Dun Laoghaire - Rathdown County Council

Kilbogget Park Sports Pavilion, Engineering Report In Support of Planning Application

2534-DOB-XX-SI-RP-C-0001

APRIL 2026

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Appendices

1. Introduction

Dun Laoghaire Rathdown County Council are providing integrated design team services for a Part 8 planning application for the development of Kilbogget Sports Pavilion located in Cabinteely, County Dublin. This Engineering planning design report has been prepared by Donnachadh O'Brien & Associates Consulting Engineers (DOB&A) on behalf of Dun Laoghaire Rathdown County Council in support of the Part 8 application.

The proposed development includes a Sports Pavilion, soccer playing pitch, walkways and play areas as indicated on Dun Laoghaire Rathdown County Council.

1.1 Existing Site

The section of the existing park which is been developed is approx. 2 acres is bounded to the north, south and west by the athletic fields and to the east by Churchview Road. The topography of the overall land falls from north to south levels of approx. +31.47m OD to +30.93m OD. The existing site layout is indicated on drawing C-0010 while the proposed site layout is indicated on drawing C-0050. The site location is included in Figure 1 below.

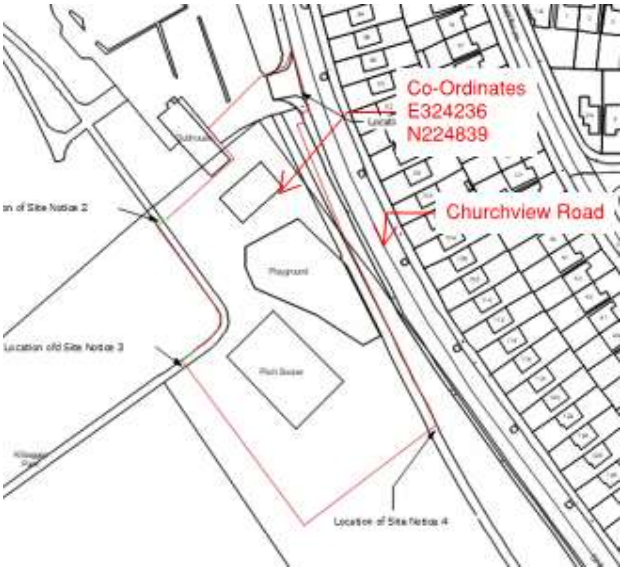


Figure 1 – Site location (highlighted in red)

1.2 Report Overview

This report outlines the preliminary engineering design associated with the proposed Part 8 planning submission under the following headings:

- Surface Water Drainage
- Foul Water Drainage
- Water Supply

This report should be read in conjunction with the following engineering drawings, which are submitted in support of the planning application:

C-0010	Topographical Survey
C-0020	Proposed Surface Water Drainage Layout
C-0030	Proposed Foul Drainage and Watermain Layout
C-0120	Proposed Drainage details

2. Surface Water Drainage

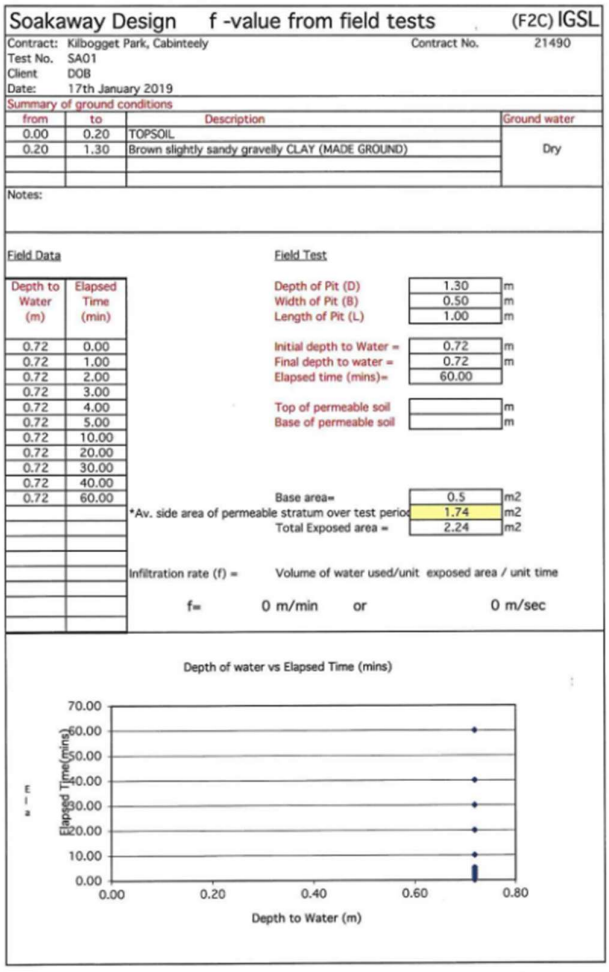
2.1 Existing Surface Water Drainage

An existing local surface water drainage network has been identified around the existing buildings which are included in the application boundary. This network discharges to the public surface water network on Churchview Road to the east of the application site. A local surface water network has also been identified around the perimeter of the existing all-weather pitch which also appears to be discharging towards the Churchview Road (subject to further CCTV surveys).

An existing 600mm diameter SW pipe has been identified along Churchview Road based on the topographical survey information.

2.2 Preliminary Site Investigation

IGSL were previously commissioned by DOB&A on behalf of Dun Laoghaire Rathdown County Council to carry out preliminary site investigations including trial pits and soakaway tests (refer to Appendix B for the full report - 21490) in the vicinity of the proposed works. The previous infiltration tests failed due to the impermeable nature of the cohesive subsoils. An extract of the infiltration tests carried out previously is included in Figure XX below.



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Kilbogget Park, Cabinteely Contract No. 21490
Test No. SA01
Client DOB
Date: 17th January 2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	
0.20	1.30	Brown slightly sandy gravelly CLAY (MADE GROUND)	Dry

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.72	0.00
0.72	1.00
0.72	2.00
0.72	3.00
0.72	4.00
0.72	5.00
0.72	10.00
0.72	20.00
0.72	30.00
0.72	40.00
0.72	60.00

Field Test

Depth of Pit (D)	1.30	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.72	m
Final depth to water =	0.72	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.5	m2
*Av. side area of permeable stratum over test perio	1.74	m2
Total Exposed area =	2.24	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Figure 2 Extract from infiltration test results IGSL report 21490

Supplementary site investigations have been procured by DOBA on behalf of DLRCC and will be carried out prior to commencement of the works.

2.3 Proposed Surface Water Drainage

The design and management of surface water for the proposed development will comply with the policies and guidelines of Dun Laoghaire Rathdown County Council and outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and Sustainable Drainage Systems (SuDS) Strategy. Pipe sizes and gradients will be designed to achieve self-cleansing velocities as per the requirements of the Building Regulations Part "H".

The layout of the proposed surface water drainage is included on the following drawings:

C-0020 Proposed Surface Water Drainage Layout

2.3.1 SuDS Measures

Infiltration measures have been utilised where favourable infiltration rates have been identified in the site investigation report. The surface water strategy includes the following:

- A Blue Roof is to be incorporated on the proposed new building. This will store the rainfall runoff for storm events up to a 1% AEP event plus 30% climate change with a discharge restricted to Qbar.
- The runoff from the proposed all-weather pitch will be restricted to Qbar, via a hydrobrake, and volumes up to a 1% AEP event plus 30% climate change will be stored in filter drains along the pitch;
- The playground areas and paths are to be constructed using permeable materials to reflect the pre-development greenfield characteristics;
- Maintenance of the filter drains will be via a rigid perforated pipe installed within the trench with a silt trap manhole provided at each end;

2.4 GDSDS Summary of Design Criterion

GDSDS summarises the design criteria for the design of drainage systems under four criterions in Section 6.3.4 as follows:

1. Criterion 1 – River water quality protection
2. Criterion 2 – River regime protection
3. Criterion 3 – Level of service (Flooding) for the site
4. Criterion 4 – River flood protection

2.4.1 Criterion 1 – River water quality protection

The green / blue roof will provide adequate interception of rainfall. The first 5mm of rainfall event on site the pitch will be intercepted without discharging within the filter drains serving the pitch.

2.4.2 Criterion 2 – River regime protection

Discharge from the site will be via a Hydrobrake to the existing public network located on Churchview Road.

2.4.3 Criterion 3 – Level of service (Flooding) for the site

The filter drains on site has been designed to store volumes up to 1 in 100 - year rainfall event + 30% climate change below ground with no flooding on the site proposed.

2.4.4 Criterion 4 – River flood protection

Long term storage of runoff is not proposed due to the extremely poor infiltration results. The discharge is restricted to Qbar with storage of storm events up to a 1& AEP event + 30% climate change to provide river flood protection.

3. Foul Drainage

3.1 Existing Foul Drainage

Dun Laoghaire Rathdown County Council and Irish Water records indicate an existing 225mm diameter foul sewer adjacent to the sports Pavilion on Churchview Road which serves the Kilbogget Park.

Dun Laoghaire Rathdown County Council and Irish Water maps are included in Appendix A of this report.

3.2 Irish Water Confirmation of Feasibility

A pre connection enquiry was submitted to Irish Water for a wastewater connection for the proposed development. We have yet to receive feedback from Irish Water.

3.3 Proposed Foul Drainage

The proposed foul network will collect effluent from the new community building via a piped gravity network which will discharge to the existing foul manhole located at the north east boundary of the site. The design of the new foul network will be in compliance with the Irish Water Code of Practice and Standard Details for Wastewater Infrastructure.

The proposed discharge from the future community buildings connecting into the existing foul public network has been calculated in accordance with Irish Water standards using a peak flow factor of 4.5DWF.

Estimated Maximum Occupancy = 50 persons (Conservative)

Average Daily Discharge = (50 x 40 l/person/day) / (24 x 60 x 60) = 0.023 l/s

Average Daily Discharge x infiltration= 0.0255 l/s

Peak Daily Discharge = 0.08 x 6 DWF = 0.1146 l/s

The layout of the proposed foul water drainage is included on drawing C-0030 (Proposed Foul Drainage and Watermain Layout).

4. Water Supply

4.1 Existing Water Supply

Dun Laoghaire Rathdown County Council and Irish Water records indicate an existing 150mm uPVC public water serving the Kilbogget Park running through the centre of the site. Dun Laoghaire Rathdown County Council and Irish Water maps are included in Appendix A of this report.

4.2 Proposed Water Supply

It is proposed to keep the existing watermain and extend it to loop around the new building.

The layout of the proposed water main is included on the following drawings:

C-0030	Proposed Foul Drainage and Watermain Layout
C-0130	Typical Watermain Details

4.3 Irish Water Confirmation of Feasibility

A pre connection enquiry was submitted to Irish Water for new water connection for the proposed application development. . We have yet to receive feedback from Irish Water.

4.4 Water Demand Calculations

Estimate Occupancy = 50 persons

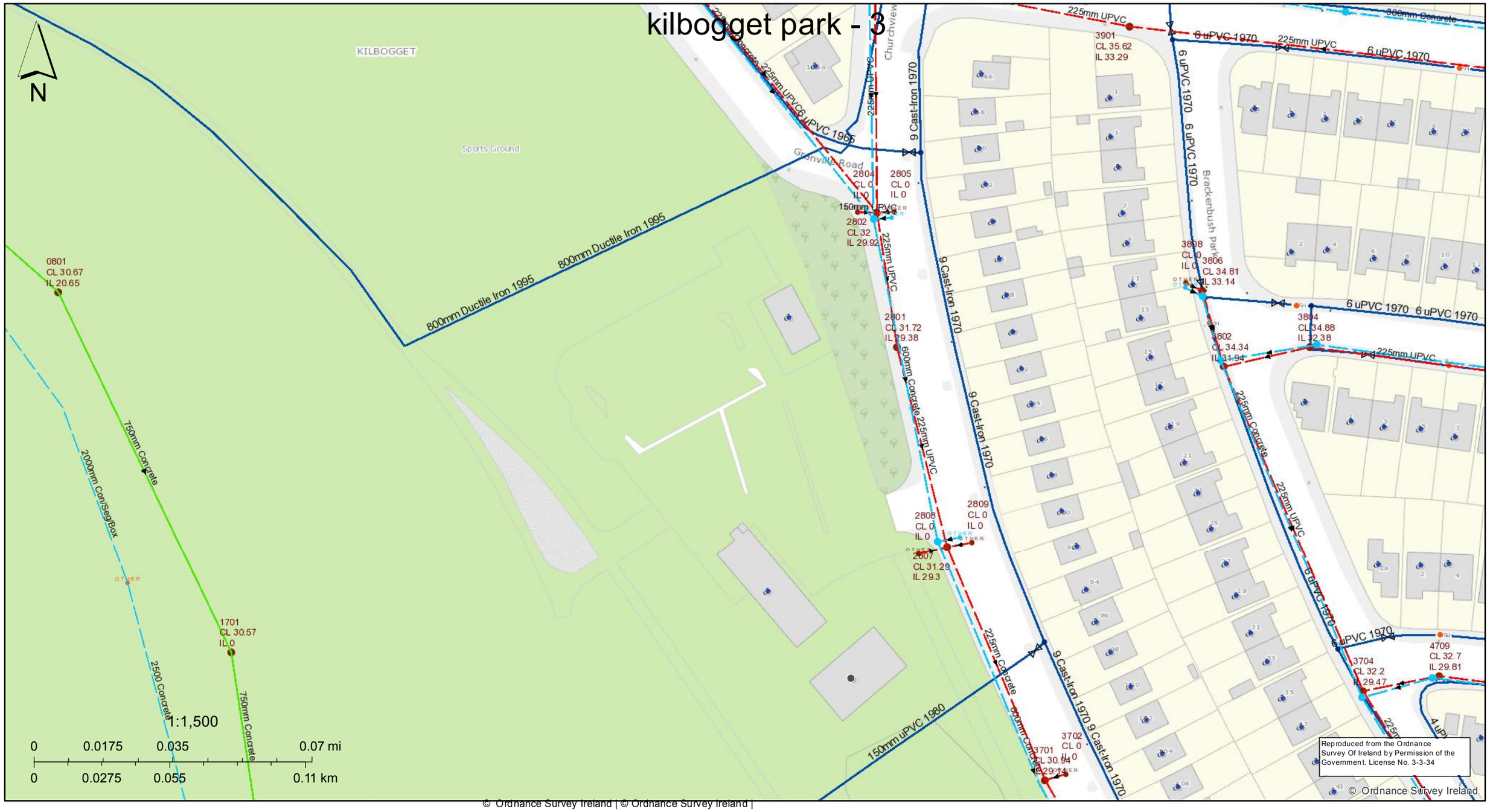
Consumption = 40 litres / person / day x 50 persons = 2,000litres / day

