PAH MS											
Naphthalene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	0.05	<0.03	<0.03	<0.03	<0.03	0.11	<0.03	0.20	<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	0.08	<0.03	<0.03	<0.03	<0.03	0.21	0.06	0.42	<0.03	mg/kg	TM4/PM8
Pyrene [#]	0.07	<0.03	<0.03	<0.03	<0.03	0.17	0.05	0.36	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	<0.06	<0.06	<0.06	<0.06	<0.06	0.19	<0.06	0.32	<0.06	mg/kg	TM4/PM8
Chrysenes [#]	<0.02	<0.02	<0.02	<0.02	<0.02	0.11	<0.02	0.26	<0.02	mg/kg	TM4/PM8
Benzo(k)fluoranthene [#]	<0.07	<0.07	<0.07	<0.07	<0.07	0.24	<0.07	0.46	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	0.12	<0.04	0.26	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	0.09	<0.04	0.16	<0.04	mg/kg	TM4/PM8
Dibenzo(a,h)anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	0.09	<0.04	0.15	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total [#]	<0.22	<0.22	<0.22	<0.22	<0.22	0.75	<0.22	1.45	<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	1.33	<0.64	2.65	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	0.17	<0.05	0.33	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	0.07	<0.02	0.13	<0.02	mg/kg	TM4/PM8
Benzo(i)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	90	85	88	87	94	92	94	92	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/9762

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	LOD/LOR	Units	Method No.
	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06			
Sample ID	TP02	TP03	TP03	TP04	TP04	TP05	TP05	TP06	Please see attached notes for all abbreviations and acronyms		
Depth	1.70	0.70	1.70	0.70	1.70	0.70	1.70	0.70			
COC No / misc											
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019	12/06/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1			
Date of Receipt	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019	17/06/2019			
TPH CWG											
Aliphatics											
>C5-C6 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C6-C8 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 [#]	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
>C6-C10	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics											
>C5-EC7 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC8-EC10 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 [#]	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics(C5-40)	<52	<52	<52	<52	<52	<52	<52	<52	<52	mg/kg	TM5/PM8/PM16
>EC6-EC10 [#]	<0.1	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
MTBE [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
Benzene [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
Toluene [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
Ethylbenzene [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
m/p-Xylene [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
o-Xylene [#]	<5	<5	<5 ^{SV}	<5 ^{SV}	<5	<5 ^{SV}	<5	<5 ^{SV}	<5	ug/kg	TM31/PM12
PCB 28 [#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 [#]	<5	<5									

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Phase 4
Contact: Barry Sexton

Note:
 Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.
 Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Element Materials Technology:


 Ryan Butterworth
 Asbestos Team Leader

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/9762	1	TP02	1.70	2	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP03	0.70	5	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP03	1.70	8	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP04	0.70	11	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP04	1.70	14	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP05	0.70	17	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP05	1.70	20	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Phase 4
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/9762	1	TP05	1.70	20	19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD
19/9762	1	TP06	0.70	23	19/06/2019	General Description (Bulk Analysis)	soil/stones
					19/06/2019	Asbestos Fibres	NAD
					19/06/2019	Asbestos ACM	NAD
					19/06/2019	Asbestos Type	NAD
					19/06/2019	Asbestos Level Screen	NAD

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

EMT Job No: 19/9762

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometric methods after distillation)* (BY HPLC - EMT)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amounts of acid or base needed to cover the pH range
Notes:	
*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS	
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180	
***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.	

Element Materials Technology

Method Code Appendix

EMT Job No: 19/9762

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11469 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC/FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TMS/TM36	please refer to TMS and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1999 Determination of Total Organic Carbon or Total Carbon by combustion in an Eira TOC titrimetric analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

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Element Materials Technology

Method Code Appendix

EMT Job No: 19/9762

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analyses except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes

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Ground Investigations Ireland
 Catharinestown House
 Hazelhatch Road
 Newcastle
 Co. Dublin
 Ireland



Element Materials Technology

Method Code Appendix

EMT Job No: 19/9762

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM00	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 8050, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM65.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NDNE	No Method Code	NDNE	No Method Code			AD	Yes
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NDNE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

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Attention : Barry Sexton
Date : 3rd July, 2019
Your reference : 8658-04-19
Our reference : Test Report 19/10073 Batch 1
Location : Parkside Phase 4
Date samples received : 21st June, 2019
Status : Final report
Issue : 1

Eighteen samples were received for analysis on 21st June, 2019 of which eighteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied. All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:



Phil Sommerton BSc
 Senior Project Manager

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Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/10073

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH02	BH02	BH02	BH03	BH03	BH03	BH04A	BH04A	BH04A	BH05			
Depth	0.80	1.70	2.50	0.90	1.40	2.50	0.50	1.50	2.40	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019			
	LOD/LOR	Units	Method No.										
Antimony	3	2	2	3	2	2	2	2	2	2	<1	mg/kg	TM30/PM15
Arsenic [#]	15.4	11.9	8.2	18.8	10.1	8.2	13.2	12.8	12.2	13.9	<0.5	mg/kg	TM30/PM15
Barium [#]	115	101	112	102	95	121	120	162	78	180	<1	mg/kg	TM30/PM15
Cadmium [#]	2.0	1.1	1.6	2.4	1.4	1.4	1.7	2.4	1.7	2.6	<0.1	mg/kg	TM30/PM15
Chromium [#]	55.6	40.4	41.7	53.5	40.2	46.8	51.6	57.0	41.8	62.6	<0.5	mg/kg	TM30/PM15
Copper [#]	25	15	20	22	15	20	24	18	29	38	<1	mg/kg	TM30/PM15
Lead [#]	33	16	16	23	16	18	30	29	17	73	<5	mg/kg	TM30/PM15
Mercury [#]	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum [#]	4.7	3.2	4.0	6.1	3.9	4.1	4.0	4.1	5.5	4.4	<0.1	mg/kg	TM30/PM15
Nickel [#]	42.6	32.8	36.4	33.2	28.9	40.8	34.9	50.0	38.0	41.3	<0.7	mg/kg	TM30/PM15
Selenium [#]	1	2	2	3	3	3	1	1	2	2	<1	mg/kg	TM30/PM15
Zinc [#]	116	65	87	178	68	78	97	135	74	150	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene [#]	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene [#]	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.21	<0.03	mg/kg	TM4/PM8
Anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene [#]	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.11	<0.03	<0.03	0.34	<0.03	mg/kg	TM4/PM8
Pyrene [#]	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.11	<0.03	<0.03	0.30	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene [#]	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.07	<0.06	<0.06	0.21	<0.06	mg/kg	TM4/PM8
Chrysene [#]	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	<0.02	0.20	<0.02	mg/kg	TM4/PM8
Benzo(k)fluoranthene [#]	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	0.11	<0.07	<0.07	0.33	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	0.16	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.12	<0.04	mg/kg	TM4/PM8
Dibenzo(a,h)anthracene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene [#]	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.12	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total [#]	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	0.28	<0.22	<0.22	1.07	<0.22	mg/kg	TM4/PM8
PAH 17 Total [#]	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	1.99	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.24	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.09	<0.02	mg/kg	TM4/PM8
Benzo(i)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	78	96	71	96	89	74	79	84	70	75	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	58	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/10073

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH02	BH02	BH02	BH03	BH03	BH03	BH04A	BH04A	BH04A	BH05			
Depth	0.80	1.70	2.50	0.90	1.40	2.50	0.50	1.50	2.40	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019			
	LOD/LOR	Units	Method No.										
TPH CWG													
Aliphatics													
>C5-C6 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 [#]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 [#]	<7	<7	<7	58	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26	58	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
>C6-C10	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10	45	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 [#]	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1 ^{SV}	<0.1 ^{SV}	<0.1 ^{SV}	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 [#]	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 [#]	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 [#]	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	mg/kg	TM5/PM8/PM16
Total aliphatics and aromatics(C5-40)													

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/10073

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30	Please see attached notes for all abbreviations and acronyms		
Sample ID	BH02	BH02	BH02	BH03	BH03	BH03	BH04A	BH04A	BH04A	BH05			
Depth	0.80	1.70	2.50	0.90	1.40	2.50	0.50	1.50	2.40	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019			
	LOD/LOR	Units	Method No.										
Natural Moisture Content	26.4	14.0	14.4	18.4	9.9	14.5	21.1	30.5	13.6	30.9	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	20.9	12.2	12.6	15.5	9.0	12.7	17.4	23.4	12.0	23.6	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	55.6	40.4	41.7	53.5	40.2	46.8	51.6	57.0	41.8	62.6	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.71	0.42	0.49	0.50	0.43	0.48	0.69	0.88	0.43	1.90	<0.02	%	TM21/PM24
pH #	8.59	8.45	8.40	8.67	8.41	8.44	8.61	8.46	8.70	8.25	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1056	0.103	0.1028	0.103	0.0997	0.1016	0.1109	0.1226	0.1027	0.1178		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

Element Materials Technology

Client Name: Ground Investigations Ireland
 Reference: 8658-04-19
 Location: Parkside Phase 4
 Contact: Barry Sexton
 EMT Job No: 19/10073

Report : Solid
 Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	Please see attached notes for all abbreviations and acronyms				
Sample ID	BH05	BH05	BH06	BH06	BH06	BH07	BH07	BH07					
Depth	1.50	3.00	1.00	1.60	2.40	0.50	2.00	2.60					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019					
	LOD/LOR	Units	Method No.										
Antimony	2	2	3	3	3	2	2	2			<1	mg/kg	TM30/PM15
Arsenic #	13.6	15.0	17.2	17.1	17.4	12.0	14.9	11.5			<0.5	mg/kg	TM30/PM15
Barium #	168	143	130	146	168	108	144	66			<1	mg/kg	TM30/PM15
Cadmium #	2.5	3.3	2.6	2.2	2.8	1.9	2.4	1.6			<0.1	mg/kg	TM30/PM15
Chromium #	56.0	45.2	64.2	66.8	60.4	57.5	56.6	44.1			<0.5	mg/kg	TM30/PM15
Copper #	41	9	47	55	14	32	32	27			<1	mg/kg	TM30/PM15
Lead #	45	15	104	99	32	137	528	22			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	4.1	4.3	5.3	5.0	6.5	4.6	4.9	4.4			<0.1	mg/kg	TM30/PM15
Nickel #	45.2	38.5	46.8	41.3	57.5	36.3	44.0	38.9			<0.7	mg/kg	TM30/PM15
Selenium #	2	1	2	2	2	1	2	2			<1	mg/kg	TM30/PM15
Zinc #	166	67	216	244	108	154	166	74			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.28	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.16	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.31	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	0.05	<0.03	<0.03	0.30	3.61	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	0.54	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	0.08	0.08	<0.03	0.46	5.00	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	0.06	0.06	<0.03	0.39	3.92	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	0.08	<0.06	<0.06	0.23	2.36	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	0.05	<0.02	<0.02	0.27	2.50	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(b)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	0.42	4.23	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.19	2.05	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene	<0.04	<0.04	<0.04	<0.04	<0.04	0.15	1.48	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	0.42	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	0.15	1.37	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.27	<0.04			<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	<0.22	<0.22	1.37	14.13	<0.22			<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	2.68	28.66	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	0.30	3.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	0.12	1.18	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	98	70	78	91	72	103	112	97			<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	54	<30	<30	<30	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton
EMT Job No: 19/10073