Average Daily Demand = 2,000 litres / day x 1.25 = 2,5000 l / day/ (24x60x60) = 0.03 litres / second

Peak Daily Demand = 0.03 x 5 = 0.1446 litres / second

Appendix A – Drainage Maps

kilbogget park - 3



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Legend

Stormwater Gravity Mains (Irish Water Owned)
- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)
- Surface

Storm Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Storm Inlets
- Gully
- Standard
- Other; Unknown

Storm Fittings
- Vent/Col
- Other; Unknown

Storm Discharge Points
- Outfall
- Overflow
- Soakaway
- Other; Unknown

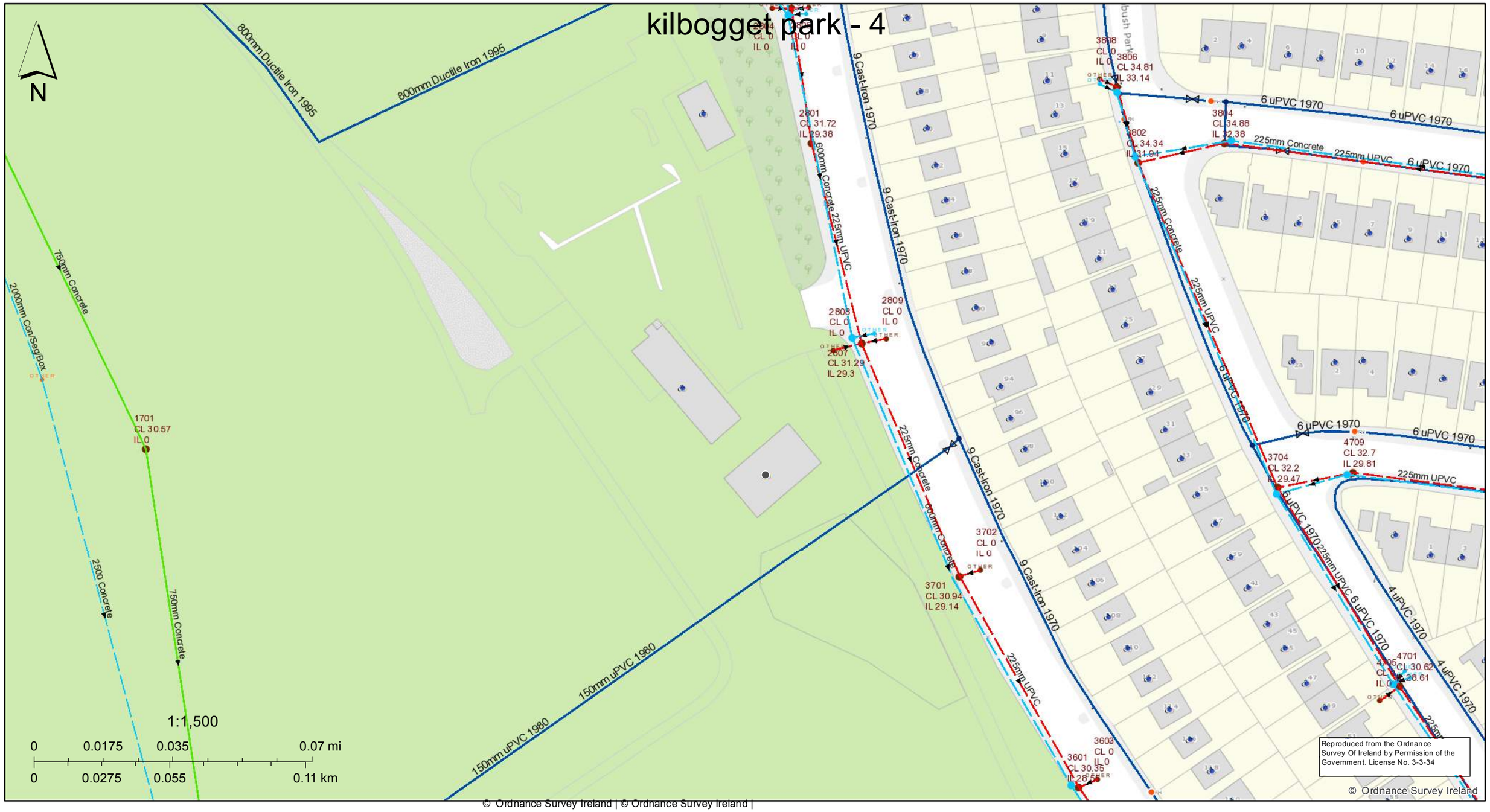
- Storm Culverts
- Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Sewer Gravity Mains (Non-Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water

kilbogget park - 4



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Legend

Stormwater Gravity Mains (Irish Water Owned)
- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)
- Surface

Storm Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Storm Inlets
- Gully
- Standard
- Other; Unknown

Storm Fittings
- Vent/Col
- Other; Unknown

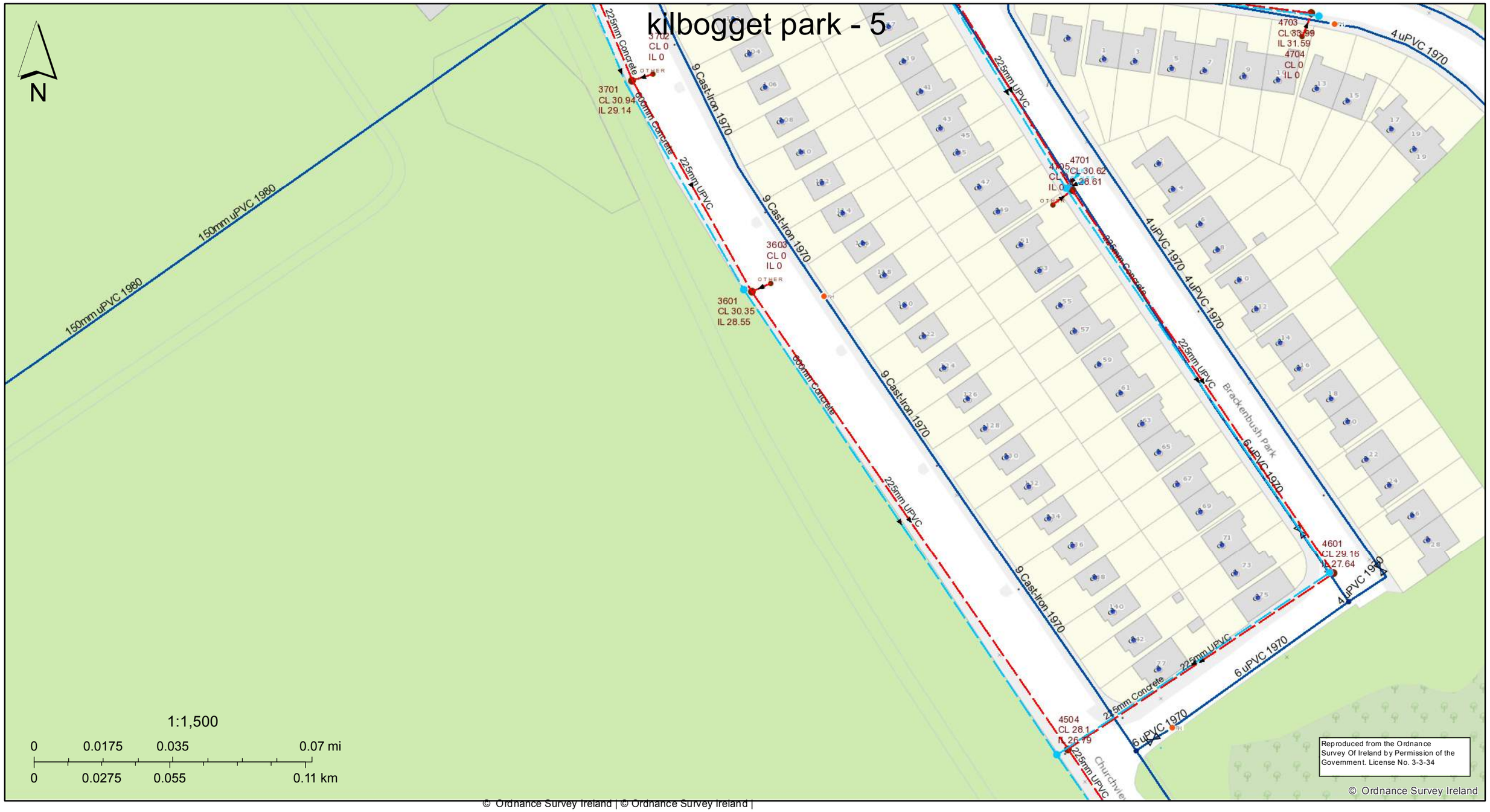
Storm Discharge Points
- Outfall
- Overflow
- Soakaway
- Other; Unknown

- Storm Culverts
- Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Sewer Gravity Mains (Non-Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

kilbogget park - 5



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Legend

Stormwater Gravity Mains (Irish Water Owned)
- Surface

Stormwater Gravity Mains (Non-Irish Water Owned)
- Surface

Storm Manholes
- Cascade
- Catchpit
- Hatchbox
- Lamphole
- Standard
- Other; Unknown

Storm Inlets
- Gully
- Standard
- Other; Unknown

Storm Fittings
- Vent/Col
- Other; Unknown

Storm Discharge Points
- Outfall
- Overflow
- Soakaway
- Other; Unknown

- Storm Culverts
- Storm Clean Outs

Sewer Gravity Mains (Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Sewer Gravity Mains (Non-Irish Water owned)
- Combined
- Foul
- Overflow
- Unknown

Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland. It should not be relied upon in the event of excavations or other works being carried out in the vicinity of the network. The onus is on the parties carrying out the works to ensure the exact location of the network is identified prior to mechanical works being carried out. Service pipes are not generally shown but their presence should be anticipated. © Irish Water

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Appendix B –Preliminary Site Investigation Report

DEVELOPMENT
AT KILGOBBET PARK
CABINTEELY
(DLR Co.Co.)

DONNACHADH O'BRIEN
CONSULTING ENGINEERS

CONTENTS

APPENDICES

FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

General.

Recommendations made, and opinions expressed in the report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

Boring Procedures.

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations sampling and/or logging of soils and in-situ testing complies with the recommendations of the British Standard Code of Practice BS 5930 (1981), 'Site Investigation' and BS 1377:1990, 'Methods of test for soils for civil engineering purposes'.

Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

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

Routine Sampling.

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

In-Situ Testing.

Standard penetration tests, utilising either the standard split spoon sampler or solid cone and automatic trip-hammer are conducted unless otherwise where required by instruction. Subsequent to a seating drive of 150mm, a summation for the number of blows for 300mm penetration is recorded on the boring records together with the blow count for each 75mm penetration. In cases where incomplete penetration is obtained, the number of blows for the recorded value of penetration are noted. In coarse granular soils, a cone end is fitted to the sampler and a similar procedure adopted.

Groundwater.

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level.

Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage condition, tidal variation or other causes.

Retention of Samples.

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

REPORT ON A SITE INVESTIGATION
FOR A PROPOSED DEVELOPMENT
AT KILBOGGET PARK
CABINTEELY

FOR
DONNACHADH O'BRIEN AND ASSOCIATES
CONSULTING ENGINEERS

Report No. 21490 **MARCH 2019**

I Introduction

A new development is proposed for Kilbogget Park in Cabinteely, Co. Dublin.

An investigation of sub soil conditions in the area of the new development has been carried out by IGSL for DOBA Consulting Engineers, on behalf of Dun Laoghaire Rathdown Co.Co.

The sub soils at four specific areas located in the vicinity of the existing car park were established.

The scheduled site investigation included the following elements:

*	Cable Percussion Borehole	1 nr.
•	Trial Pit Excavations	4 nr.
•	HD Dynamic Probes	4 nr.
•	CBR by Plate Test	4 nr.
•	BRE Digest 365 Percolation	3 nr.
•	Geotechnical Laboratory Testing	
•	Environmental Laboratory Testing	

This report includes all factual data from field operations and laboratory and discusses these findings relative to the proposed new development.

II Fieldwork

The development is to take place in and around the existing Kilbogget Park car park, located off Churchview Road in Cabinteely.

The site and the proposed exploratory locations are noted on the drawing and aerial map enclosed in Appendix VII. The drawing was provided by DOBA. The investigation was concentrated in four areas referenced 1 to 4.

The various elements of the investigation are detailed in the following paragraphs. All field works were supervised by an experienced geotechnical engineer who carefully recorded stratification, recovered samples as required and prepared detailed records.

Each location was scanned electronically (CAT) to ensure that existing services were not damaged. A shallow trial pit was opened at BH01 to confirm this.

Borehole

One exploratory borehole was constructed in Area 2. The initial borehole refused on an obstruction in clay FILL at 2.00 metres BGL. A re-bore identified FILL material to a depth of 2.60 metres, overlying very stiff brown very gravelly CLAY (Boulder Clay). The borehole was terminated at 3.30 metres on obstruction. The final refusal depth is not indicative of rock horizon. No ground water was observed in this location. Detailed boring records are presented in Appendix I.

Trial Pits

Pits were excavated using a JCB excavator under engineering supervision. Detailed trial pit logs with photographs are enclosed in Appendix II.

TP01 encountered CLAY fill to a depth of 0.80 metres overlying firm to stiff gravelly SILT/CLAY (boulder clay). The excavation was completed at 2.60 metres. No ground water was noted.

TP02 noted variable FILL material to a depth of 1.80 metres with firm damp gravelly CLAY from 1.80 to 2.80 metres. Very stiff gravelly SILT/CLAY is present from 2.80 to refusal at 2.90 metres. Water ingress was noted at 2.40 metres BGL.

TP03 penetrated FILL material from GL to 3.50 metres. The fill is very variable containing domestic waste material with a distinct gassy rotten egg odour. The excavation was unstable in the damp fill material.

At TP04 variable FILL was noted to a depth of 1.40 metres overlying soft brown sandy gravelly SILT/CLAY. Excavation was terminated at 3.00 metres with water noted at 2.30 metres and excavation instability recorded.

Dynamic Probes

Heavy Duty Dynamic Probes were taken at the four investigation locations. Probing was in accordance with the heavy-duty probe specification of BS 1377: Part 9: 1990. In these tests, the soil resistance is measured in terms of the number of drop-hammer blows required to drive the test probe through each 100 mm increment of penetration. Probing is terminated when the blow count exceeds 25/100mm to avoid damage to the apparatus. Where loose material is present a single blow count may drive the apparatus in excess of 100mm. In this instance blow counts of zero may be recorded.

Individual probe records are contained in Appendix III.

The probe graphs generally reflect a pattern of soft or firm soils to depths ranging from 1.50 to 3.50 metres. This would typically be related to probe resistance less than $N_{100} = 3$.