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54					LOD/LOR	Units	Method No.
Sample ID	BH05	BH05	BH06	BH06	BH06	BH07	BH07	BH07							
Depth	1.50	3.00	1.00	1.60	2.40	0.50	2.00	2.60							
COC No / misc															
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1	1	1							
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019							
TPH CWG															
Aliphatics															
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4					<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	54	<7	<7	<7	11	20	<7					<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7	<7	<7	<7	<7	<7					<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	54	<26	<26	<26	<26	<26	<26					<26	mg/kg	TM36/PM12
>C6-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10	<10	<10	<10	<10	<10					<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	55	<10	<10	<10	<10	17	<10					<10	mg/kg	TM5/PM8/PM16
Aromatics															
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2					<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4					<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	14	31	<7					<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	93	161	<7					<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	<7	<7	<7	16	28	<7					<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	<26	<26	<26	123	220	<26					<26	mg/kg	TM36/PM12
Total aliphatics and aromatics(C5-40)	<52	54	<52	<52	<52	123	220	<52					<52	mg/kg	TM36/PM12
>EC6-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 ^{SV}	<0.1					<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10	<10	<10	39	68	<10					<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10	<10	<10	<10	71	117	<10					<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5	<5 ^{SV}	<5					<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5					<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35					<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton
EMT Job No: 19/10073

Report : Solid
Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54					LOD/LOR	Units	Method No.
Sample ID	BH05	BH05	BH06	BH06	BH06	BH07	BH07	BH07							
Depth	1.50	3.00	1.00	1.60	2.40	0.50	2.00	2.60							
COC No / misc															
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019	19/06/2019							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1	1	1							
Date of Receipt	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019	21/06/2019							
Natural Moisture Content	31.0	25.4	27.7	29.1	29.1	26.9	34.3	9.5					<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	23.6	20.3	21.7	22.5	22.5	21.2	25.5	8.7					<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3					<0.3	mg/kg	TM38/PM20
Chromium III	56.0	45.2	64.2	66.8	60.4	57.5	56.6	44.1					<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	1.10	0.39	1.57	1.38	0.52	3.11	3.38	0.38					<0.02	%	TM21/PM24
pH #	8.08	8.37	7.92	7.74	8.00	8.10	7.90	8.79					<0.01	pH units	TM73/PM11
Mass of raw test portion	0.121	0.1112	0.1185	0.1228	0.1181	0.1148	0.1221	0.1002						kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09						kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
19/10073	1	BH02	0.80	1-3	No interpretation possible
19/10073	1	BH02	1.70	4-6	No interpretation possible
19/10073	1	BH02	2.50	7-9	No interpretation possible
19/10073	1	BH03	0.90	10-12	Possible lubricating oil
19/10073	1	BH03	1.40	13-15	No interpretation possible
19/10073	1	BH03	2.50	16-18	No interpretation possible
19/10073	1	BH04A	0.50	19-21	No interpretation possible
19/10073	1	BH04A	1.50	22-24	No interpretation possible
19/10073	1	BH04A	2.40	25-27	No interpretation possible
19/10073	1	BH05	0.50	28-30	No interpretation possible
19/10073	1	BH05	1.50	31-33	No interpretation possible
19/10073	1	BH05	3.00	34-36	Possible lubricating oil
19/10073	1	BH06	1.00	37-39	No interpretation possible
19/10073	1	BH06	1.60	40-42	No interpretation possible
19/10073	1	BH06	2.40	43-45	No interpretation possible
19/10073	1	BH07	0.50	46-48	PAH's
19/10073	1	BH07	2.00	49-51	PAH's
19/10073	1	BH07	2.60	52-54	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Phase 4
Contact: Barry Sexton

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Element Materials Technology:



Ryan Butterworth
 Asbestos Team Leader

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/10073	1	BH02	0.80	2	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH02	1.70	5	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH02	2.50	8	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH03	0.90	11	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH03	1.40	14	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH03	2.50	17	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH04A	0.50	20	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD

Element Materials Technology

Asbestos Analysis

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Phase 4
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/10073	1	BH04A	0.50	20	26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH04A	1.50	23	26/06/2019	General Description (Bulk Analysis)	soil/stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH04A	2.40	26	26/06/2019	General Description (Bulk Analysis)	soil/stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH05	0.50	29	26/06/2019	General Description (Bulk Analysis)	Soil
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH05	1.50	32	26/06/2019	General Description (Bulk Analysis)	soil-stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH05	3.00	35	26/06/2019	General Description (Bulk Analysis)	Soil
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH06	1.00	38	26/06/2019	General Description (Bulk Analysis)	Soil
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH06	1.60	41	26/06/2019	General Description (Bulk Analysis)	soil-stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH06	2.40	44	26/06/2019	General Description (Bulk Analysis)	soil/stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
19/10073	1	BH07	0.50	47	26/06/2019	General Description (Bulk Analysis)	soil/stones
					26/06/2019	Asbestos Fibres	NAD

Element Materials Technology

Asbestos Analysis

Client Name: Ground Investigations Ireland
Reference: 19/04/8658
Location: Parkside Phase 4
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
19/10073	1	BH07	0.50	47	26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH07	2.00	50	26/06/2019	General Description (Bulk Analysis)	Soil
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD
19/10073	1	BH07	2.60	53	26/06/2019	General Description (Bulk Analysis)	soil.stones
					26/06/2019	Asbestos Fibres	NAD
					26/06/2019	Asbestos ACM	NAD
					26/06/2019	Asbestos Type	NAD
					26/06/2019	Asbestos Level Screen	NAD

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No: 19/10073

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Element Materials Technology

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 8658-04-19
Location: Parkside Phase 4
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 19/10073						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

EMT Job No: 19/10073

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometric methods after distillation)* (BY HPLC - EMT)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amounts of acid or base needed to cover the pH range
Notes:	
*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS	
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180	
***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.	

Element Materials Technology

Method Code Appendix

EMT Job No: 19/10073

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS) ANAS	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required. Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GC-FID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required. Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TMS/TM36	please refer to TMS and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eira TOC analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

Element Materials Technology

Method Code Appendix

EMT Job No: 19/10073

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS) ANAS	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12467-2. As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methylterbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC-FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GC-MS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15925-1, 7186A (Hex Cl)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analyses except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes



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Unconfined Compression Tests On Rock Cores

Project: Parkside Phase 4

Project No: 8658 - 04 - 19

Delivery Date: 26.07.2019

Test Date: 30.07.2019

<i>Borehole Number</i>	<i>Depth (m)</i>	<i>Average Diameter (mm)</i>	<i>Height (mm)</i>	<i>Length/Dia. (Ratio)</i>	<i>Unconfined Compressive Strength (Mpa)</i>	<i>Density (Mg/m³)</i>
BH - 01	9.10 - 9.60	63.1	153.5	2.43	78.8	2.68
BH - 05	4.70 - 5.00	63.2	153.6	2.43	102.4	2.72

Element Materials Technology

Method Code Appendix

EMT Job No: 19/10073

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/IS ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM00	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 8000, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM95.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NDNE	No Method Code	NDNE	No Method Code			AD	Yes
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NDNE	No Method Code	PM17	Modified method BS EN12467-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NDNE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Prof. B. O'Kelly

Specimens prepared and tested in accordance with suggested method from International Society for Rock Mechanics (ISRM), 1985



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Point Load Index Tests (single diametral determination)

Project: Parkside Phase 4

Project No: 8658 - 04 - 19

Delivery date: 24.07.2019

Test Date: 30.07.2019

Diametric samples

Borehole No.	Depth (m)	Is(50) (Mpa)
BH - 01	9.70 - 10.10	5.54
BH - 05	5.00 - 5.20	4.01
BH - 05	6.90 - 7.20	5.58
BH - 07	6.30 - 6.60	4.72

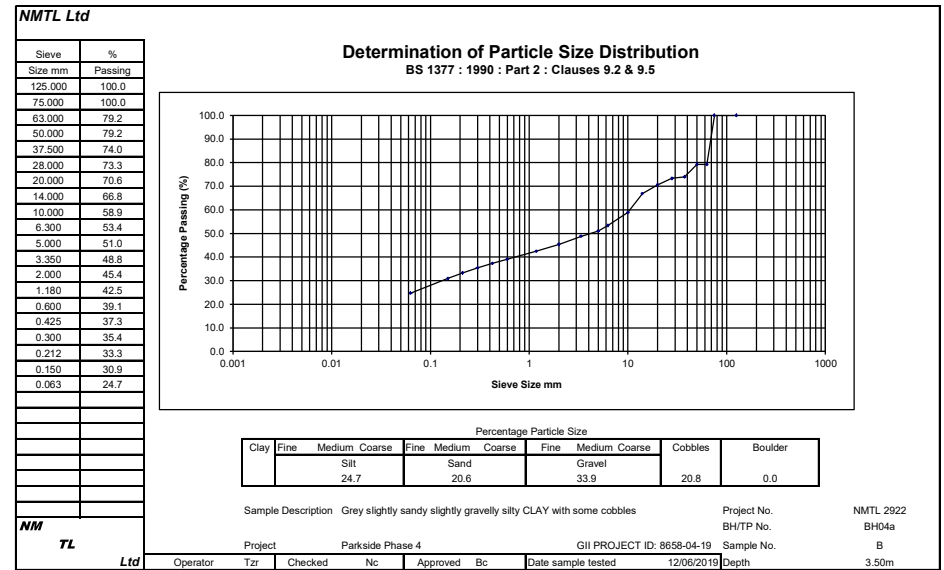
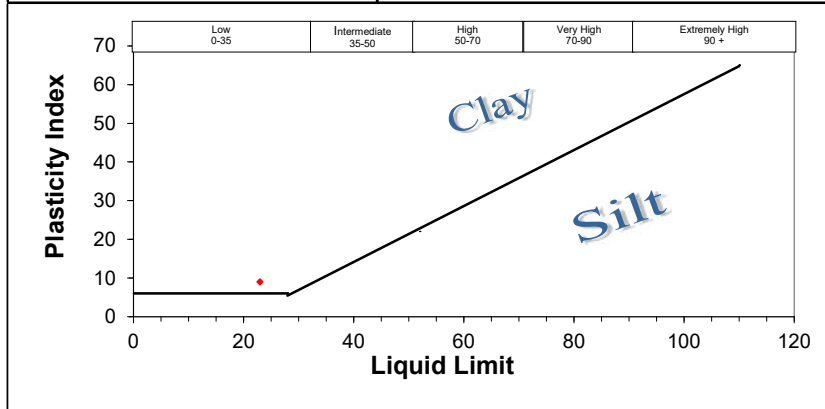
National Materials Testing Laboratory Ltd.															
SUMMARY OF TEST RESULTS															
BH/TP No	Depth m	sample No.	Moisture %	Density Mg/m ³	Particle <425um %	LL %	PL %	PI %	Bulk Density Mg/m ³	Cell Pressure kPa	Undrained Triaxial Tests Compressive Stress kPa	Strain at Failure %	Lab Vane kPa	Remarks	
BH04a	3.50	B	11.4		37.3	23	14	9							
NMTL	Notes : 1. All BS tests carried out using preferred (definitive) method unless otherwise stated.										Job ref No.	NMTL	GII Project ID:	8658-04-19	
											Location	Parkside Phase 4			