Increasing resistance, reflecting base stiff boulder clay was noted as follows:

DP01	3.20
DP02	2.30
DP03	2.50
DP04	3.50

In Situ CBR by Plate Bearing Test

The CBR value of the soils at shallow depth was established at three locations using Plate Bearing Test Apparatus. Tests were carried out along the line of the proposed site access road. A steel plate is loaded and off-loaded incrementally over two stages and the deflection under load and recovery under off-load is measured by a system of dial gauges. The data is processed and load settlement graphs are prepared. An equivalent CBR value is calculated in accordance with NRA HD25-26/10. At each location testing was carried out on FILL material.

Results are summarised in the following table and details are presented in Appendix IV

Test No.	**Depth**	**CBR at Load Cycle (%)**	**CBR @ Re-Load (%)**
PBT 01	0.50	1.2	2.7
PBT 02	0.40	2.9	8.5
PBT 03	0.40	1.9	6.1
PBT 04	0.40	1.4	4.3

c. Percolation Test / BRE DIGEST 365

Infiltration testing was performed at three of the four locations in accordance with BRE Digest 365 'Soakaway Design'. No test was performed at location 3.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pits, and records taken of the fall in water level against time. The tests are carried over two cycles following initial soakage. Designs are based on the slowest infiltration rate, which is generally calculated from the final cycle.

The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second. In these calculations the exposed area is the sum of the base area and the average internal area of the pit sides over the test duration.

In all three locations no fall in water level was observed, the tests are therefore classed as failures. The results are typical of the extremely low permeability gravelly clay forming the FILL deposits over the site area.

Full details of each test are contained in Appendix V.

III. Laboratory Testing

A programme of laboratory testing was scheduled following completion of site operations. Geotechnical testing was carried out by IGSL in it's INAB-Accredited laboratory. Environmental and chemical testing was carried out in the UK by CHEMTEST Ltd. The test programme included the following elements:

- Liquid and Plastic Limits / Moisture Content
- PSD Grading by wet sieve and hydrometer.
- Sulphate and pH
- RILTA Suite

Individual test results are discussed in the following paragraphs.

Classification

Three cohesive samples from the trial pits had index properties established. Test results for the soils confirm clay or silt matrix material in the CI zone of the standard classification. One sample from TP02 is defined as very silty gravelly SAND.

Grading

Wet sieve with hydrometer analysis as necessary was used to establish PSD grading curves for three samples selected.

Two samples conform to the normal boulder clay pattern with smooth grading from the clay to gravel fraction.

The sample from TP02 is confirmed as brown silty very gravelly SAND.

Sulphate and pH.

Two samples were selected for sulphate and pH analysis. Sulphate concentrations (SO4 2:1 extract) of < 0.010 g/l were established with pH values of 8.3 and 7.9 . No special precautions are necessary to protect foundation concrete from sulphate aggression. A sulphate design class of DS-1 (ACEC Classification for Concrete) is indicated for concentrations less than 0.5 g/l.

Environmental

Four soil samples were submitted for detailed environmental analysis to RILTA (WAC) parameters. The results confirm that the material can be classified as INERT with no elevated contaminant levels recorded. The results indicate that material excavated from this site can be readily disposed of either on-site or to a licensed landfill facility.

No asbestos traces were found during routine screening.

While the RILTA Suite tests indicate INERT classification it should be noted that the fill at TP03 contained what appears to be household waste with a rotten egg odour indicative of landfill gas generation noted by the field engineer.

IV. Discussion:

The new development is to be carried out at the main car park area located off Churchview Road.

A detailed investigation has been carried out under the direction of DOBA. The factual data from field and laboratory is presented in Sections I to III of this report.

Four distinct areas were examined and the findings can be summarised as follows:

	Area 1	Area 2	Area 3	Area 4
Made Ground	0 – 0.80	0 – 1.80	0 – 3.50	0 -1.40
Soft to Firm Clay	0.80 – 2.50	1.80 – 2.80	N/A	1.40 – 3.00
Stiff boulder Clay	2.50 – 2.80	2.80 – 2.90	N/A	N/A
Stiff Soils defined by Probe $N_{100} = 5$	3.10	2.40	2.70	3.50
Ground Water (m BGL)	Dry	2.40	0.70	2.30
Percolation	Fail	Fail	N/A	Fail
CBR (Load) %	1.2	2.9	1.9	1.4
(Re-load) %	2.7	8.5	6.1	4.3

New Foundations

The fill deposits and underlying soft soils are unsuited as founding medium.

Foundations for new structures in the area should therefore be taken to the stiff boulder clay encountered in all locations at depths ranging from 2.40 to 3.50 metres. Either direct excavation or piled foundations can be considered.

If direct excavation is employed note should be taken of excavation instability and ground water. Statutory safety regulations prohibit personnel entering unsupported excavations deeper than 1.20 metres, irrespective of apparent stability.

Pavements / Storm Water Disposal

CBR values at each of the four locations are noted above and can be utilised for pavement design.

The soils are not suited for dispersion of storm or surface water, consideration should be given to the use of the local authority drainage system or of disposal to a local watercourse.

Environmental

While samples for RILTA analysis were classified as inert, the fill at TP03 contained material generating possible landfill gas. Further investigation in this area possibly by Window Sampling and Standpipe Installation followed by gas monitoring is advised.

Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	BOREHOLE NO.	BH01
		SHEET	Sheet 1 of 1
CO-ORDINATES		RIG TYPE	Dando 2000
		BOREHOLE DIAMETER (mm)	
GROUND LEVEL (m AOD)		BOREHOLE DEPTH (m)	2.00
		DATE COMMENCED	21/01/2019
		DATE COMPLETED	21/01/2019
CLIENT	Dun Laughaire Rathdown Co. Co.	SPT HAMMER REF. NO.	
		BORED BY	P.Allan
ENGINEER	DOB	ENERGY RATIO (%)	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	MADE GROUND (Comprised of brown sandy gravelly clay fill)			1.00	AA103042	B	0.50			
1	MADE GROUND (Comprised of grey/black gravelly clay fill)			2.00	AA103043	B	1.50		N = 34 (4, 6, 8, 8, 8, 10)	
2	Obstruction End of Borehole at 2.00 m								N = 50/150 mm (15, 18, 40, 10)	
3										
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
1.7	2	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit carried out . Obstruction encountered at 2.00m . Relocated to BH01A and attempted rebore.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21490.GPJ IGSL.GDT 24/1/19

GEOTECHNICAL BORING RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	**BOREHOLE NO.**	**BH01A**
		SHEET	Sheet 1 of 1
CO-ORDINATES	**RIG TYPE** Dando 2000	**DATE COMMENCED**	22/01/2019
	BOREHOLE DIAMETER (mm)		
GROUND LEVEL (m AOD)	**BOREHOLE DEPTH (m)** 3.30	**DATE COMPLETED**	22/01/2019
CLIENT Dun Laughaire Rathdown Co. Co.	**SPT HAMMER REF. NO.**	**BORED BY**	P.Allan
ENGINEER DOB	**ENERGY RATIO (%)**	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	MADE GROUND (Comprised of brown sandy gravelly clay fill)				AA101709	B	1.00		N = 35 (3, 7, 9, 7, 8, 11)	
1				1.50						
	MADE GROUND (Comprised of grey/black sandy gravelly clay fill)				AA101710	B	2.00			
2				2.60						
	Hard brown gravelly CLAY with cobbles				AA101711	B	3.00		N = 50/150 mm (20, 5, 40, 10)	
3				3.30						
	Obstruction End of Borehole at 3.30 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3	3.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS CAT scanned location and hand dug inspection pit carried out . Obstruction encountered at 2.00m . Relocated to BH01A and attempted rebore.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 21490.GPJ IGSL.GDT 24/1/19

Appendix II Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	724,205.00 E 724,807.00 N
		DATE STARTED	16/01/2019
		DATE COMPLETED	16/01/2019
CLIENT	Dun Laughaire Rathdown Co. Co.	**GROUND LEVEL (m)**	
ENGINEER	DOB	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL (MADE GROUND)		0.20							
Soft to firm brown slightly sandy gravelly SILT/CLAY (MADE GROUND)					AA110726	Env B	0.50 0.50		
Firm brown slightly gravelly SILT/CLAY with a medium cobble content and low boulder content (<350mm). (Possible MADE GROUND)		0.80			AA110727	Env B	1.50 1.50		
1.0									
2.0									
Stiff brown gravelly CLAY with a medium cobble content and a low boulder content (<350mm)		2.50							
End of Trial Pit at 2.60m		2.60							
3.0									
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks

IGSL TP LOG 21490.GPJ IGSL.GDT 24/1/19

TRIAL PIT RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	TRIAL PIT NO.	TP02
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	CO-ORDINATES	724,165.00 E 724,908.00 N
			DATE STARTED 16/01/2019
		GROUND LEVEL (m)	DATE COMPLETED 16/01/2019
CLIENT	Dun Laughaire Rathdown Co. Co.		EXCAVATION METHOD JCB
ENGINEER	DOB		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL (MADE GROUND)									
Soft to firm brown slightly sandy gravelly CLAY with a medium cobble content and a low boulder content (<250mm). Infrequent brick fragments, concrete fragments, granite fragments (MADE GROUND)		0.20			AA110717	Env B	0.50 0.50		
1.0 Soft to firm dark brown slightly gravelly CLAY. Frequent timber, rootlets (MADE GROUND)		0.90			AA110718	Env B	1.00 1.00		
Firm wet greyish brown very sandy gravelly CLAY		1.80		1 (Seepage)	AA110719	Env B	2.00 2.00		
2.0				2 (Moderate)					
Stiff brown gravelly SILT/CLAY with a low cobble content		2.80							
End of Trial Pit at 2.90m		2.90							
3.0									
4.0									

Groundwater Conditions
Groundwater at 2.40m

Stability
Wall collapse from 1.50m to end of pit

General Remarks

TRIAL PIT RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	724,108.00 E 724,864.00 N
		DATE STARTED	16/01/2019
		DATE COMPLETED	16/01/2019
CLIENT	Dun Laughaire Rathdown Co. Co.	**GROUND LEVEL (m)**	
ENGINEER	DOB	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL (MADE GROUND)									
Brown slightly sandy gravelly CLAY (MADE GROUND)		0.20				Env	0.50		
		0.70			AA110720	B	0.50		
Very soft to soft black sludgy silty clayey GRAVEL with abundant waste material including plastic bags and tape, concrete fragments, granite fragments, cloth, bedsprings. rotten egg odour (MADE GROUND)						Env	1.00		
1.0					AA110721	B	1.00		
2.0						Env	2.00		
					AA110722	B	2.00		
3.0									
		3.50							
End of Trial Pit at 3.50m									
4.0									

Groundwater Conditions
Damp from 0.70m

Stability
Wall collapse from 0.70m to end of pit

General Remarks

IGSL TP LOG 21490.GPJ IGSL.GDT 24/1/19

TRIAL PIT RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	L. Daniels	**CO-ORDINATES**	724,135.00 E 724,819.00 N
		DATE STARTED	16/01/2019
		DATE COMPLETED	16/01/2019
CLIENT	Dun Laughaire Rathdown Co. Co.	**GROUND LEVEL (m)**	
ENGINEER	DOB	**EXCAVATION METHOD**	JCB

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL (MADE GROUND)		0.20							
Brown slightly sandy gravelly CLAY. Infrequent cloth, plastic, timber fragments (MADE GROUND)						Env	0.50		
					AA110723	B	0.50		
1.0						Env	1.00		
					AA110724	B	1.00		
Soft brown sandy slightly gravelly SILT/CLAY		1.40							
2.0						Env	2.00		
				1 (Moderate)	AA110725	B	2.00		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Groundwater at 2.30m

Stability
Wall collapse from 1.60m to end of pit

General Remarks

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP01

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP01 Spoil

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP02

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP02 Spoil

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP03

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP03 Spoil

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP04

21490: Kilboggett Park, Cabinteely. Trial Pits.

TP04 Spoil

Appendix III Dynamic Probes

DYNAMIC PROBE RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	PROBE NO.	DP01
		SHEET	Sheet 1 of 1
CO-ORDINATES	724,205.00 E 724,807.00 N	DATE DRILLED	17/01/2019
GROUND LEVEL (mOD)		PROBE TYPE	DPH
CLIENT	Dun Laughaire Rathdown Co. Co.		
ENGINEER	DOB		
HAMMER MASS (kg)	50		
INCREMENT SIZE (mm)	100		
FALL HEIGHT (mm)	500		

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	2
						0.10	4
						0.20	4
						0.30	3
						0.40	4
						0.50	3
						0.60	2
						0.70	6
						0.80	3
						0.90	3
1.0						1.00	4
						1.10	4
						1.20	4
						1.30	4
						1.40	7
						1.50	6
						1.60	9
						1.70	5
						1.80	5
						1.90	3
2.0						2.00	4
						2.10	3
						2.20	3
						2.30	4
						2.40	3
						2.50	1
						2.60	3
						2.70	3
						2.80	2
						2.90	4
3.0						3.00	3
						3.10	5
						3.20	5
						3.30	6
						3.40	7
						3.50	7
						3.60	14
						3.70	17
	End of Probe at 3.80 m						
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21490.GPJ IGSL.GDT 21/1/19

DYNAMIC PROBE RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	PROBE NO.	DP02
		SHEET	Sheet 1 of 1
CO-ORDINATES	724,165.00 E 724,908.00 N	DATE DRILLED	17/01/2019
GROUND LEVEL (mOD)		HAMMER MASS (kg)	50
CLIENT	Dun Laughaire Rathdown Co. Co.	INCREMENT SIZE (mm)	100
ENGINEER	DOB	FALL HEIGHT (mm)	500
		PROBE TYPE	DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	2
						0.10	5
						0.20	8
						0.30	8
						0.40	9
						0.50	5
						0.60	3
						0.70	2
						0.80	3
						0.90	4
1.0						1.00	3
						1.10	3
						1.20	3
						1.30	3
						1.40	3
						1.50	2
						1.60	4
						1.70	4
						1.80	4
						1.90	6
2.0						2.00	5
						2.10	4
						2.20	5
						2.30	5
						2.40	6
						2.50	13
						2.60	21
						2.70	6
						2.80	6
						2.90	10
3.0						3.00	14
						3.10	13
						3.20	16
						3.30	10
						3.40	18
						3.50	23
						3.60	25
	End of Probe at 3.70 m						
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL_DP LOG 100MM INCREMENTS 21490.GPJ IGSL.GDT 21/1/19