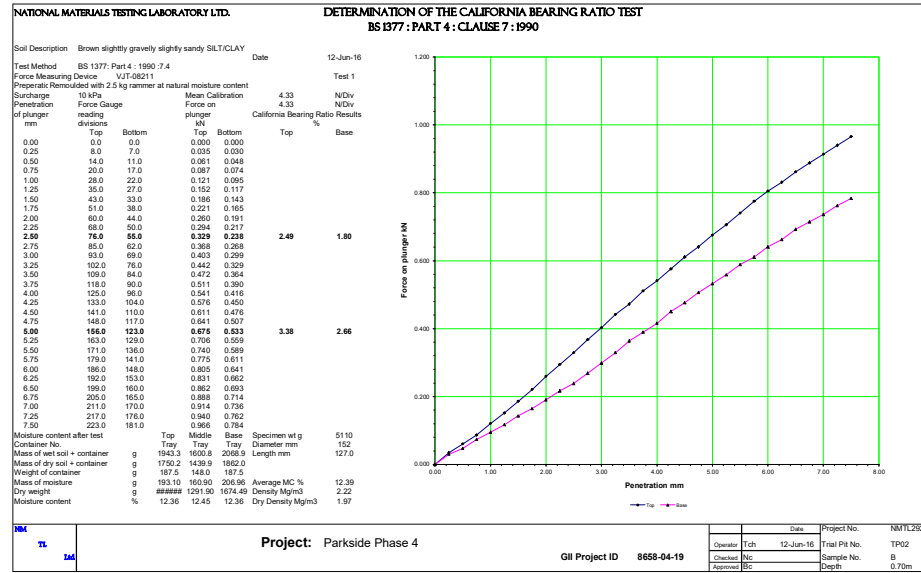
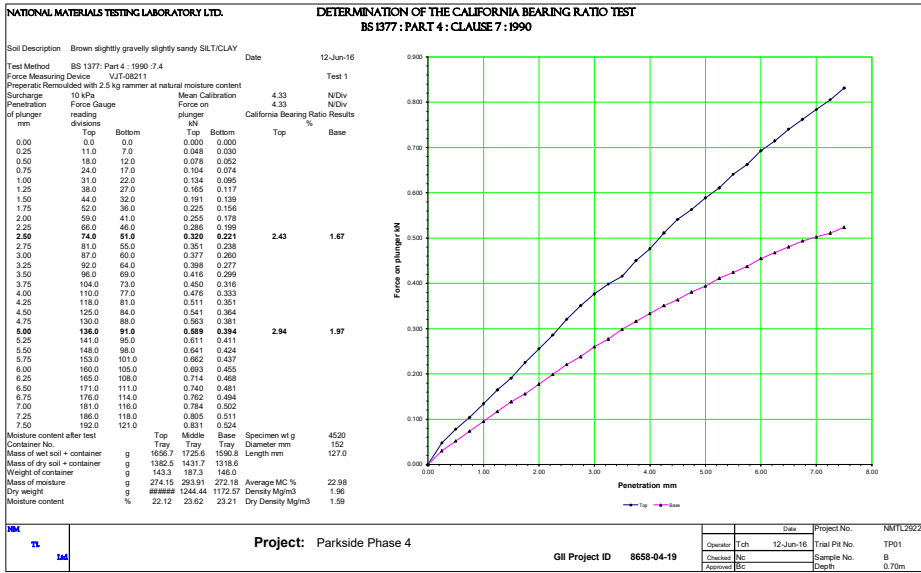
Revision-02

Prof. Brendan O'Kelly

Specimens prepared and tested in accordance with suggested method from International Society for Rock Mechanics (ISRM), 1985

NMTL LTD Unit 18c, Tullow Industrial Estate Tullow County Carlow Tel: 00353 59 9180822 Mob: 00353 872575508 bill@nmtl.ie	Contract: Parkside Phase 4 Client: Ground Investigations Ireland Ltd Engineer: Aisling McDonnell GII Project ID: 8658-04-19 Date: 17/06/2019 Tested By: Sb Checked: Bc Job ref No.: NMTL
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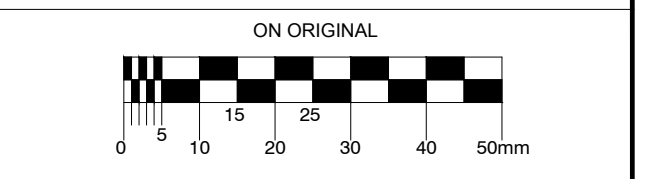




CHAPTER 7 HYDROLOGY AND WATER SERVICES

APPENDIX 7.1 - PRE & POST DEVELOPMENT FLOODPLAIN EXTENTS

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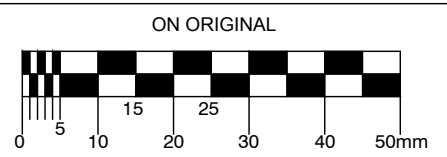
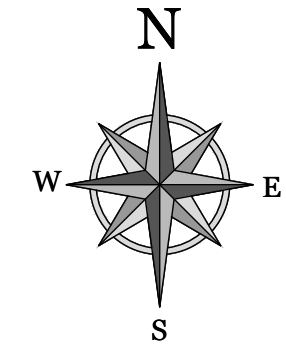
- NOTES:
- LEGEND:
- SITE BOUNDARY
 - EXISTING WAYNE STREAM/RIVER
 - EXISTING 1:100 Yr FLOOD EXTENTS (0.1% AEP)
 - EXISTING 1:1000 Yr FLOOD EXTENTS (0.1% AEP)
 - EXISTING FLOOD ZONES A & B - < 0.1% AEP
 - PROPOSED EXISTING FLOOD ZONE C - > 0.1% AEP
 - FLOOD SECTION POSITION & PREPARING REFERENCE NODE
 - EXTENT OF EXISTING FLOODPLAIN TO BE REPROFILLED
- GENERAL NOTES:
- ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER BEFORE COMMENCEMENT OF WORKS.
 - THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF EXISTING DRAINAGE LEVELS AND LOCATION OF EXISTING SERVICES IN THE PROOF TO CONFORMANCE OF WORKS ON SITE.
 - ALL DIMENSIONS AND LEVELS ARE IN METERS AND ARE RELATED TO ORDNANCE DATUM. CO-ORDINATES RELATE TO IRISH NATIONAL GRID.
 - ALL MATERIALS USED IN FLOODPLAIN MODIFICATION TO BE IN ACCORDANCE WITH THE SITES 600 SPECIFICATIONS.
 - REFER TO DBFL SITE SPECIFIC FLOOD RISK ASSESSMENT.



FEM FRAMS FLOOD DATA

Station Profile	Hydraulic Maximum Level (m AOD)	Bank & Bed Levels (m AOD)	IGB Coordinates	Section Elevation Extents					
100 Yr	1000 Yr	Left Bank Right Bank	Max Left	Max Right					
Wayne River	12.45	12.32	12.32	12.31	11.98	12.03	12.03	12.03	12.03
M02020	12.36	12.45	12.29	12.29	12.18	12.24	12.24	12.24	12.24
M02030	12.28	12.45	12.29	12.29	12.18	12.24	12.24	12.24	12.24
M02040	11.92	12.11	12.29	12.29	12.18	12.24	12.24	12.24	12.24
M02050	11.78	11.97	12.19	12.19	12.08	12.14	12.14	12.14	12.14
M02060	11.61	11.78	11.97	11.97	11.86	11.92	11.92	11.92	11.92
M02070	11.45	11.62	11.87	11.87	11.76	11.82	11.82	11.82	11.82
M02080	11.30	11.47	11.68	11.68	11.57	11.63	11.63	11.63	11.63
M02090	11.15	11.31	11.53	11.53	11.42	11.48	11.48	11.48	11.48
M02100	11.02	11.18	11.38	11.38	11.27	11.33	11.33	11.33	11.33
M02110	10.87	11.03	11.24	11.24	11.13	11.19	11.19	11.19	11.19
M02120	10.73	10.89	11.10	11.10	10.99	11.05	11.05	11.05	11.05
M02130	10.58	10.74	10.96	10.96	10.85	10.91	10.91	10.91	10.91
M02140	10.44	10.60	10.82	10.82	10.71	10.77	10.77	10.77	10.77
M02150	10.30	10.46	10.68	10.68	10.57	10.63	10.63	10.63	10.63
M02160	10.16	10.32	10.54	10.54	10.43	10.49	10.49	10.49	10.49
M02170	10.02	10.18	10.40	10.40	10.29	10.35	10.35	10.35	10.35
M02180	9.88	10.04	10.26	10.26	10.15	10.21	10.21	10.21	10.21
M02190	9.74	9.90	10.12	10.12	10.01	10.07	10.07	10.07	10.07
M02200	9.60	9.76	9.98	9.98	9.87	9.93	9.93	9.93	9.93
M02210	9.46	9.62	9.84	9.84	9.73	9.79	9.79	9.79	9.79
M02220	9.32	9.48	9.70	9.70	9.59	9.65	9.65	9.65	9.65
M02230	9.18	9.34	9.56	9.56	9.45	9.51	9.51	9.51	9.51
M02240	9.04	9.20	9.42	9.42	9.31	9.37	9.37	9.37	9.37
M02250	8.90	9.06	9.28	9.28	9.17	9.23	9.23	9.23	9.23
M02260	8.76	8.92	9.14	9.14	9.03	9.09	9.09	9.09	9.09
M02270	8.62	8.78	9.00	9.00	8.89	8.95	8.95	8.95	8.95
M02280	8.48	8.64	8.86	8.86	8.75	8.81	8.81	8.81	8.81
M02290	8.34	8.50	8.72	8.72	8.61	8.67	8.67	8.67	8.67
M02300	8.20	8.36	8.58	8.58	8.47	8.53	8.53	8.53	8.53
M02310	8.06	8.22	8.44	8.44	8.33	8.39	8.39	8.39	8.39
M02320	7.92	8.08	8.30	8.30	8.19	8.25	8.25	8.25	8.25
M02330	7.78	7.94	8.16	8.16	8.05	8.11	8.11	8.11	8.11
M02340	7.64	7.80	8.02	8.02	7.91	7.97	7.97	7.97	7.97
M02350	7.50	7.66	7.88	7.88	7.77	7.83	7.83	7.83	7.83
M02360	7.36	7.52	7.74	7.74	7.63	7.69	7.69	7.69	7.69
M02370	7.22	7.38	7.60	7.60	7.49	7.55	7.55	7.55	7.55
M02380	7.08	7.24	7.46	7.46	7.35	7.41	7.41	7.41	7.41
M02390	6.94	7.10	7.32	7.32	7.21	7.27	7.27	7.27	7.27
M02400	6.80	6.96	7.18	7.18	7.07	7.13	7.13	7.13	7.13
M02410	6.66	6.82	7.04	7.04	6.93	6.99	6.99	6.99	6.99
M02420	6.52	6.68	6.90	6.90	6.79	6.85	6.85	6.85	6.85
M02430	6.38	6.54	6.76	6.76	6.65	6.71	6.71	6.71	6.71
M02440	6.24	6.40	6.62	6.62	6.51	6.57	6.57	6.57	6.57
M02450	6.10	6.26	6.48	6.48	6.37	6.43	6.43	6.43	6.43
M02460	5.96	6.12	6.34	6.34	6.23	6.29	6.29	6.29	6.29
M02470	5.82	5.98	6.20	6.20	6.09	6.15	6.15	6.15	6.15
M02480	5.68	5.84	6.06	6.06	5.95	6.01	6.01	6.01	6.01
M02490	5.54	5.70	5.92	5.92	5.81	5.87	5.87	5.87	5.87
M02500	5.40	5.56	5.78	5.78	5.67	5.73	5.73	5.73	5.73
M02510	5.26	5.42	5.64	5.64	5.53	5.59	5.59	5.59	5.59
M02520	5.12	5.28	5.50	5.50	5.39	5.45	5.45	5.45	5.45
M02530	4.98	5.14	5.36	5.36	5.25	5.31	5.31	5.31	5.31
M02540	4.84	5.00	5.22	5.22	5.11	5.17	5.17	5.17	5.17
M02550	4.70	4.86	5.08	5.08	4.97	5.03	5.03	5.03	5.03
M02560	4.56	4.72	4.94	4.94	4.83	4.89	4.89	4.89	4.89
M02570	4.42	4.58	4.80	4.80	4.69	4.75	4.75	4.75	4.75
M02580	4.28	4.44	4.66	4.66	4.55	4.61	4.61	4.61	4.61
M02590	4.14	4.30	4.52	4.52	4.41	4.47	4.47	4.47	4.47
M02600	4.00	4.16	4.38	4.38	4.27	4.33	4.33	4.33	4.33
M02610	3.86	4.02	4.24	4.24	4.13	4.19	4.19	4.19	4.19
M02620	3.72	3.88	4.10	4.10	3.99	4.05	4.05	4.05	4.05
M02630	3.58	3.74	3.96	3.96	3.85	3.91	3.91	3.91	3.91
M02640	3.44	3.60	3.82	3.82	3.71	3.77	3.77	3.77	3.77
M02650	3.30	3.46	3.68	3.68	3.57	3.63	3.63	3.63	3.63
M02660	3.16	3.32	3.54	3.54	3.43	3.49	3.49	3.49	3.49
M02670	3.02	3.18	3.40	3.40	3.29	3.35	3.35	3.35	3.35
M02680	2.88	3.04	3.26	3.26	3.15	3.21	3.21	3.21	3.21
M02690	2.74	2.90	3.12	3.12	3.01	3.07	3.07	3.07	3.07
M02700	2.60	2.76	2.98	2.98	2.87	2.93	2.93	2.93	2.93
M02710	2.46	2.62	2.84	2.84	2.73	2.79	2.79	2.79	2.79
M02720	2.32	2.48	2.70	2.70	2.59	2.65	2.65	2.65	2.65
M02730	2.18	2.34	2.56	2.56	2.45	2.51	2.51	2.51	2.51
M02740	2.04	2.20	2.42	2.42	2.31	2.37	2.37	2.37	2.37
M02750	1.90	2.06	2.28	2.28	2.17	2.23	2.23	2.23	2.23
M02760	1.76	1.92	2.14	2.14	2.03	2.09	2.09	2.09	2.09
M02770	1.62	1.78	2.00	2.00	1.89	1.95	1.95	1.95	1.95
M02780	1.48	1.64	1.86	1.86	1.75	1.81	1.81	1.81	1.81
M02790	1.34	1.50	1.72	1.72	1.61	1.67	1.67	1.67	1.67
M02800	1.20	1.36	1.58	1.58	1.47	1.53	1.53	1.53	1.53
M02810	1.06	1.22	1.44	1.44	1.33	1.39	1.39	1.39	1.39
M02820	0.92	1.08	1.30	1.30	1.19	1.25	1.25	1.25	1.25
M02830	0.78	0.94	1.16	1.16	1.05	1.11	1.11	1.11	1.11
M02840	0.64	0.80	1.02	1.02	0.91	0.97	0.97	0.97	0.97
M02850	0.50	0.66	0.88	0.88	0.77	0.83	0.83	0.83	0.83
M02860	0.36	0.52	0.74	0.74	0.63	0.69	0.69	0.69	0.69
M02870	0.22	0.38	0.60	0.60	0.49	0.55	0.55	0.55	0.55
M02880	0.08	0.24	0.46	0.46	0.35	0.41	0.41	0.41	0.41
M02890	-0.06	0.10	0.32	0.32	0.21	0.27	0.27	0.27	0.27
M02900	-0.20	-0.04	0.18	0.18	0.07	0.13	0.13	0.13	0.13
M02910	-0.34	-0.18	0.04	0.04	-0.07	-0.01	-0.01	-0.01	-0.01
M02920	-0.48	-0.32	-0.10	-0.10	-0.13	-0.07	-0.07	-0.07	-0.07
M02930	-0.62	-0.46	-0.24	-0.24	-0.27	-0.21	-0.21	-0.21	-0.21
M02940	-0.76	-0.60	-0.38	-0.38	-0.41	-0.35	-0.35	-0.35	-0.35
M02950	-0.90	-0.74	-0.52	-0.52	-0.55	-0.49	-0.49	-0.49	-0.49
M02960	-1.04	-0.88	-0.66	-0.66	-0.69	-0.63	-0.63	-0.63	-0.63
M02970	-1.18	-1.02	-0.80	-0.80	-0.83	-0.77	-0.77	-0.77	-0.77
M02980	-1.32	-1.16	-0.94	-0.94	-0.97	-0.91	-0.91	-0.91	-0.91
M02990	-1.46	-1.30	-1.08	-1.08	-1.11	-1.05	-1.05	-1.05	-1.05
M03000	-1.60	-1.44	-1.22	-1.22	-1.25	-1.19	-1.19	-1.19	-1.19
M03010	-1.74	-1.58	-1.36	-1.36	-1.39	-1.33	-1.33	-1.33	-1.33
M03020	-1.88	-1.72	-1.50	-1.50	-1.53	-1.47	-1.47	-1.47	-1.47
M03030	-2.02	-1.86	-1.64	-1.64	-1.67	-1.61	-1.61	-1.61	-1.61
M03040	-2.16	-2.00	-1.78	-1.78	-1.81	-1.75	-1.75	-1.75	-1.75
M03050	-2.30	-2.14	-1.92	-1.92	-1.95	-1.89	-1.89	-1.89	-1.89
M03060	-2.44	-2.28	-2.06	-2.06	-2.09	-2.03	-2.03	-2.03	-2.03
M03070	-2.58	-2.42	-2.20	-2.20	-2.23	-2.17	-2.17	-2.17	-2.17
M03080	-2.72	-2.56	-2.34	-2.34	-2.37	-2.31	-2.31	-2.31	-2.31
M03090	-2.86	-2.70	-2.48	-2.48	-2.51	-2.45	-2.45	-2.45	-2.45
M03100	-3.00	-2.84	-2.62	-2.62	-2.65	-2.59	-2.59	-2.59	-2.59
M03110	-3.14	-2.98	-2.76	-2.76	-2.79	-2.73	-2.73	-2.73	-2.73
M03120	-3.28	-3.12	-2.90	-2.90	-2.93	-2.87	-2.87	-2.87	-2.87
M03130	-3.42	-3.26	-3.04	-3.04	-3.07	-3.01	-3.01	-3.01	-3.01
M03140	-3.56	-3.40	-3.18	-3.18	-3.21	-3.15	-3.15	-3.15	-3.15
M03150	-3.70	-3.54	-3.32	-3.32	-3.35	-3.29	-3.29	-3.29	-3.29
M03160	-3.84	-3.68	-3.46	-3.46	-3.49	-3.43	-3.43	-3.43	-3.43
M03170	-3.98	-3.82	-3.60	-3.60	-3.63	-3.57	-3.57	-3.57	-3.57
M03180	-4.12	-3.96	-3.74	-3.74	-3.77	-3.71	-3.71	-3.71	-3.71
M03190	-4.26	-4.10	-3.88	-3.88	-3				