DYNAMIC PROBE RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	PROBE NO.	DP03
		SHEET	Sheet 1 of 1
CO-ORDINATES	724,108.00 E 724,864.00 N	DATE DRILLED	17/01/2019
GROUND LEVEL (mOD)		HAMMER MASS (kg) 50	
CLIENT	Dun Laughaire Rathdown Co. Co.	INCREMENT SIZE (mm) 100	
ENGINEER	DOB	FALL HEIGHT (mm) 500	PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0						0.00	3
						0.10	3
						0.20	5
						0.30	6
						0.40	12
						0.50	11
						0.60	16
						0.70	19
						0.80	12
						0.90	7
1.0						1.00	4
						1.10	4
						1.20	3
						1.30	4
						1.40	8
						1.50	3
						1.60	8
						1.70	5
						1.80	3
						1.90	4
2.0						2.00	4
						2.10	4
						2.20	5
						2.30	5
						2.40	4
						2.50	5
						2.60	17
						2.70	22
						2.80	25
	End of Probe at 2.90 m						
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21490.GPJ IGSL.GDT 21/1/19

DYNAMIC PROBE RECORD

REPORT NUMBER 21490

CONTRACT	Kilbogget Park, Cabinteely, Dublin	PROBE NO.	DP04
		SHEET	Sheet 1 of 1
CO-ORDINATES	724,135.00 E 724,819.00 N	DATE DRILLED	17/01/2019
GROUND LEVEL (mOD)		HAMMER MASS (kg) 50	
CLIENT	Dun Laughaire Rathdown Co. Co.	INCREMENT SIZE (mm) 100	
ENGINEER	DOB	FALL HEIGHT (mm) 500	PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.					0.00	2
						0.10	5
						0.20	9
						0.30	7
						0.40	5
						0.50	15
						0.60	13
						0.70	8
						0.80	6
						0.90	5
1.0						1.00	5
						1.10	2
						1.20	2
						1.30	1
						1.40	1
						1.50	2
						1.60	2
						1.70	2
						1.80	2
						1.90	2
2.0						2.00	3
						2.10	5
						2.20	6
						2.30	7
						2.40	6
						2.50	3
						2.60	1
						2.70	2
						2.80	3
						2.90	2
3.0						3.00	1
						3.10	1
						3.20	1
						3.30	1
						3.40	1
						3.50	2
						3.60	10
						3.70	14
						3.80	21
						3.90	25
4.0	End of Probe at 4.00 m						

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 21490.GPJ IGSL.GDT 21/1/19

IV CBR by Plate Test

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

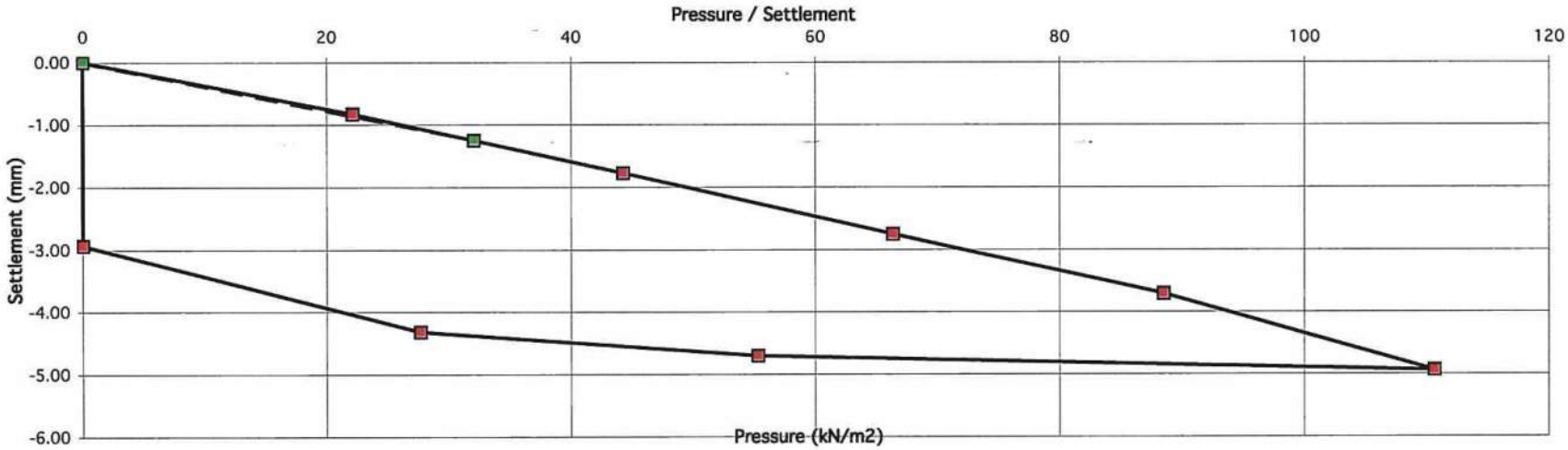
Reference No.	R97889
Contract	Cabinteely
Test No.	CBR01
Location	See TP01
Depth	0.50mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. _____

Depth _____ m bgl



Gradient at 1.25 mm settlement intersection = 26
Modulus of subgrade reaction = 16 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.2 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

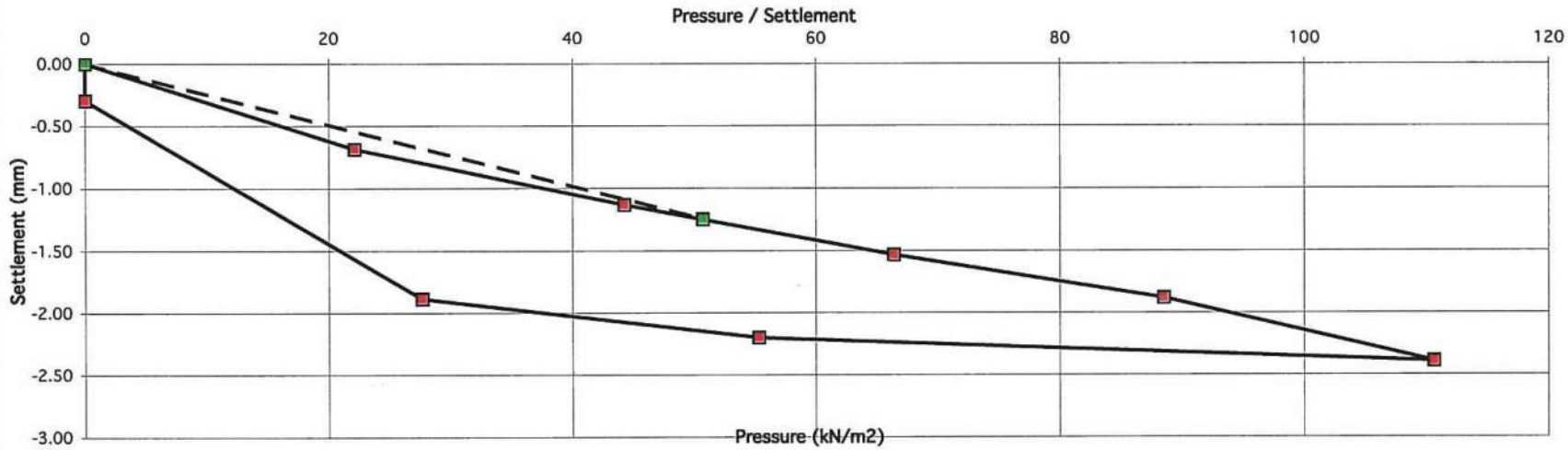
Reference No.	R97889
Contract	Cabinteely
Test No.	CBR01 Reload
Location	See TP01
Depth	0.50mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....

Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 41
Modulus of subgrade reaction = 26 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.7 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

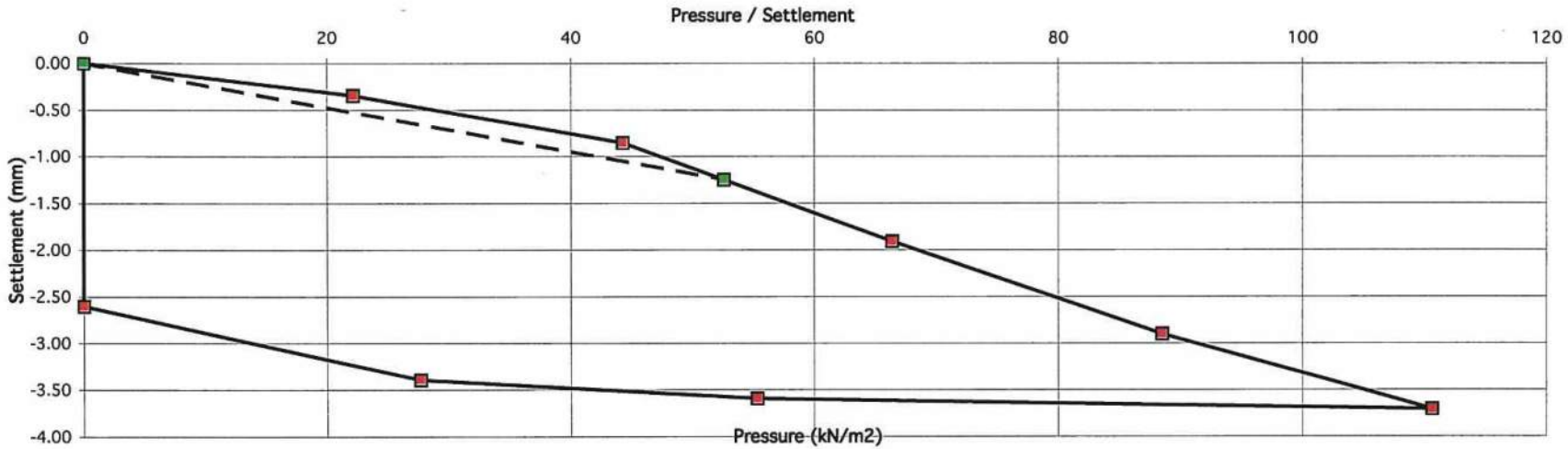
Reference No.	R97890
Contract	Cabinteely
Test No.	CBR02 Load
Location	See TP02
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....

Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 42
Modulus of subgrade reaction = 27 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 2.9 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

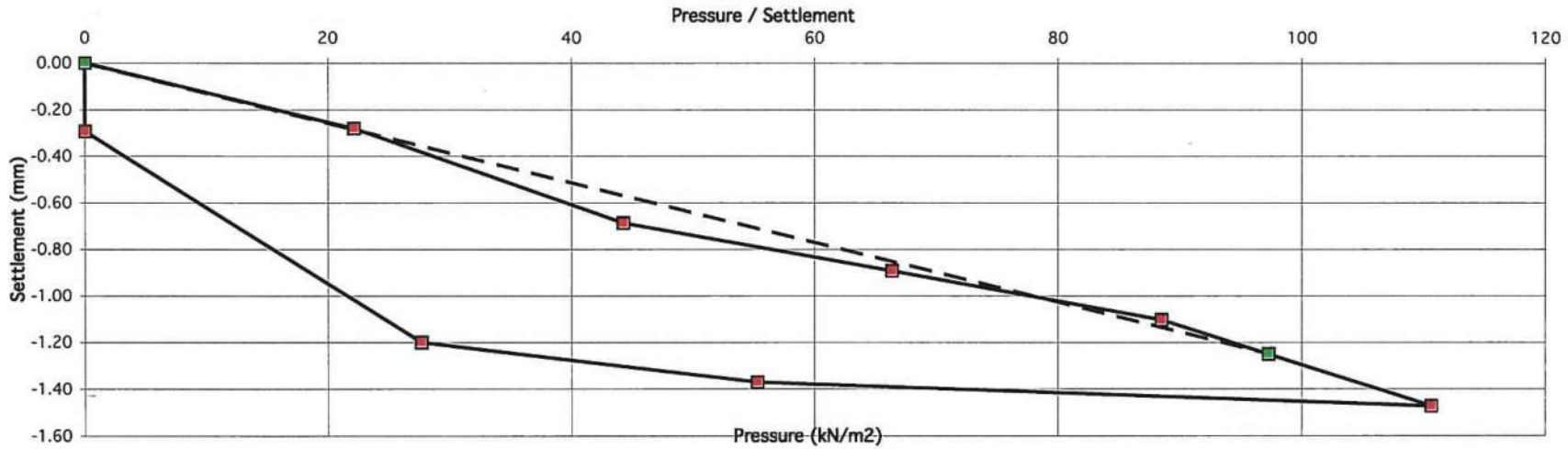
Reference No.	R97890
Contract	Cabinteely
Test No.	CBR02 Reload
Location	See TP02
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....

Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 78
Modulus of subgrade reaction = 50 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 8.5 %

PLATE TEST REPORT SHEET (F3.1)

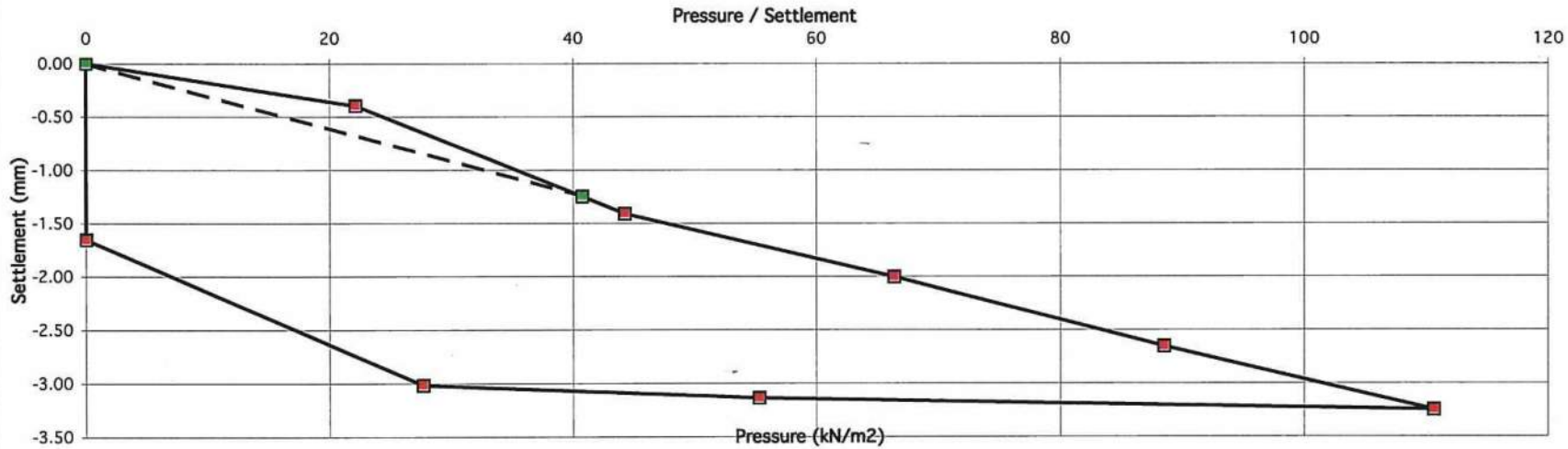
Applied Pressure/Settlement Curve

Reference No.	R97891
Contract	Cabinteely
Test No.	CBR03 Load
Location	See TP03
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....
Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 33
Modulus of subgrade reaction = 21 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.9 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