APPENDIX 7.2 - DRAINAGE LAYOUT



- GENERAL NOTES:
1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPANCIES BEFORE WORK COMMENCES.
 2. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF EXISTING DRAINAGE LEVELS AND LOCATION OF EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS ON SITE.
 3. ALL DIMENSIONS AND LEVELS ARE IN METERS AND ARE RELATED TO ORDNANCE DATUM. CO-ORDINATES RELATE TO IRISH NATIONAL GRID.
 4. ALL FOUL SEWERS, MANHOLES AND CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND IRISH WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS.
 5. ALL FOUL SEWER HOUSE CONNECTIONS TO BE MIN 100mm UPVC TO IS EN 1401 2009/2012, STIFFNESS CLASS BKN/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
 6. ALL PUBLIC FOUL SEWERS PIPE MATERIAL TO BE IN COMPLIANCE WITH SECTION 3.13 OF IRISH WATER WASTEWATER CODE OF PRACTICE.
 7. ALL PUBLIC SURFACE WATER SEWERS TO BE MINIMUM 225 DIA CLASS H CONCRETE TO EN1916 & IS 6 2004 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
 8. ALL SURFACE WATER CONNECTIONS TO BE MINIMUM 150mm UPVC TO IS EN 1401 2009/2012 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
 9. LOCATION AND INVERT LEVELS OF EXISTING MANHOLES OR OUTFALL POINTS, WHERE APPLICABLE, TO BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF DRAINAGE WORKS.
 10. ALL COVER LEVELS TO MATCH FINISHED ROAD/VERGE/FOOTPATH/CYCLETRACK LEVELS UNLESS OTHERWISE STATED.
 11. CONTRACTOR TO INCLUDE FOR CCTV SURVEY OF ALL SEWERS UPON COMPLETION OF SAME.
 12. ALL FOUL SEWERS TO BE AIR TESTED IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
 13. WHERE COVERS ARE LOCATED IN GRASS AREAS, THEY SHALL BE SURROUNDED BY A CONCRETE PLINTH 200MM ALL ROUND AND 100MM DEEP FORMED WITH C20/25 CONCRETE, 20MM AGGREGATE SIZE, BEDDED IN CLAUSE 808 MATERIAL.

- LEGEND:
- SITE BOUNDARY
 - EXISTING MAYNE STREAM/RIVER
 - PROPOSED SURFACE WATER DRAINAGE
 - SLOT DRAIN (A/C OR SIMILAR APPROVED)
 - PROPOSED FOUL SEWER
 - FOUL RISING MAIN
 - EXISTING SURFACE WATER
 - EXISTING FOUL SEWER
 - EXISTING DRAINAGE TO BE REMOVED
 - WATERMAIN
 - EXISTING WATERMAIN
 - SURFACE WATER ATTENUATION TANK
 - PROPOSED BUILDING
 - OUTLINE OF BASEMENT
 - NORTH FRINGE SEWER EASEMENT AREA
 - PROPOSED FLOOD ZONE A & B EXTENTS

REV	DATE	DESCRIPTION	BY	CHKD
A	20/09/19	STAGE 3 SUBMISSION TO ABP	PJC	NGC

PLANNING			
DESIGNED	NGC	PREPARED	PJC
DATE	APR 2019	CHECKED	DJR

Dublin Office: Ormrod House, Upper Ormrod Quay, Dublin 7, Ireland. PHONE +353 1 400 4000 FAX +353 1 400 4050

Waterford Office: Unit 2, The Chandlery, 1-2 O'Connell Street, Waterford, Ireland. PHONE +353 51 308 500 FAX +353 51 844 913

DBFL Consulting Engineers email: info@dbfl.ie site: www.dbfl.ie

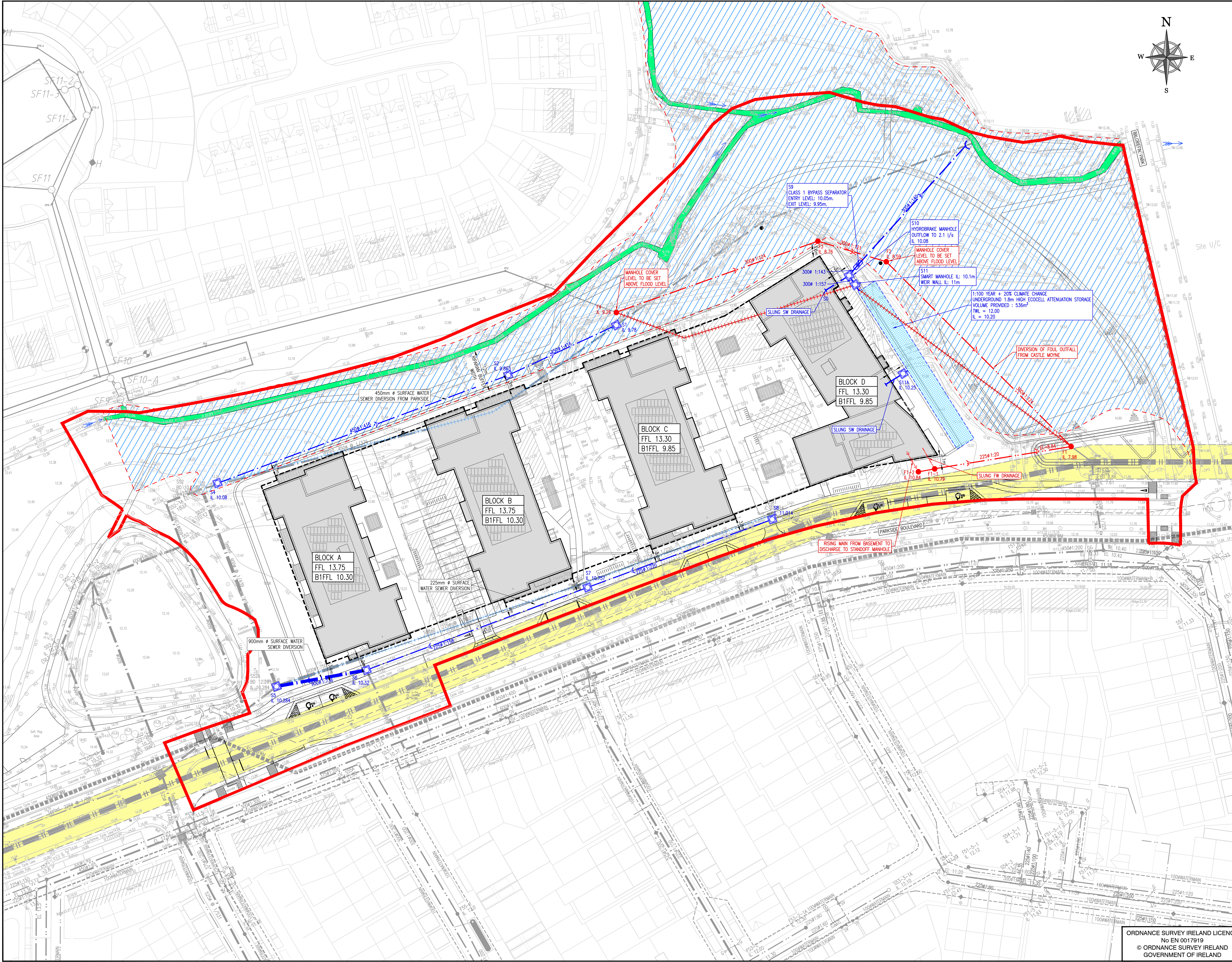
PROJECT
PARKSIDE 4, PARKSIDE, DUBLIN 13

DRG. TITLE
DRAINAGE LAYOUT

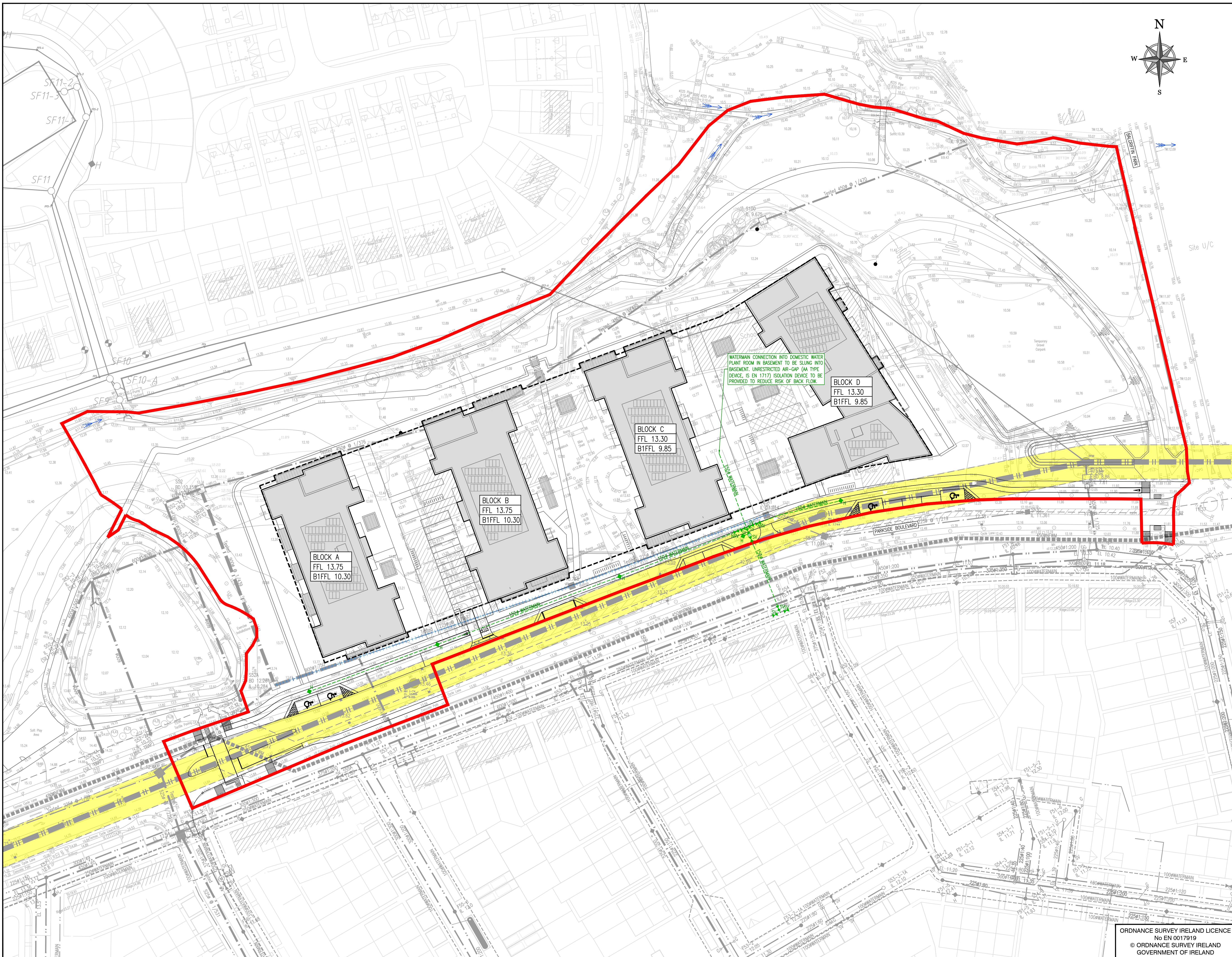
CLIENT
CAIRN HOMES PROPERTIES LTD.

SCALE	1:500 @A1	FILE REF.	190011-3000
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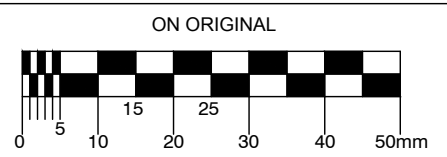
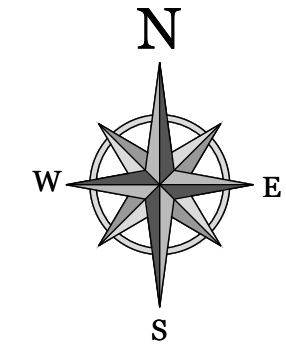
ORDNANCE SURVEY IRELAND LICENCE
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 GOVERNMENT OF IRELAND



APPENDIX 7.3 - WATERMAIN LAYOUT



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- GENERAL NOTES:
1. ALL DRAWINGS TO BE CHECKED BY CONTRACTOR ON SITE AND ENGINEER INFORMED OF DISCREPANCIES BEFORE WORK COMMENCES.
 2. THE CONTRACTOR SHALL SATISFY HIMSELF AS TO THE ACCURACY OF EXISTING DRAINAGE LEVELS AND LOCATION OF EXISTING SERVICES ON SITE PRIOR TO COMMENCEMENT OF WORKS ON SITE.
 3. ALL DIMENSIONS AND LEVELS ARE IN METERS AND ARE RELATED TO ORDNANCE DATUM. CO-ORDINATES RELATE TO IRISH NATIONAL GRID.
 4. ALL FOUL SEWERS, MANHOLES AND CONNECTIONS TO BE CONSTRUCTED IN ACCORDANCE WITH IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE AND IRISH WATER WASTEWATER INFRASTRUCTURE STANDARD DETAILS.
 5. ALL FOUL SEWER HOUSE CONNECTIONS TO BE MIN 100mm UPVC TO IS EN 1401 2009/2012, STIFFNESS CLASS BKN/M2 IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
 6. ALL PUBLIC FOUL SEWERS PIPE MATERIAL TO BE IN COMPLIANCE WITH SECTION 3.13 OF IRISH WATER WASTEWATER CODE OF PRACTICE.
 7. ALL PUBLIC SURFACE WATER SEWERS TO BE MINIMUM 225 DIA. CLASS H CONCRETE TO EN1916 & IS 6 2004 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
 8. ALL SURFACE WATER CONNECTIONS TO BE MINIMUM 150mm UPVC TO IS EN 1401 2009/2012 IN ACCORDANCE WITH THE GREATER DUBLIN REGIONAL CODE OF PRACTICE FOR DRAINAGE WORKS.
 9. LOCATION AND INVERT LEVELS OF EXISTING MANHOLES OR OUTFALL POINTS, WHERE APPLICABLE, TO BE VERIFIED BY CONTRACTOR PRIOR TO COMMENCEMENT OF DRAINAGE WORKS.
 10. ALL COVER LEVELS TO MATCH FINISHED ROAD/VERGE/FOOTPATH/CYCLETRACK LEVELS UNLESS OTHERWISE STATED.
 11. CONTRACTOR TO INCLUDE FOR CCTV SURVEY OF ALL SEWERS UPON COMPLETION OF SAME.
 12. ALL FOUL SEWERS TO BE AIR TESTED IN ACCORDANCE WITH IRISH WATER SPECIFICATIONS.
 13. ALL PUBLIC WATERMANS PIPE MATERIALS TO BE IN COMPLIANCE WITH SECTION 3.5 OF IRISH WATER CODE OF PRACTICE.
 14. WHERE COVERS ARE LOCATED IN GRASS AREAS, THEY SHALL BE SURROUNDED BY A CONCRETE PLINTH, 200MM ALL ROUND AND 100MM DEEP FORMED WITH C20/25 CONCRETE, 20MM AGGREGATE SIZE, BEDDED IN CLAUSE 808 MATERIAL.

- LEGEND:
- SITE BOUNDARY
 - EXISTING SURFACE WATER
 - EXISTING FOUL SEWER
 - EXISTING WATERMAIN
 - WATERMAIN
 - SLUICE VALVES AS PER IRISH WATER STANDARD DETAIL STD-W-14/15
 - NON RETURN VALVE
 - METER CHAMBER AS PER IRISH WATER STANDARD STD-W-26

REV	DATE	DESCRIPTION	BY	CHKD
PLANNING				
DESIGNED	NGC	PREPARED	PJC	
DATE	APR 2019	CHECKED	DJR	

DBFL Dublin Office: Ormrod House, Upper Ormrod Quay, Dublin 7, Ireland. PHONE +353 1 400 4000 FAX +353 1 400 4050

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DBFL Consulting Engineers email: info@dbfl.ie site: www.dbfl.ie

PROJECT
**PARKSIDE 4,
PARKSIDE, DUBLIN 13**

DRG. TITLE
WATERMAIN LAYOUT

CLIENT
CAIRN HOMES PROPERTIES LTD.

ORDNANCE SURVEY IRELAND LICENCE
No EN 0017919
© ORDNANCE SURVEY IRELAND
GOVERNMENT OF IRELAND

SCALE 1:500 @A1 FILE REF. 190011-3007
DRG. NO. 190011-3007

CHAPTER 9 CLIMATE & AIR QUALITY

APPENDIX 9.1 - AMBIENT AIR QUALITY STANDARDS

Ambient Air Quality Standards

National standards for ambient air pollutants in Ireland have generally ensued from Council Directives enacted in the EU (& previously the EC & EEC). The initial interest in ambient air pollution legislation in the EU dates from the early 1980s and was in response to the most serious pollutant problems at that time which was the issue of acid rain. As a result of this sulphur dioxide, and later nitrogen dioxide, were both the focus of EU legislation. Linked to the acid rain problem was urban smog associated with fuel burning for space heating purposes. Also apparent at this time were the problems caused by leaded petrol and EU legislation was introduced to deal with this problem in the early 1980s.

In recent years the EU has focused on defining a basis strategy across the EU in relation to ambient air quality. In 1996, a Framework Directive, Council Directive 96/62/EC, on ambient air quality assessment and management was enacted. The aims of the Directive are fourfold. Firstly, the Directive's aim is to establish objectives for ambient air quality designed to avoid harmful effects to health. Secondly, the Directive aims to assess ambient air quality on the basis of common methods and criteria throughout the EU. Additionally, it is aimed to make information on air quality available to the public via alert thresholds and fourthly, it aims to maintain air quality where it is good and improve it in other cases.

As part of these measures to improve air quality, the European Commission has adopted proposals for daughter legislation under Directive 96/62/EC. The first of these directives to be enacted, Council Directive 1999/30/EC, has been passed into Irish Law as S.I. No 271 of 2002 (Air Quality Standards Regulations 2002) and has set limit values which came into operation on 17th June 2002. The Air Quality Standards Regulations 2002 detail margins of tolerance, which are trigger levels for certain types of action in the period leading to the attainment date. The margin of tolerance varies from 60% for lead, to 30% for 24-hour limit value for PM₁₀, 40% for the hourly and annual limit value for NO₂ and 26% for hourly SO₂ limit values. The margin of tolerance commenced from June 2002, and started to reduce from 1st January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by the attainment date. A second daughter directive, EU Council Directive 2000/69/EC, has published limit values for both carbon monoxide and benzene in ambient air. This has also been passed into Irish Law under the Air Quality Standards Regulations 2002.

The most recent EU Council Directive on ambient air quality was published on the 11/06/08 which has been transposed into Irish Law as S.I. 180 of 2011. Council Directive 2008/50/EC combines the previous Air Quality Framework Directive and its subsequent daughter directives. Provisions were also made for the inclusion of new ambient limit values relating to PM_{2.5}. The margins of tolerance specific to each pollutant were also slightly adjusted from previous directives. In regards to existing ambient air quality standards, it is not proposed to modify the standards but to strengthen existing provisions to ensure that non-compliances are removed. In addition, new ambient standards for PM_{2.5} are included in Directive 2008/50/EC. The approach for PM_{2.5} was to establish a target value of 25 µg/m³, as an annual average (to be attained everywhere by 2010) and a limit value of 25 µg/m³, as an annual average (to be attained everywhere by 2015), coupled with a target to reduce human exposure generally to PM_{2.5} between 2010 and 2020. This exposure reduction target will range from 0% (for PM_{2.5} concentrations of less than 8.5 µg/m³ to 20% of the average exposure indicator (AEI) for concentrations of between 18 - 22 µg/m³). Where the AEI is currently greater than 22 µg/m³ all appropriate measures should be employed to reduce this level to 18 µg/m³ by 2020. The AEI is based on measurements taken in urban background locations averaged over a three year period from 2008 - 2010 and again from 2018-2020. Additionally, an exposure concentration obligation of 20 µg/m³ was set to be complied with by 2015 again based on the AEI.

Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions. The Alert Threshold is defined in Council Directive 96/62/EC as "a level beyond which there is a risk to human health from brief exposure and at which immediate steps shall be taken as laid down in Directive 96/62/EC". These steps include undertaking to ensure that the necessary steps are taken to inform the public (e.g. by means of radio, television and the press).

The Margin of Tolerance is defined in Council Directive 96/62/EC as a concentration which is higher than the limit value when legislation comes into force. It decreases to meet the limit value by the attainment date. The Upper Assessment Threshold is defined in Council Directive 96/62/EC as a concentration above which high quality measurement is mandatory. Data from measurement may be supplemented by information from other sources, including air quality modelling.

An annual average limit for both NO_x (NO and NO₂) is applicable for the protection of vegetation in highly rural areas away from major sources of NO_x such as large conurbations, factories and high road vehicle activity such as a dual carriageway or motorway. Annex VI of EU Directive 1999/30/EC identifies that monitoring to demonstrate compliance with the NO_x limit for the protection of vegetation should be carried out distances greater than:

- 5 km from the nearest motorway or dual carriageway
- 5 km from the nearest major industrial installation
- 20 km from a major urban conurbation

As a guideline, a monitoring station should be indicative of approximately 1000 km² of surrounding area.