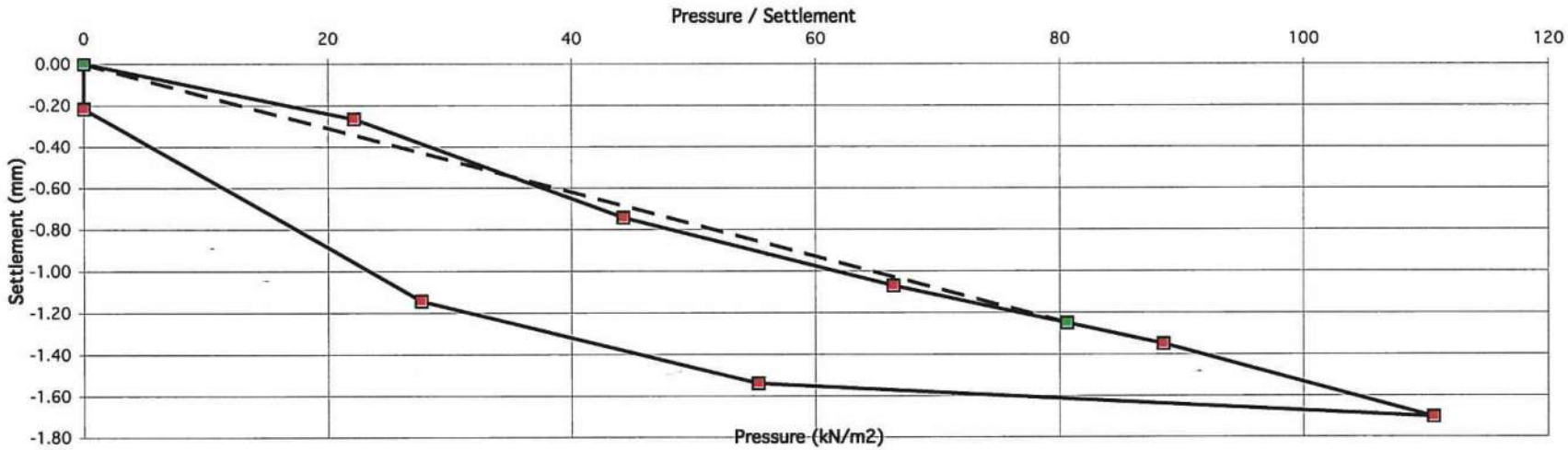
Reference No.	R97891
Contract	Cabinteely
Test No.	CBR03 Reload
Location	See TP03
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....

Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 64
Modulus of subgrade reaction = 41 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 6.1 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

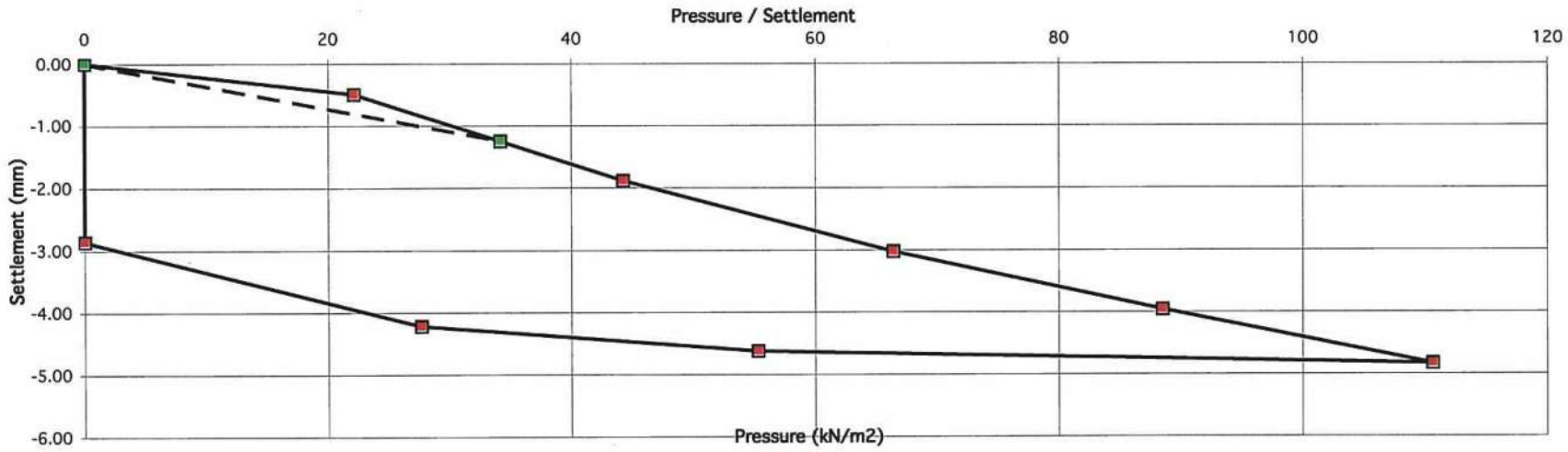
Reference No.	R97892
Contract	Cabinteely
Test No.	CBR04 Load
Location	See TP04
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....

Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 27
Modulus of subgrade reaction = 18 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.4 %

PLATE TEST REPORT SHEET (F3.1)

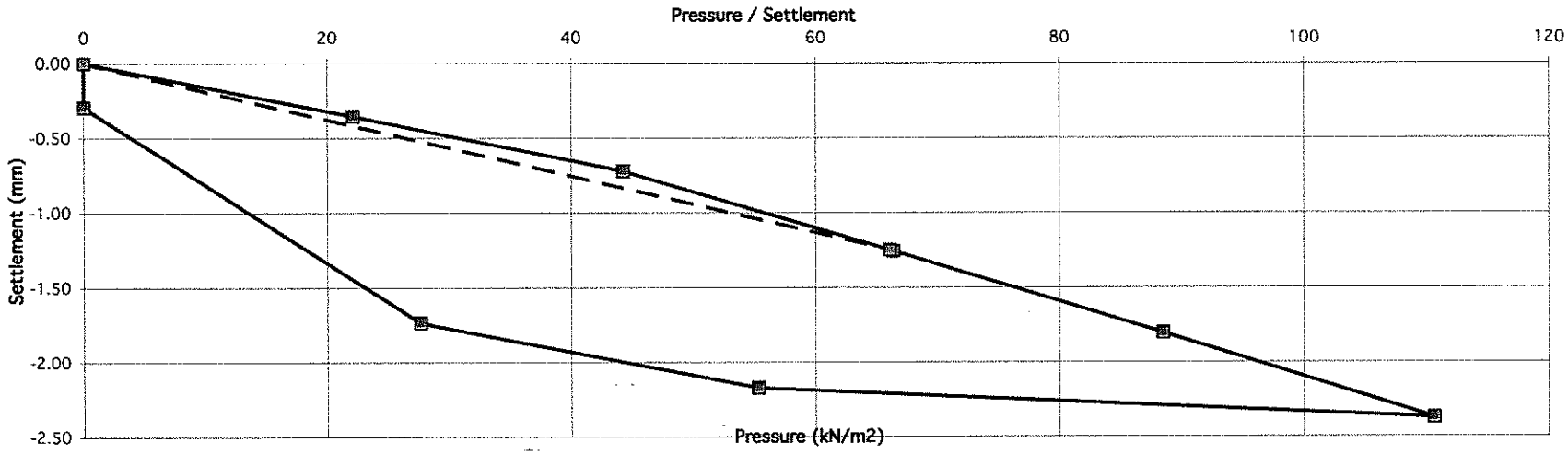
Applied Pressure/Settlement Curve

Reference No.	R97892
Contract	Cabinteely
Test No.	CBR04 Reload
Location	See TP04
Depth	0.40mbgl
Client	DOB
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	L. Daniels
Authorised by	
Date	16/01/2019

Description of soil under test
(natural soil, placed fill, sub-base)

Brown slightly gravelly CLAY (MADE GROUND)

Sample Ref No. .....
Depth ..... m bgl



Gradient at 1.25 mm settlement intersection = 53
Modulus of subgrade reaction = 34 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 4.3 %

Appendix V BRE Digest 365

Soakaway Design f -value from field tests (F2C) IGSL

Contract: Kilbogget Park, Cabinteely Contract No. 21490
Test No. SA01
Client DOB
Date: 17th January 2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	Dry
0.20	1.30	Brown slightly sandy gravelly CLAY (MADE GROUND)	

Notes:

Field Data

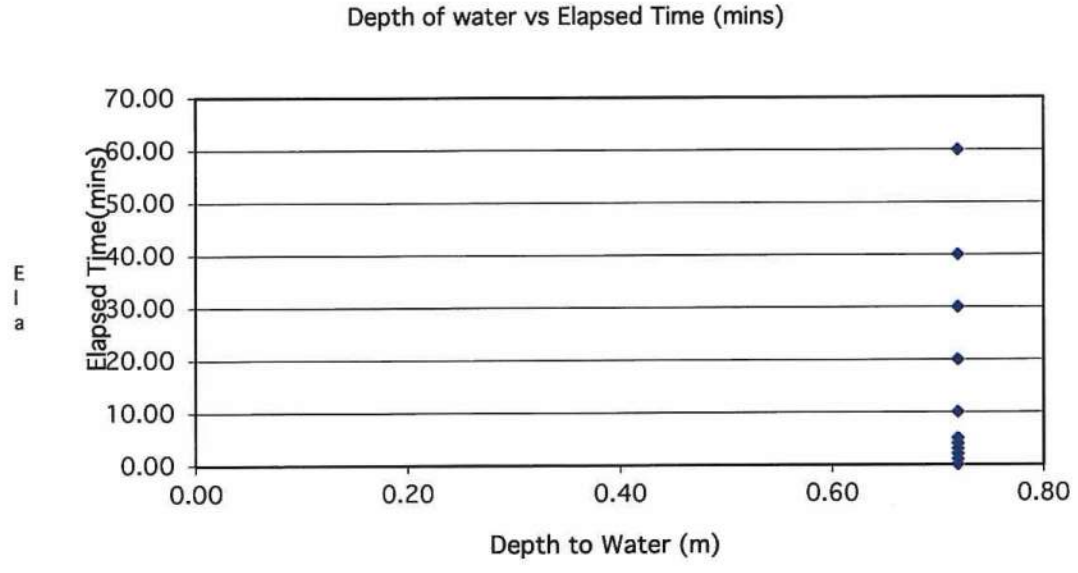
Depth to Water (m)	Elapsed Time (min)
0.72	0.00
0.72	1.00
0.72	2.00
0.72	3.00
0.72	4.00
0.72	5.00
0.72	10.00
0.72	20.00
0.72	30.00
0.72	40.00
0.72	60.00

Field Test

Depth of Pit (D)	1.30	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.00	m
Initial depth to Water =	0.72	m
Final depth to water =	0.72	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.5	m2
*Av. side area of permeable stratum over test perio	1.74	m2
Total Exposed area =	2.24	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Kilbogget Park, Cabinteely Contract No. 21490
Test No. SA02
Client DOB
Date: 17th January 2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	Dry
0.20	1.30	Brown slightly sandy gravelly CLAY (MADE GROUND)	

Notes:

Field Data

Depth to Water (m)	Elapsed Time (min)
0.75	0.00
0.75	1.00
0.75	2.00
0.75	3.00
0.75	4.00
0.75	5.00
0.75	10.00
0.75	20.00
0.75	30.00
0.75	40.00
0.75	60.00

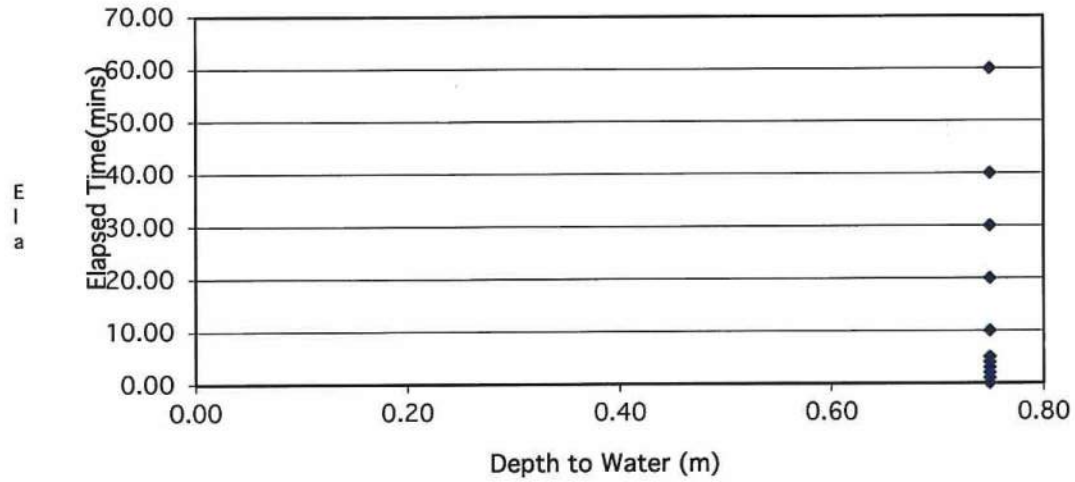
Field Test

Depth of Pit (D)	1.30	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.10	m
Initial depth to Water =	0.75	m
Final depth to water =	0.75	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.55	m2
*Av. side area of permeable stratum over test perio	1.76	m2
Total Exposed area =	2.31	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec

Depth of water vs Elapsed Time (mins)



Soakaway Design f -value from field tests (F2C) IGSL

Contract: Kilbogget Park, Cabinteely Contract No. 21490
Test No. SA04
Client DOB
Date: 17th January 2019

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	TOPSOIL	Dry
0.20	1.10	Brown slightly sandy gravelly CLAY (MADE GROUND)	

Notes:

Field Data

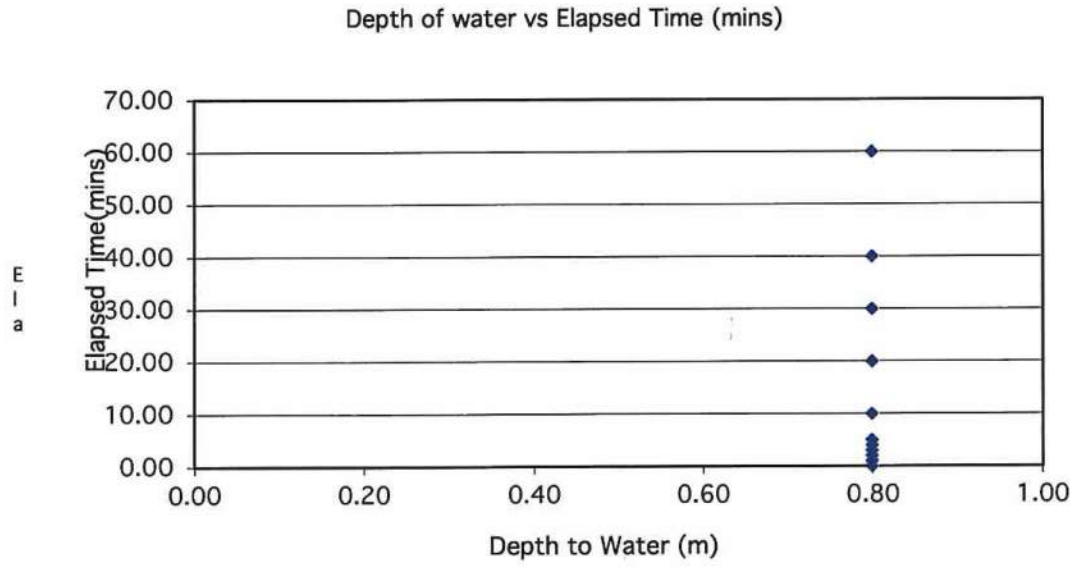
Depth to Water (m)	Elapsed Time (min)
0.80	0.00
0.80	1.00
0.80	2.00
0.80	3.00
0.80	4.00
0.80	5.00
0.80	10.00
0.80	20.00
0.80	30.00
0.80	40.00
0.80	60.00

Field Test

Depth of Pit (D)	1.10	m
Width of Pit (B)	0.50	m
Length of Pit (L)	0.80	m
Initial depth to Water =	0.80	m
Final depth to water =	0.80	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.4	m2
*Av. side area of permeable stratum over test perio	0.78	m2
Total Exposed area =	1.18	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Appendix VI Laboratory

a. Geotechnical

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

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2*, 4.3, 4.4 & 5.3

Report No. **R98187** Contract No. 21490 Contract Name: Kilbogget Park , Cabinteely ,Dublin

Customer Donnachadh O'Brien & Associates, Unit 5C, Elm House, Millennium Park, Naas Co. Kildare.

Samples Received: 23/01/19 Date Tested: 25/01/19

BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
TP01	AA110727	1.0	A19/259	B	12	42	22	20	44	WS	4.4	C I	Brown slightly sandy, gravelly, CLAY
TP02	AA110719	2.0	A19/261	B	15	31	NP	NP	21	WS	4.4		Light brown silty, very gravelly, SAND
TP04	AA110725	2.0	A19/264	B	24	50	NP	NP	42	WS	4.4		Brown slightly sandy, gravelly, SILT

Notes:
Preparation: WS - Wet sieved; AR - As received; NP - Non plastic
Liquid Limit Clause: 4.3 Cone Penetrometer definitive method; 4.4 Cone Penetrometer one point method
Sample Type: B - Bulk Disturbed; U - Undisturbed

Remarks:

NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014
Opinions and interpretations are outside the scope of accreditation.
The results relate to the specimens tested. Any remaining material will be retained for one month.

IGSL Ltd Materials Laboratory	Persons authorized to approve reports	Approved by	Date	Page
	H Byrne (Laboratory Manager)	H Byrne	4/2/19	1 of 1

TEST REPORT

Determination of Particle Size Distribution

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

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB TESTING DETAILED IN SCOPE REG NO. 1331

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	89	
28	85	
20	83	
14	80	
10	77	
6.3	73	
5	71	
3.35	66	
2	59	
1.18	53	SAND
0.6	46	
0.425	43	
0.3	39	
0.15	33	
0.063	25	SILT/CLAY
0.040	21	
0.028	20	
0.018	17	
0.011	15	
0.007	13	
0.005	11	
0.002	7	

Contract No: 21490 Report No. R98216

Contract: Kilbogget Park , Cabinteely , Co.Dublin

BH/TP : TP01

Sample No. AA110727 Lab. Sample No. A19/0259

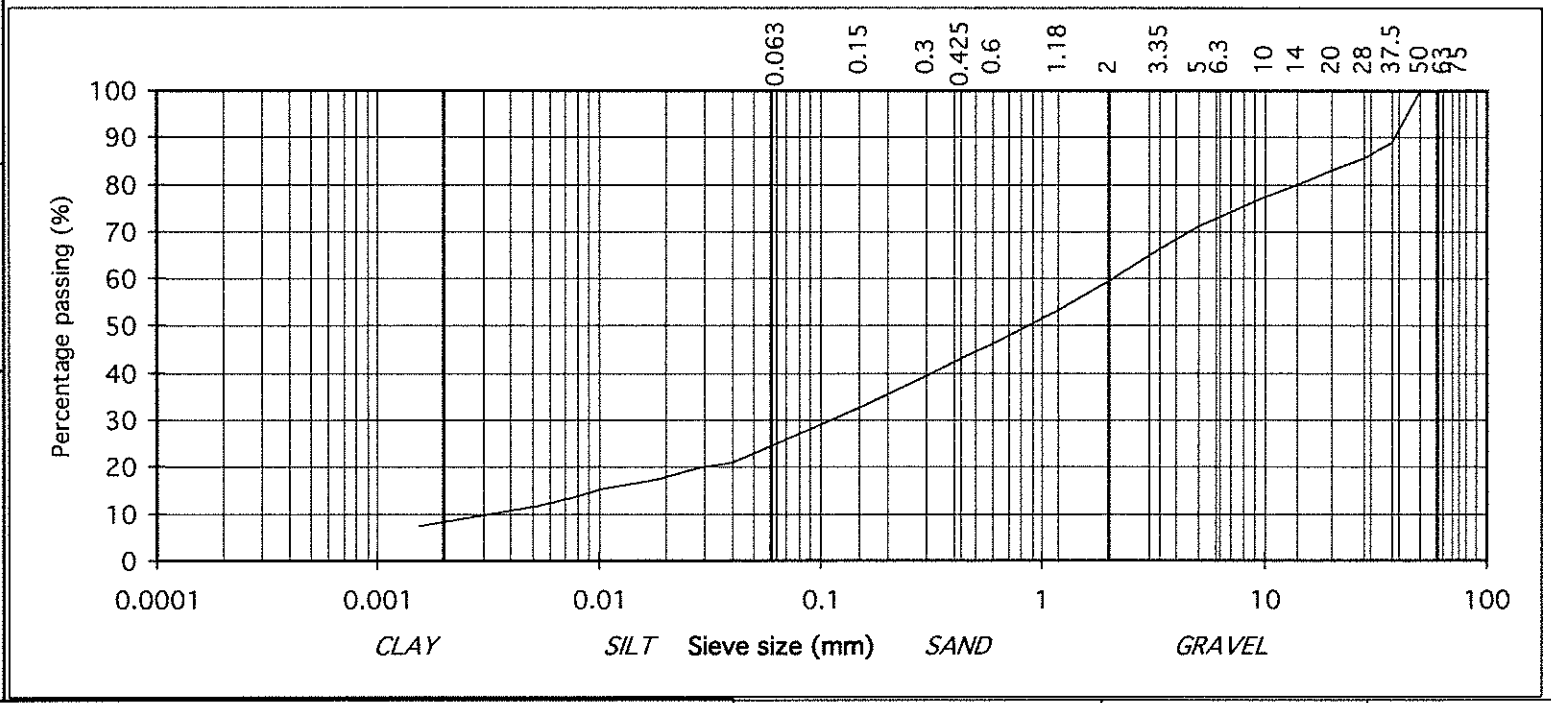
Sample Type: B

Depth (m) 1.00 Customer: Donnachadh O'Brien & Associates, Unit 5C, Elm House, Millennium Park, Naas Co. Kildare.

Date Received 23/01/2019 Date Testing started 25/01/2019

Description: Brown slightly sandy, gravelly, CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	30/01/19	1 of 1

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

TEST REPORT

Determination of Particle Size Distribution

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

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 1337

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	92	
28	91	
20	89	
14	86	
10	83	
6.3	79	
5	75	
3.35	67	
2	57	
1.18	49	SAND
0.6	39	
0.425	34	
0.3	29	
0.15	20	
0.063	13	SILT/CLAY

Contract No: 21490 Report No. R98301

Contract: Kilbogget Park , Cabinteely , Co.Dublin

BH/TP : TP02

Sample No. AA110719 Lab. Sample No. A19/0261

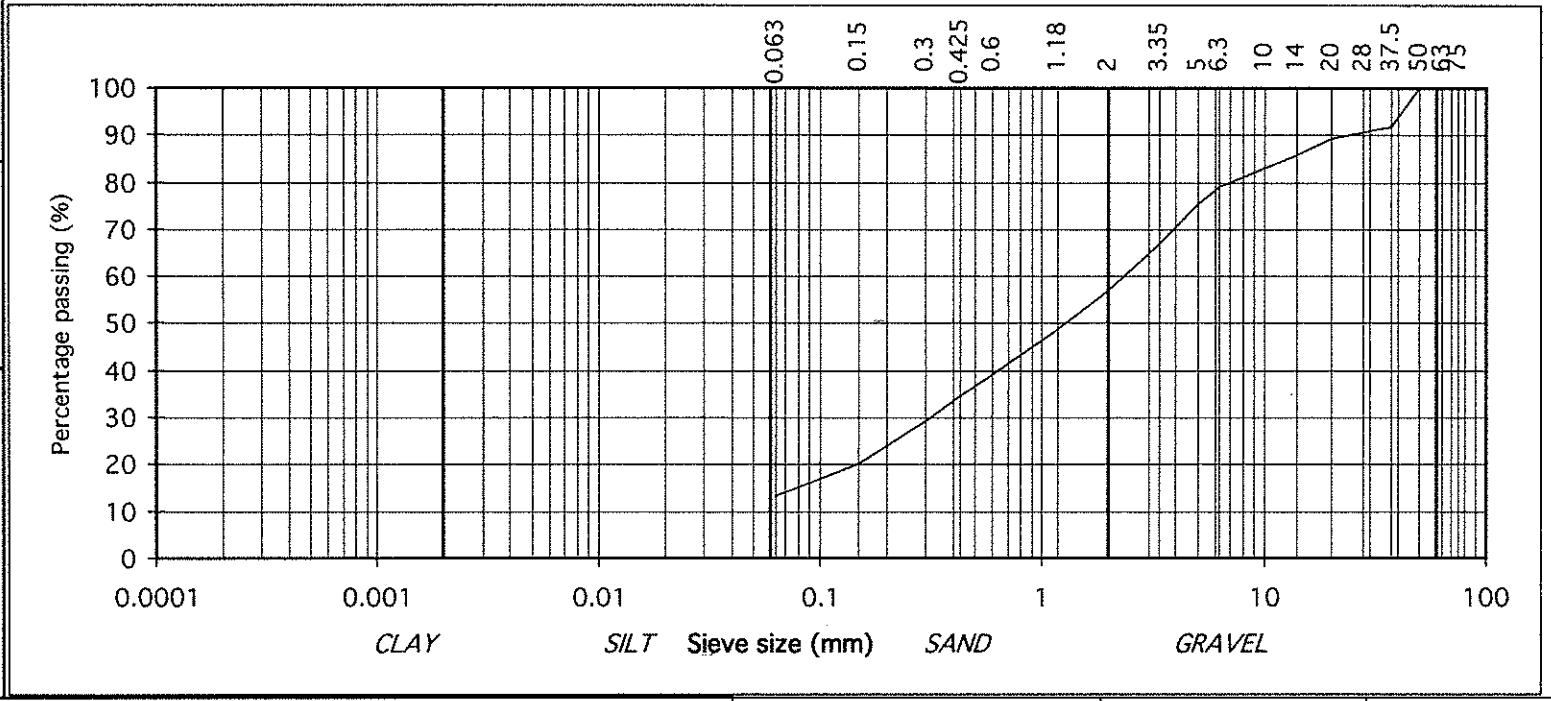
Sample Type: B

Depth (m) 2.00 Customer: Donnachadh O'Brien & Associates, Unit 5C, Elm House, Millennium Park, Naas Co. Kildare.

Date Received 23/01/2019 Date Testing started 25/01/2019

Description: Light brown silty, very gravelly, SAND

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	07/02/19	1 of 1

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

TEST REPORT

Determination of Particle Size Distribution

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

(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE REG. NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	95	
28	91	
20	88	
14	81	
10	78	
6.3	74	
5	71	
3.35	67	
2	63	
1.18	55	SAND
0.6	52	
0.425	48	
0.3	43	
0.15	36	
0.063	29	SILT/CLAY
0.040	25	
0.028	23	
0.018	21	
0.011	18	
0.008	14	
0.005	13	
0.002	7	

Contract No: 21490 Report No. R98217

Contract: Kilbogget Park , Cabinteely , Co.Dublin

BH/TP : TP04

Sample No. AA110725 Lab. Sample No. A19/0264

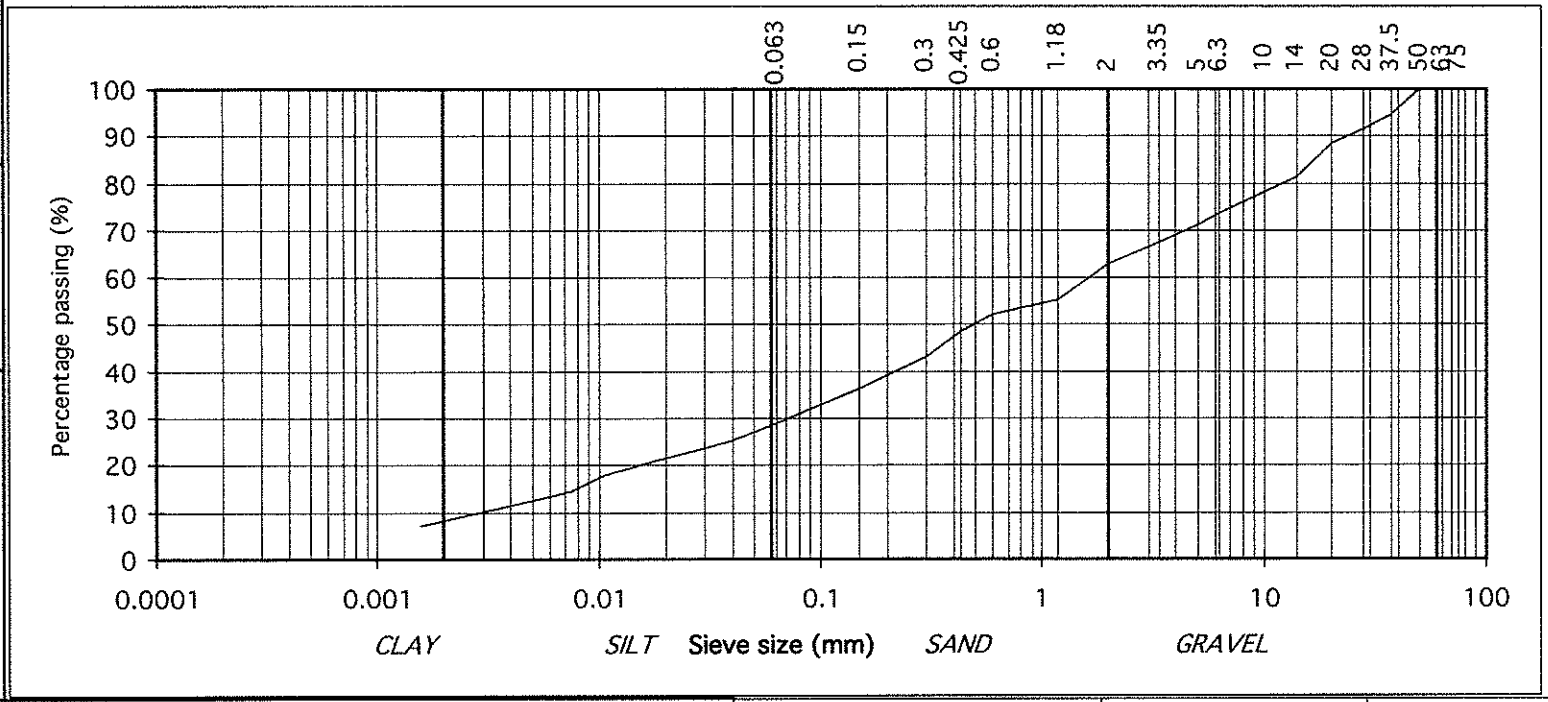
Sample Type: B

Depth (m) 2.00 Customer: Donnachadh O'Brien & Associates, Unit 5C, Elm House, Millennium Park, Naas Co. Kildare.