Under the terms of EU Framework Directive on Ambient Air Quality (96/62/EC), geographical areas within member states have been classified in terms of zones. The zones have been defined in order to meet the criteria for air quality monitoring, assessment and management as described in the Framework Directive and Daughter Directives. Zone A is defined as Dublin and its environs, Zone B is defined as Cork City, Zone C is defined as 23 urban areas with a population greater than 15,000 and Zone D is defined as the remainder of the country. The Zones were defined based on among other things, population and existing ambient air quality.

EU Council Directive 96/62/EC on ambient air quality and assessment has been adopted into Irish Legislation (S.I. No. 33 of 1999). The act has designated the Environmental Protection Agency (EPA) as the competent authority responsible for the implementation of the Directive and for assessing ambient air quality in the State. Other commonly referenced ambient air quality standards include the World Health Organisation. The WHO guidelines differ from air quality standards in that they are primarily set to protect public health from the effects of air pollution. Air quality standards, however, are air quality guidelines recommended by governments, for which additional factors, such as socio-economic factors, may be considered.

Air Dispersion Modelling

The inputs to the DMRB model consist of information on road layouts, receptor locations, annual average daily traffic movements, annual average traffic speeds and background concentrations. Using this input data the model predicts ambient ground level concentrations at the worst-case sensitive receptor using generic meteorological data. The DMR B has recently undergone an extensive validation exercise as part of the UK's Review and Assessment Process to designate areas as Air Quality Management Areas (AQMAs). The validation exercise was carried out at 12 monitoring sites within the UK DEFRA's national air quality monitoring network. The validation exercise was carried out for NO_x, NO₂ and PM₁₀, and included urban background and kerbside/roadside locations, "open" and "confined" settings and a variety of geographical locations.

In relation to NO₂, the model generally over-predicts concentrations, with a greater degree of over-prediction at "open" site locations. The performance of the model with respect to NO₂ mirrors that of NO_x showing that the

over-prediction is due to NO_x calculations rather than the NO_x:NO₂ conversion. Within most urban situations, the model overestimates annual mean NO₂ concentrations by between 0 to 40% at confined locations and by 20 to 60% at open locations. The performance is considered comparable with that of sophisticated dispersion models when applied to situations where specific local validation corrections have not been carried out.

The model also tends to over-predict PM₁₀. Within most urban situations, the model will over-estimate annual mean PM₁₀ concentrations by between 20 to 40%. The performance is comparable to more sophisticated models, which, if not validated locally, can be expected to predict concentrations within the range of 50%. Thus, the validation exercise has confirmed that the model is a useful screening tool for the Second Stage Review and Assessment, for which a conservative approach is applicable.

APPENDIX 9.2 -TRANSPORT INFRASTRUCTURE IRELAND SIGNIFICANCE CRITERIA

Magnitude of Change	Annual Mean NO ₂ / PM ₁₀	Annual Mean PM _{2.5}
Large	Increase / decrease ≥4 µg/m ³	Increase / decrease ≥2.5 µg/m ³
Medium	Increase / decrease 2 - <4 µg/m ³	Increase / decrease 1.25 - <2.5 µg/m ³
Small	Increase / decrease 0.4 - <2 µg/m ³	Increase / decrease 0.25 - <1.25 µg/m ³
Imperceptible	Increase / decrease <0.4 µg/m ³	Increase / decrease <0.25

Table A1: Definition of Impact Magnitude for Changes in Ambient Pollutant Concentrations

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration ^{Note 1}		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥35 days)	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (32 - <35 days)	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (26 - <32 days)	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<26 days)	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Scheme (≥35 days)	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Scheme (32 - <35 days)	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Scheme (26 - <32 days)	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Scheme (<26 days)	Negligible	Negligible	Slight Beneficial

Note 1 Where the Impact Magnitude is Imperceptible, then the Impact Description is Negligible

Table A3: Air Quality Impact Significance Criteria For Changes to Number of Days with PM₁₀ Concentration Greater than 50 µg/m³ at a Receptor

Absolute Concentration in Relation to Objective/Limit Value	Change in Concentration ^{Note 1}		
	Small	Medium	Large
Increase with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m ³ of NO ₂ or PM ₁₀) (≥25 µg/m ³ of PM _{2.5})	Slight Adverse	Moderate Adverse	Substantial Adverse
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m ³ of NO ₂ or PM ₁₀) (22.5 - <25 µg/m ³ of PM _{2.5})	Slight Adverse	Moderate Adverse	Moderate Adverse
Below Objective/Limit Value With Scheme (30 - <36 µg/m ³ of NO ₂ or PM ₁₀) (18.75 - <22.5 µg/m ³ of PM _{2.5})	Negligible	Slight Adverse	Slight Adverse
Well Below Objective/Limit Value With Scheme (<30 µg/m ³ of NO ₂ or PM ₁₀) (<18.75 µg/m ³ of PM _{2.5})	Negligible	Negligible	Slight Adverse
Decrease with Scheme			
Above Objective/Limit Value With Scheme (≥40 µg/m ³ of NO ₂ or PM ₁₀) (≥25 µg/m ³ of PM _{2.5})	Slight Beneficial	Moderate Beneficial	Substantial Beneficial
Just Below Objective/Limit Value With Scheme (36 - <40 µg/m ³ of NO ₂ or PM ₁₀) (22.5 - <25 µg/m ³ of PM _{2.5})	Slight Beneficial	Moderate Beneficial	Moderate Beneficial
Below Objective/Limit Value With Scheme (30 - <36 µg/m ³ of NO ₂ or PM ₁₀) (18.75 - <22.5 µg/m ³ of PM _{2.5})	Negligible	Slight Beneficial	Slight Beneficial
Well Below Objective/Limit Value With Scheme (<30 µg/m ³ of NO ₂ or PM ₁₀) (<18.75 µg/m ³ of PM _{2.5})	Negligible	Negligible	Slight Beneficial

Note 1 Well Below Standard = <75% of limit value.

Table A2: Air Quality Impact Significance Criteria For Annual Mean NO₂ and PM₁₀ and PM_{2.5} Concentrations at a Receptor

APPENDIX 9.3 - DUST MINIMISATION PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland and the United Kingdom.

Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 9.1 for the windrose for Casement Aerodrome). As the prevailing wind is predominantly south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed. The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials. Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods where care will be needed to ensure that dust nuisance does not occur.

The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;

- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80%.

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50%. Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency;
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

CHAPTER 10 LANDSCAPE AND VISUAL

APPENDIX 10.1: PHOTOMONTAGES

PARKSIDE 4

EIAR - Appendix 10.1

**Verified Photomontages and CGI Views for
Landscape and Visual Impact Assessment**

October 2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 30-01-2019 10:27 am
Canon 5D Mark II
24 mm Lens

location: Junction of Parkside
Boulevard, Marrsfield Avenue
and Balgriffin Park

viewpoint: **View 01** **Baseline**

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 30-01-2019 10:27 am
Canon 5D Mark II
24 mm Lens

location: Junction of Parkside
Boulevard, Marrsfield Avenue
and Balgriffin Park

viewpoint: **View 01** Proposed

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)

▶▶

Reg. Ref. 2295/19
(Permitted Development, Simple Model Shown)

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

Reg. Ref. 3696/18
(Under Construction, Simple Model Shown)



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)

▶▶

Reg. Ref. 2295/19
(Permitted Development, Simple Model Shown)

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

Reg. Ref. 3696/18
(Under Construction, Simple Model Shown)



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 02:40 pm
Canon 5D Mark II
24 mm Lens

location: House at Northern Edge of
Parkside Estate

viewpoint: **View 03** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 02:40 pm
Canon 5D Mark II
24 mm Lens

location: House at Northern Edge of
Parkside Estate

viewpoint: **View 03** **Proposed**

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 28-01-2019 01:05 pm
Canon 5D Mark II
24 mm Lens

location: Junction of Parkside Way and
Parkside Crescent

viewpoint: **View 04** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 28-01-2019 01:05 pm
Canon 5D Mark II
24 mm Lens

location: Junction of Parkside Way and
Parkside Crescent

viewpoint: **View 04** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)

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▶▶

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 01:43 pm
Canon 5D Mark II
24 mm Lens

location: Parkside Boulevard West
of Site

viewpoint: **View 05** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 01:43 pm
Canon 5D Mark II
24 mm Lens

location: Parkside Boulevard West
of Site

viewpoint: **View 05** Proposed

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)

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▶▶

Reg. Ref. 2717/19
(Under Construction,
Simple Model Shown)

Reg. Ref. 2295/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 01:50 pm
Canon 5D Mark II
24 mm Lens

location: St Sampson's Square

viewpoint: **View 06** **Baseline**

issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)

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▶▶

Reg. Ref. 2295/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 01:50 pm
Canon 5D Mark II
24 mm Lens

location: St Sampson's Square

viewpoint: **View 06** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens) ▶▶

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

Reg. Ref. 2295/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 28-01-2019 01:57 pm
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North West
of Site

viewpoint: **View 07** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 28-01-2019 01:57 pm
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North West
of Site

viewpoint: **View 07** **Proposed**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 28-01-2019 02:06 pm
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North of Site
N 322194.951 E 241323.287

viewpoint: **View 08** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 28-01-2019 02:06 pm
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North of Site
N 322194.951 E 241323.287

viewpoint: **View 08** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



Reg. Ref. 2295/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 30-01-2019 10:54 am
Canon 5D Mark II
24 mm Lens

location: Castlemoyne Open Space

viewpoint: **View 09** **Baseline**

issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



Reg. Ref. 2295/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 30-01-2019 10:54 am
Canon 5D Mark II
24 mm Lens

location: Castlemoyne Open Space

viewpoint: **View 09** Proposed

issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 30-01-2019 10:49 am
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North East
of Site

viewpoint: **View 10** **Baseline**

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 30-01-2019 10:49 am
Canon 5D Mark II
24 mm Lens

location: Castlemoyne North East
of Site

viewpoint: **View 10** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens) ▶▶

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 08-02-2019 11:33 am
Canon 5D Mark II
24 mm Lens

location: Junction of Balgriffin Park
and Moyne Road

viewpoint: **View 11** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens) ▶▶

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 08-02-2019 11:33 am
Canon 5D Mark II
24 mm Lens

location: Junction of Balgriffin Park
and Moyne Road

viewpoint: **View 11** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀ Angle of View 39° Horizontal (50 mm Lens) ▶▶