Date Received 23/01/2019 Date Testing started 25/01/2019

Description: Brown slightly sandy, gravelly, SILT

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	07/02/19	1 of 1

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

Appendix VI Laboratory

b. Chemical and Environmental

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	19-03882-1
Initial Date of Issue:	18-Feb-2019
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	21490 Kilbogget Park, Cabinteely

Quotation No.:		**Date Received:**	04-Feb-2019
Order No.:		**Date Instructed:**	04-Feb-2019
No. of Samples:	6		
Turnaround (Wkdays):	7	**Results Due:**	12-Feb-2019
Date Approved:	18-Feb-2019		

Approved By:

Details: Glynn Harvey, Laboratory Manager

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 21490 Kilbogget Park, Cabinteely

Client: IGSL				Chemtest Job No.:	19-03882	19-03882	19-03882	19-03882
Quotation No.:				Chemtest Sample ID.:	766414	766415	766417	766418
				Sample Location:	TP1	TP2	TP3	TP4
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.50	1.00	2.00	1.00
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Ammonium	U	1220	mg/l	0.050	0.089	0.071	4.2	0.37
Ammonium	N	1220	mg/kg	0.10	0.89	0.71	42	3.7
Boron (Dissolved)	U	1450	µg/l	20	< 20	< 20	< 20	< 20
Boron (Dissolved)	U	1450	mg/kg	0.20	< 0.20	< 0.20	< 0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 21490 Kilbogget Park, Cabinteely

Client: IGSL					Chemtest Job No.:	19-03882	19-03882	19-03882	19-03882	19-03882	19-03882
Quotation No.:					Chemtest Sample ID.:	766414	766415	766416	766417	766418	766419
					Sample Location:	TP1	TP2	TP2	TP3	TP4	TP4
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	2.00	2.00	1.00	2.00
					Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
ACM Type	U	2192		N/A		-	-		-	-	
Asbestos Identification	U	2192	%	0.001		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	
ACM Detection Stage	U	2192		N/A		-	-		-	-	
Moisture	N	2030	%	0.020		16	12	19	16	16	21
pH	U	2010		N/A				[A] 8.3			[A] 7.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40		< 0.40	0.86		< 0.40	< 0.40	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010				< 0.010			< 0.010
Sulphur (Elemental)	U	2180	mg/kg	1.0		[A] 3.9	[A] < 1.0		[A] 8.8	[A] 1.4	
Cyanide (Total)	U	2300	mg/kg	0.50		[A] < 0.50	[A] < 0.50		[A] < 0.50	[A] < 0.50	
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50		[A] 1.8	[A] 2.1		[A] 23	[A] 6.8	
Sulphate (Acid Soluble)	U	2430	%	0.010		[A] 0.066	[A] 0.024		[A] 0.027	[A] 0.050	
Arsenic	U	2450	mg/kg	1.0		35	17		21	31	
Barium	U	2450	mg/kg	10		260	47		72	170	
Cadmium	U	2450	mg/kg	0.10		2.7	0.62		1.2	1.8	
Chromium	U	2450	mg/kg	1.0		35	17		16	23	
Molybdenum	U	2450	mg/kg	2.0		36	< 2.0		2.1	22	
Antimony	N	2450	mg/kg	2.0		5.8	2.4		2.3	3.5	
Copper	U	2450	mg/kg	0.50		77	16		21	53	
Mercury	U	2450	mg/kg	0.10		0.42	< 0.10		< 0.10	0.28	
Nickel	U	2450	mg/kg	0.50		63	24		30	37	
Lead	U	2450	mg/kg	0.50		190	25		32	130	
Selenium	U	2450	mg/kg	0.20		0.38	< 0.20		< 0.20	< 0.20	
Zinc	U	2450	mg/kg	0.50		380	58		76	240	
Chromium (Trivalent)	N	2490	mg/kg	1.0		35	17		16	23	
Chromium (Hexavalent)	N	2490	mg/kg	0.50		< 0.50	< 0.50		< 0.50	< 0.50	
Total Organic Carbon	U	2625	%	0.20		[A] 3.0	[A] 2.9		[A] 0.52	[A] 0.79	
Mineral Oil	N	2670	mg/kg	10		32	< 10		31	10	
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C8-C10	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C10-C12	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C12-C16	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0		[A] 32	[A] < 1.0		[A] 31	[A] 9.9	
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0		[A] 32	[A] < 5.0		[A] 31	[A] 9.9	
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C8-C10	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 21490 Kilbogget Park, Cabinteely

Client: IGSL					Chemtest Job No.:	19-03882	19-03882	19-03882	19-03882	19-03882	19-03882
Quotation No.:					Chemtest Sample ID.:	766414	766415	766416	766417	766418	766419
					Sample Location:	TP1	TP2	TP2	TP3	TP4	TP4
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	2.00	2.00	1.00	2.00
					Asbestos Lab:	COVENTRY	COVENTRY		COVENTRY	COVENTRY	
Determinand	**Accred.**	**SOP**	**Units**	**LOD**							
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Aromatic TPH >C12-C16	U	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] 14	
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0		[A] 1.5	[A] < 1.0		[A] 5.0	[A] 41	
Aromatic TPH >C21-C35	U	2680	mg/kg	1.0		[A] 72	[A] < 1.0		[A] 56	[A] 240	
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0		[A] 74	[A] < 5.0		[A] 61	[A] 300	
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0		[A] 110	[A] < 10		[A] 93	[A] 310	
Benzene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Toluene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Ethylbenzene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
m & p-Xylene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
o-Xylene	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0	[A] < 1.0	
Naphthalene	U	2800	mg/kg	0.10		< 0.10	< 0.10		0.55	< 0.10	
Acenaphthylene	N	2800	mg/kg	0.10		< 0.10	< 0.10		0.46	< 0.10	
Acenaphthene	U	2800	mg/kg	0.10		< 0.10	< 0.10		1.2	< 0.10	
Fluorene	U	2800	mg/kg	0.10		< 0.10	< 0.10		1.1	< 0.10	
Phenanthrene	U	2800	mg/kg	0.10		< 0.10	< 0.10		3.9	0.28	
Anthracene	U	2800	mg/kg	0.10		< 0.10	< 0.10		0.92	< 0.10	
Fluoranthene	U	2800	mg/kg	0.10		< 0.10	< 0.10		4.5	0.51	
Pyrene	U	2800	mg/kg	0.10		< 0.10	< 0.10		3.9	0.60	
Benzo[a]anthracene	U	2800	mg/kg	0.10		< 0.10	< 0.10		2.0	< 0.10	
Chrysene	U	2800	mg/kg	0.10		< 0.10	< 0.10		2.2	< 0.10	
Benzo[b]fluoranthene	U	2800	mg/kg	0.10		< 0.10	< 0.10		3.0	< 0.10	
Benzo[k]fluoranthene	U	2800	mg/kg	0.10		< 0.10	< 0.10		1.0	< 0.10	
Benzo[a]pyrene	U	2800	mg/kg	0.10		< 0.10	< 0.10		2.2	< 0.10	
Indeno(1,2,3-c,d)Pyrene	U	2800	mg/kg	0.10		< 0.10	< 0.10		1.0	< 0.10	
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10	< 0.10	
Benzo[g,h,i]perylene	U	2800	mg/kg	0.10		< 0.10	< 0.10		1.1	< 0.10	
Coronene	N	2800	mg/kg	0.10		< 0.10	< 0.10		< 0.10	< 0.10	
Total Of 17 PAH's	N	2800	mg/kg	2.0		< 2.0	< 2.0		29	< 2.0	
PCB 28	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 52	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 90+101	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 118	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 153	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 138	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
PCB 180	U	2815	mg/kg	0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010	[A] < 0.010	
Total PCBs (7 Congeners)	N	2815	mg/kg	0.10		[A] < 0.10	[A] < 0.10		[A] < 0.10	[A] < 0.10	
Total Phenols	U	2920	mg/kg	0.30		< 0.30	< 0.30		< 0.30	< 0.30	

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Results - Single Stage WAC

Project: 21490 Kilbogget Park, Cabinteely

Chemtest Job No:	19-03882				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	766414						
Sample Ref:							
Sample ID:							
Sample Location:	TP1						
Top Depth(m):	0.50						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 3.0	3	5	6
Loss On Ignition	2610	U	%	31	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] 110	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.11	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0032	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0052	0.052	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.11	1.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	35	350	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.2	72	500	800	1000

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

Waste Acceptance Criteria

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

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Results - Single Stage WAC

Project: 21490 Kilbogget Park, Cabinteely

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-03882						
Chemtest Sample ID:	766415						
Sample Ref:							
Sample ID:							
Sample Location:	TP2						
Top Depth(m):	1.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 2.9	3	5	6
Loss On Ignition	2610	U	%	2.5	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.018	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0012	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	< 0.0010	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	38	380	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	6.5	65	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

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

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Results - Single Stage WAC

Project: 21490 Kilbogget Park, Cabinteely

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-03882						
Chemtest Sample ID:	766417						
Sample Ref:							
Sample ID:							
Sample Location:	TP3						
Top Depth(m):	2.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.52	3	5	6
Loss On Ignition	2610	U	%	2.9	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] 93	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	29	100	--	--
pH	2010	U		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.022	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0037	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0020	< 0.050	0.5	10	30
Nickel	1450	U	0.0012	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.2	12	800	15000	25000
Fluoride	1220	U	0.10	1.0	10	150	500
Sulphate	1220	U	3.2	32	1000	20000	50000
Total Dissolved Solids	1020	N	58	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.4	74	500	800	1000

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

Waste Acceptance Criteria

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

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Results - Single Stage WAC

Project: 21490 Kilbogget Park, Cabinteely

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	19-03882						
Chemtest Sample ID:	766418						
Sample Ref:							
Sample ID:							
Sample Location:	TP4						
Top Depth(m):	1.00						
Bottom Depth(m):							
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	U	%	[A] 0.79	3	5	6
Loss On Ignition	2610	U	%	6.9	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	U	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	U	mg/kg	[A] 310	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	U		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.040	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0038	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0051	0.051	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	1.1	11	800	15000	25000
Fluoride	1220	U	0.10	1.0	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	42	420	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.1	71	500	800	1000

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

Waste Acceptance Criteria

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

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Deviations

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

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
766414			TP1		A	Amber Glass 250ml
766414			TP1		A	Amber Glass 60ml
766415			TP2		A	Amber Glass 250ml
766415			TP2		A	Amber Glass 60ml
766416			TP2		A	Amber Glass 250ml
766417			TP3		A	Amber Glass 250ml
766417			TP3		A	Amber Glass 60ml
766418			TP4		A	Amber Glass 250ml
766418			TP4		A	Amber Glass 60ml
766419			TP4		A	Amber Glass 250ml

Test Methods

SOP	Title	Parameters included	Method summary
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection

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Test Methods

SOP	Title	Parameters included	Method summary
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

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Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