Reg. Ref. 3696/18
(Under Construction, Simple Model Shown)

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 30-01-2019 11:11 am
Canon 5D Mark II
24 mm Lens

location: View from the top of Hampton
Road looking South

viewpoint: **View 12** **Baseline**
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens) ◀ Angle of View 39° Horizontal (50 mm Lens) ▶▶

Reg. Ref. 3696/18
(Under Construction, Simple Model Shown)

Reg. Ref. 2717/19
(Under Construction, Simple Model Shown)

project: Parkside 4

photography: 30-01-2019 11:11 am
Canon 5D Mark II
24 mm Lens

location: View from the top of Hampton
Road looking South

viewpoint: **View 12** Proposed
issued: 10-10-2019





◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀◀ Angle of View 39° Horizontal (50 mm Lens)



project: Parkside 4

photography: 08-02-2019 11:24 am
Canon 5D Mark II
24 mm Lens

location: Aerial Photomontage from
South East

viewpoint: **View 13** Proposed

issued: 10-10-2019

**MODEL
WORKS**



◀◀ Angle of View 73° Horizontal (24 mm Lens)

◀◀ Angle of View 39° Horizontal (50 mm Lens)

▶▶

▶▶

project: Parkside 4

photography:

location: CGI Courtyard

viewpoint: **View 14** Proposed

issued: 10-10-2019

**MODEL
WORKS**

CHAPTER 14 ARCHAEOLOGICAL AND CULTURAL HERITAGE

APPENDIX 14.1: SMR/RMP SITES WITHIN THE SURROUNDING AREA

RMP No.:	DU015-06201
Status:	Not scheduled for inclusion in the next revision of the RMP
Townland:	Balgriffin Park
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	Location unknown
Classification:	Castle- unclassified
Description:	The Civil Survey (1654-6) mentions one small castle with a stone house at Balgriffin (Simington 1945, 189). This was held by James Bath who owned vast estates in the Drumcondra area. There is a complex of farm buildings on a low-lying site at Balgriffin Park. These are largely dilapidated and ruinous with no early stone work apparent.
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-062003
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Balgriffin Park
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	c. 124m west of the proposed development area
Classification:	Building
Description:	A 12th century castle was reputed to have been located on lands associated with Balgriffin Park. The Civil Survey (1654-6) mentions a stone house at Balgriffin (Simington 1945, 189). This was held by James Bath who owned vast estates in the Drumcondra area. There was a complex of farm buildings on a low-lying site known as Balgriffin Park which may be the site of this stone house. The site is now within open space of a housing development. A test excavation (Licence no. 00E0714) in advance of the Northern Fringe sewer immediately south of the site did not identify archaeological remains.
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-06202
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Balgriffin Park
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	c. 129m west of the proposed development area
Classification:	House - 16th/17th century

Description:	A 12th century castle was reputed to have been located on lands associated with Balgriffin Park. The Civil Survey (1654-6) mentions a stone house at Balgriffin (Simington 1945, 189). This was held by James Bath who owned vast estates in the Drumcondra area. There was a complex of farm buildings on a low-lying site known as Balgriffin Park which may be the site of this stone house. The site is now within open space of a housing development. A test excavation (Licence no. 00E0714) in advance of the Northern Fringe sewer immediately south of the site did not identify archaeological remains.
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-012002
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Balgriffin Park
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	c. 158m west-northwest of the proposed development area
Classification:	Graveslab
Description:	A grave-slab fragment was found at the site and is housed in the National Museum (NMI 1958:60; DU018-159----
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-012001
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Balgriffin Park
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	c. 161m west-northwest of the proposed development area
Classification:	Church
Description:	According to D'Alton the church was confirmed of its titles in 1178 by Archbishop O'Toole. The Regal Visitations (1630) describe the church and chancel as ruinous (Ronan 1941, 67). Currently located within the open space of a housing development. A number of archaeological investigations were associated with the development. Geophysical survey (03R053) identified anomalies that were confirmed by test excavation (04E1371). A substantial curving ditch (4.75m in width and 1.3m deep) that appeared to be enclosing the site of the church was identified. Two smaller linear ditches were associated with the enclosure and contained similar fills. Several sherds of medieval pottery and a medieval glass bead were found in this area (McLoughlin, G. 2004:0513 www.excavtions.ie)
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-124
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Saintdoolaghs
Parish:	Balgriffin
Barony:	Coolock

Dist. from development:	c. 422m north of the proposed development area
Classification:	Field system
Description:	A possible field system visible as a crop mark on an aerial photograph together with a sub-circular enclosure (DU015-123) in the same field (SMR file; pers. comm. T. Condit). Located on low east west rise within large open field, sloping and south facing. Traversed by ESB poles. No visible remains.
Reference:	www.archaeology.ie/SMR file

RMP No.:	DU015-123
Status:	Scheduled for inclusion in the next revision of the RMP
Townland:	Saintdoolaghs
Parish:	Balgriffin
Barony:	Coolock
Dist. from development:	c. 422m north of the proposed development area
Classification:	Enclosure
Description:	A sub-circular enclosure visible as a crop mark on an aerial photograph together with other features that could indicate a possible field system (DU015-134) (SMR file; pers. comm. T. Condit). Located on low east west rise within large open field, sloping and south facing. Traversed by ESB poles. No visible remains.
Reference:	www.archaeology.ie/SMR file

APPENDIX 14.2: STRAY FINDS WITHIN THE SURROUNDING AREA

NMI No:	1958- 50
Townland:	Balgriffen Park
Parish:	Balgriffen
Barony:	Coolock
Find:	Fragment of decorated slab
Find place:	During building work within DU015-012001
Description:	The slab seems to be a portion of a small grave stone with an interlaced cross on it. Possibly 9th or 10th century. Discovered at or close to the site of a medieval or early medieval church (DU015-012001).
Reference:	NMI Topographical Files

APPENDIX 14.3: LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE

PROTECTION OF CULTURAL HERITAGE

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

THE ARCHAEOLOGICAL RESOURCE

The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as ‘a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto’ (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

OWNERSHIP AND GUARDIANSHIP OF NATIONAL MONUMENTS

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

REGISTER OF HISTORIC MONUMENTS

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months’ notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

PRESERVATION ORDERS AND TEMPORARY PRESERVATION ORDERS

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

RECORD OF MONUMENTS AND PLACES

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Culture, Heritage and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National

Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that ‘where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice’.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989*, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document’s recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

THE PLANNING AND DEVELOPMENT ACT 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Dublin City Council Development Plan 2016-2022

It is the policy of Dublin City Council

CHC9: To protect and preserve National Monuments.

1. To protect archaeological material in situ by ensuring that only minimal impact on archaeological layers is allowed, by way of the re-use of buildings, light buildings, foundation design or the omission of basements in the Zones of Archaeological Interest.
2. That where preservation in situ is not feasible, sites of archaeological interest shall be subject to ‘preservation by record’ according to best practice in advance of re-development.
3. That sites within Zones of Archaeological Interest will be subject to consultation with the City Archaeologist and archaeological assessment prior to a planning application being lodged.
4. That the National Monuments Service will be consulted in assessing proposals for development which relate to Monuments and Zones of Archaeological Interest.
5. To preserve known burial grounds and disused historic graveyards, where appropriate, to ensure that human remain are re-interred, except where otherwise agreed with the National Museum of Ireland.
6. That in evaluating proposals for development in the vicinity of the surviving sections of the city wall that due recognition be given to their national significance and their special character.
7. To have regard to the Shipwreck inventory maintained by the DAHG. Proposed developments that may have potential to impact on riverine, inter-tidal and sub-tidal environments shall be subject to an underwater archaeological assessment in advance of works.

8. To have regard to DAHG policy documents and guidelines relating to archaeology.

It is an Objective of Dublin City Council:

CHCO10:

1. To implement the archaeological actions of the Dublin City Heritage Plan 2002-6 in light of the Dublin City Heritage Plan Review 2012.
2. To prepare and implement conservation plans for National Monuments and Monuments in DCC care (City Walls, St Luke's Church, St James's Graveyard, St. Thomas's Abbey, St Canice's Graveyard etc).
3. To maintain, develop and promote the Dublin City Archaeological Archive (DCAA) at Pearse Street Library and Archives.
4. To ensure the public dissemination of the findings of licensed archaeological activity in Dublin through the Dublin County Archaeology GIS.
5. To develop a long-term management plan to promote the conservation, management and interpretation of archaeological sites and monuments and to identify areas for strategic research.
6. To have regard to the city's industrial heritage and Dublin City Industrial Heritage Record (DCIHR) in the preparation of Local Area Plans (LAPs) and the assessment of planning applications and to publish the DCIHR online. To review the DCIHR in accordance with Ministerial recommendations arising from the national Inventory of Architectural Heritage (NIAH) survey of Dublin City and in accordance with the Strategic Approach set out in Section 11.1.4 of this Chapter
7. To promote awareness of, and access to, the city's archaeological inheritance and foster high-quality public archaeology.
8. To promote archaeological best practice in Dublin city.
9. To promote the awareness of the international significance of Viking Dublin and to support post-excavation research into the Wood Quay excavations 1962-81.
10. To develop a strategy for the former Civic Museum collection and for other collections of civic interest and importance.
11. To investigate the potential for the erection of Columbarium Walls.
12. To support the implementation of the Kilmainham Mill Conservation Plan.
13. Dublin City Council will seek to work with Diageo to undertake a more comprehensive industrial heritage survey of the constituent historic buildings within the Guinness Brewery complex at Saint James's Gate.
14. To implement and promote The Dublin Principles (ICOMOS, 2011) as guiding principles to assist in the documentation, protection, conservation and appreciation of industrial heritage as part of the heritage of Dublin and Ireland.
15. To continue to implement actions of the Saint Luke's Conservation Plan on the basis of funds available to conserve the monument, recover the graveyard, provide visitor access, improve visual amenity and secure an appropriate new use.

APPENDIX 14.4: IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE

POTENTIAL IMPACTS ON ARCHAEOLOGICAL AND HISTORICAL REMAINS

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

PREDICTED IMPACTS

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;

- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

APPENDIX 14.5: MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE

POTENTIAL MITIGATION STRATEGIES FOR CULTURAL HERITAGE REMAINS

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

DEFINITION OF MITIGATION STRATEGIES

ARCHAEOLOGICAL RESOURCE

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as ‘a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate’ (CifA 2014a).

Full Archaeological Excavation can be defined as ‘a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design’ (CifA 2014b).

Archaeological Monitoring can be defined as ‘a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CifA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.