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

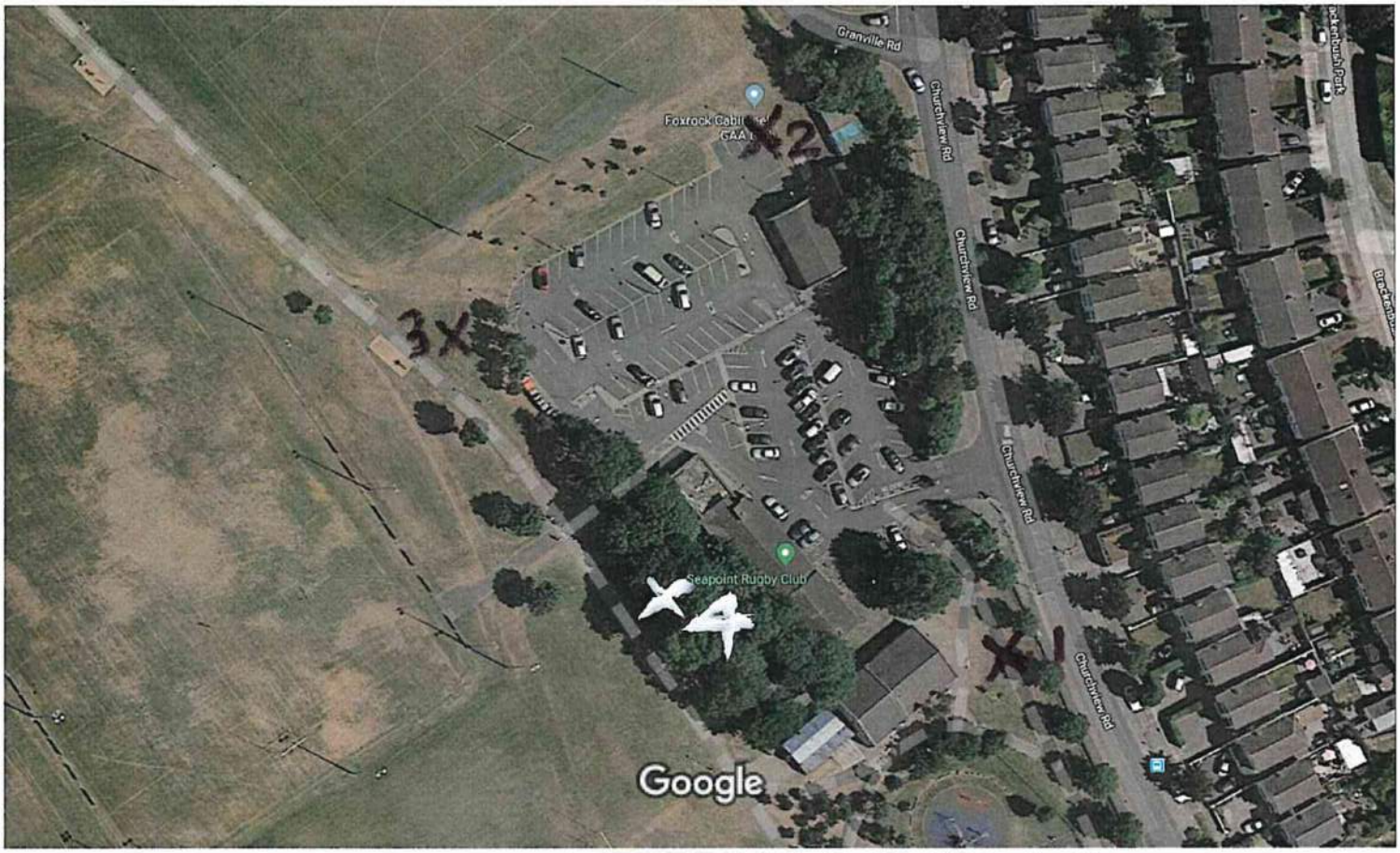
Sample Retention and Disposal

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

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

Appendix VII Site Plan

Google Maps Kilbogget Park



Imagery ©2019 DigitalGlobe, Map data ©2019 Google 20 m

Kilbogget Park

Dublin

4.1 ★★★★ · 14 reviews

Terrain

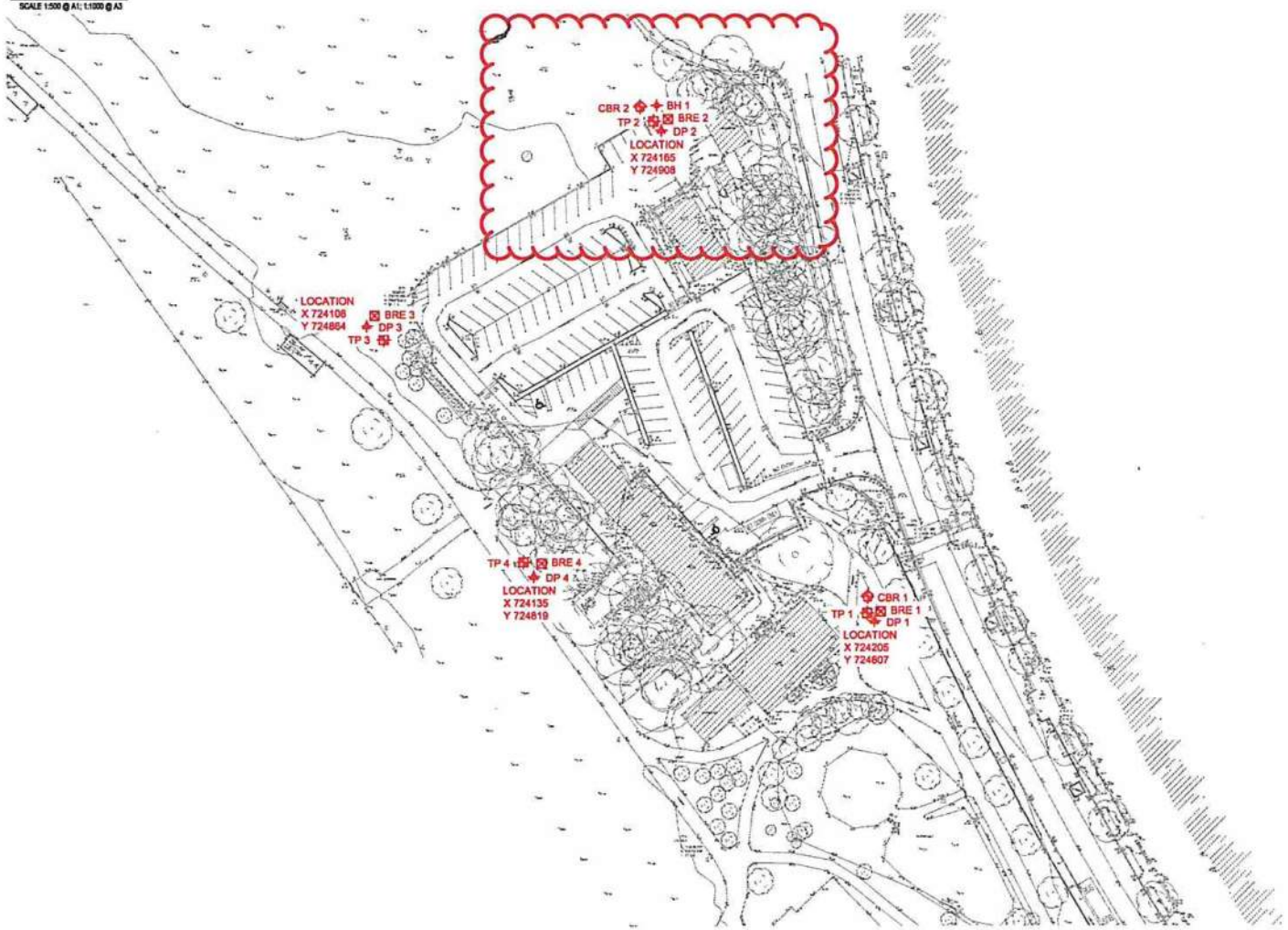
Dublin

Photos

DO NOT SCALE CONTRACTOR TO CHECK ALL DIMENSIONS AND REPORT ANY ERRORS OR OMISSIONS

N

0 5 10 15 20 25 m
SCALE 1:500 @ A1; 1:1000 @ A3



LEGEND:

- TRIAL PIT
- DYNAMIC PROBE
- BOREHOLE
- PLATE BEARING TEST / CBR TEST
- BRE-365 INFILTRATION TEST

NOTES:

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SITE INVESTIGATION SPECIFICATION AND RELEVANT TOPOGRAPHICAL AND GPR SURVEY DRAWINGS
- CONTRACTOR IS TO REFER TO THE SITE INVESTIGATION STAGE PRELIMINARY HEALTH & SAFETY PLAN / DESIGN RISK ASSESSMENTS

Rev.	Note	Date	Drawn	Check
A	ISSUED FOR INFORMATION	07.12.2016	AL	AL

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS
UNIT 5C
LLM HOUSE
NAAS
CO. KILDARE

Client:	DUN LAOGHAIRE RATHDOWN Co. Co.
Architect:	-
Project:	KILBOGGET PARK, CABINTEELY
Drawing Title:	SITE INVESTIGATION

Drawn By:	Checked By:	Approved By:	Date:	Scale:	Sheet Size:
AL	DOB	DOB	10.06.16	1:500	A1

Project Number:	Drawing Number:	Revision Number:
DOBA1682	SK-001	A

Appendix C – Surface Water Calculations

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Project *Kilbogget Park Sports Pavillion*
Project No. *DOBA 2536*
Title: *Qbar Blue Roof*
Calcs By *SP* Date: 17.11.2025

PRELIMINARY SURFACE WATER STORAGE ESTIMATE (LONG TERM STORAGE PROV)

Catchment Characteristics

Greenfield Runoff Flows (Sites < 50 Ha)

denotes Input Value

Standard Average Annual Rainfal (SAAR) =						818	mm
Soil Index =						0.335	
Total Site Area =						0.0290	Hectares (ha)
Storm Return Period =						30	Years
Permissible Outflow per hectare, QBAR =						2.8	l/s/ha
*** Total Permissible Outflow=**						0.08	l/s
Proposed Impermeable Area:							
	Hardstanding					0.0000	ha
	Roofs					0.0355	ha
	Proposed Open Space						ha

Soil Classification for Runoff Potential
Based on FSR Maps

Soil 1	0	%
Soil 2	50	%
Soil 3	50	%
Soil 4	0	%
Soil 5	0	%

Infiltration

.....@	80	% Impermeable
.....@	95	% Impermeable
.....@	33.5	% Impermeable

Rainfall Intensity from Met Eireann
1 hectare = 10,000m²

0.080575619

return period	*grow curve factor*
1	0.85
10	1.7
30	2.1
100	2.6
200	2.9

Duration (min)	Rainfall 1/30 (mm)	Intensity (mm/hr)	Factored Intensity *** (mm/hr)	Factored Rainfall *** (mm)	Rainfall (m^3/ha)	Volume (m^3)	Permissable Outflow (m^3)	Storage Required (m^3)
5	9.9	118.8	142.6	11.9	118.8	4	0	4
10	13.8	82.8	99.4	16.6	165.6	6	0	6
15	16.2	64.8	77.8	19.4	194.4	7	0	7
30	20.3	40.6	48.7	24.4	243.6	8	0	8
60	25.5	25.5	30.6	30.6	306.0	10	0	10
120	31.9	16.0	19.1	38.3	382.8	13	0	13
180	36.4	12.1	14.6	43.7	436.8	15	0	15
240	39.9	10.0	12.0	47.9	478.8	16	0	16
360	45.5	7.6	9.1	54.6	546.0	18	0	18
540	51.9	5.8	6.9	62.3	622.8	21	0	21
720	57.0	4.8	5.7	68.4	684.0	23	0	23
1080	65.0	3.6	4.3	78.0	780.0	26	0	26
1440	71.4	3.0	3.6	85.7	856.8	29	0	29
2880	81.1	1.7	2.0	97.3	973.2	33	0	33
4320	89.5	1.2	1.5	107.4	1074.0	36	0	36

Value of storage required = 36 m^3 h 1.5 area 24.15 L1 20.00 L2

Notes

*Total Permissible Outflow calculated in accordance with GDSDS - Regional Drainage Policies (Volume 2 - Chapter 6)

**Permissable Outflow per Hectare multiplied by growth factors

i.e. $QBAR(m^3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$

SOIL : Soil Index Values in range 0.15-0.5 of Catchment values Available from the FSR. The Index derived from:

$$\frac{(0.15Soil\ 1+\ 0.30Soil\ 2\ +\ 0.40Soil\ 3+\ 0.45Soil\ 4+\ 0.50Soil\ 5)}{(Soil\ 1+\ Soil\ 2+\ Soil\ 3+\ Soil\ 4+Soil\ 5)}$$

*** Rainfall Intensity increased by 20% to comply with global warming effects as described in the GDSDS - Regional Drainage Policies (Volume 2 - Section 6.3.2.4 - Table 6.2)

Oversized Pipe Requirements for On-line Storage

Pipe dia. (mm)	Length (m)
2100	10
1500	20
1200	32
1050	42
900	57

DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS

Project *Kilbogget Park Sports Pavillion*
Project No. *DOBA 2536*
Title: *Qbar Pitch*
Calcs By *SP* Date: 17.11.2025

PRELIMINARY SURFACE WATER STORAGE ESTIMATE (LONG TERM STORAGE PROV)

Catchment Characteristics

Greenfield Runoff Flows (Sites < 50 Ha)

denotes Input Value

Standard Average Annual Rainfal (SAAR) =						818	mm
Soil Index =						0.335	
Total Site Area =						0.1930	Hectares (ha)
Storm Return Period =						30	Years
Permissible Outflow per hectare, QBAR =						2.8	l/s/ha
*** Total Permissible Outflow=**						0.54	l/s
Proposed Impermeable Area:							
	Hardstanding					0.1930	ha
	Roofs					0.0000	ha
	Proposed Open Space						ha

Soil Classification for Runoff Potential
Based on FSR Maps

Soil 1	0	%
Soil 2	50	%
Soil 3	50	%
Soil 4	0	%
Soil 5	0	%

Infiltration

.....@	80	% Impermeable
.....@	95	% Impermeable
.....@	33.5	% Impermeable

Rainfall Intensity from Met Eireann
1 hectare = 10,000m²

return period	*grow curve factor*
1	0.85
10	1.7
30	2.1
100	2.6
200	2.9

Duration (min)	Rainfall 1/30 (mm)	Intensity (mm/hr)	Factored Intensity *** (mm/hr)	Factored Rainfall *** (mm)	Rainfall (m^3/ha)	Volume (m^3)	Permissable Outflow (m^3)	Storage Required (m^3)
5	9.9	118.8	142.6	11.9	118.8	18	0	18
10	13.8	82.8	99.4	16.6	165.6	26	0	26
15	16.2	64.8	77.8	19.4	194.4	30	0	30
30	20.3	40.6	48.7	24.4	243.6	38	0	38
60	25.5	25.5	30.6	30.6	306.0	47	0	47
120	31.9	16.0	19.1	38.3	382.8	59	0	59
180	36.4	12.1	14.6	43.7	436.8	67	0	67
240	39.9	10.0	12.0	47.9	478.8	74	0	74
360	45.5	7.6	9.1	54.6	546.0	84	0	84
540	51.9	5.8	6.9	62.3	622.8	96	0	96
720	57.0	4.8	5.7	68.4	684.0	106	0	106
1080	65.0	3.6	4.3	78.0	780.0	120	0	120
1440	71.4	3.0	3.6	85.7	856.8	132	0	132
2880	81.1	1.7	2.0	97.3	973.2	150	0	150
4320	89.5	1.2	1.5	107.4	1074.0	166	0	166

Value of storage required = 166 m^3 h 1.5 area 110.55 L1 20.00 L2

Notes

*Total Permissible Outflow calculated in accordance with GDSDS - Regional Drainage Policies (Volume 2 - Chapter 6)

**Permissable Outflow per Hectare multiplied by growth factors

i.e. $QBAR(m^3/s)=0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$

SOIL : Soil Index Values in range 0.15-0.5 of Catchment values Available from the FSR. The Index derived from:

$$\frac{(0.15Soil\ 1+\ 0.30Soil\ 2\ +\ 0.40Soil\ 3+\ 0.45Soil\ 4+\ 0.50Soil\ 5)}{(Soil\ 1+\ Soil\ 2+\ Soil\ 3+\ Soil\ 4+Soil\ 5)}$$

*** Rainfall Intensity increased by 20% to comply with global warming effects as described in the GDSDS - Regional Drainage Policies (Volume 2 - Section 6.3.2.4 - Table 6.2)

Oversized Pipe Requirements for On-line Storage

Pipe dia. (mm)	Length (m)
2100	48
1500	94
1200	147
1050	192
900	261